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Global Financial Crisis: Implications for Trade and Industrial Restructuring in India

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Global Financial Crisis: Implications for Trade and Industrial Restructuring in India^

Prabir De*
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Abstract: This paper investigates the impact of global crisis shocks on India's trade and industry. The estimated results show that changes in trade composition are positively associated with changes in manufacturing composition in India, controlling for other variables. While analysing its dynamic effects, compositional change in industry has responded significantly to the export to USA, Japan and EU in the crisis period. However, there is no strong indication to conclude that Indian industry has been severely affected by the fall in demand in crisis-affected advanced economies such as US, EU and Japan, holding other things constant.

Key words: Global crisis, trade, industrial composition, trade openness, India

JEL codes: F02, F13, F17, F42, F47, L6, L7

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1. Introduction

The world has been witnessing a financial and economic crisis following the sub-prime mortgage in the United States (Nanto, 2009; Bosworth and Flaaen, 2009). While exact reasons are yet to be known at a fundamental level, the crisis could be ascribed to many factors including gross financial irregularities, excessive risk taking, large and persistence global imbalance, which, in turn, is the outcome of long periods of excessively loose monetary policy in the major advanced economies during the early part of last decade. The crisis threatens to undo the economic development achieved by many countries and to erode people's faith in an open international trading system (Lamy, 2009).[1] This is the first global recession of the new era of globalization (Stiglitz, 2008).

Over the past decades of globalization, India had grown rapidly till the financial crisis appeared in mid-2007. This acceleration of growth, in which international trade has played an important role, has helped Indian economy make impressive strides in economic development. The globalization process has resulted in an increase in international trade in goods and services in India. Indian economy has become part of growing international production networks through exchange of goods, services and capital. Eventually, India is more integrated with the world economy than it was in 1980s or early 1990s. Today India accounts for over 3 per cent of world trade in goods and services, about 2.8 per cent of world GDP, and 21 per cent of world population, respectively.[2]

In supply-constrained economies, promoting exports has always been a challenge particularly at a time when trade has been severely affected by lack of external demand. Developing Asia will continue to suffer from demand decline in OECD countries, with the China and India being the most impacted (Jongwanich *et al.*, 2009). Though South and Southeast Asia face reduced exports to the OECD countries, its exports are reduced significantly to other Asian exporters, demonstrating the indirect trade linkages that now exist in the global economy. The fall in import demand in advanced economies has led to corresponding fall in exports of India in the crisis period. The short term implications of this declining trend on developing countries like India may presumably cause havoc. At the same time, the export slowdown surely has some long term implications on trade and industrial development in India.

The broad objectives of this study are to understand India's emerging trade and industrial development scenario in view of the change in international demand from advanced economies, and the remedies in order to strengthen and enhance the trade and industry in India. The intention is to provide lessons for Indian economy regarding trade and industrial policy responses and implications for regional cooperation.

The rest of the paper is organized as follows. Section 2 discusses some stylized facts of global crisis with reference to India and South Asia. When a country trades in differentiated goods, its production sector will have cyclical links with the trade sector. We, therefore, measure the compositional change in industry and trade at the product level in pre- and post- crisis period in Section 3. We then try to assess the impact of global crisis shocks on industry and trade in Section 4. Finally, Section 5 draws conclusions and policy implications.

2. Global Financial and Economic Crisis and South Asia: Stylized Facts

Sub-prime mortgage market crisis originated in US in summer 2007 has devastating effect on US and EU's financial system through bursting of housing bubble, bankruptcies and credit crisis. A set of recent literature suggests that this crisis is an outbreak of gross financial irregularities, excessive risk taking, large global imbalance and loose monetary policies in US, among others.[3] It has caused a worldwide economic recession primarily through three channels: (i) collapse of exports; (ii) reversal of capital flows, and (iii) weakening of market confidence. Table 1 provides the major findings some of the studies and reports on global crisis. Some common features of crisis impacts on Asia observed in thses studies are as follows: (i) countries faced deceleration in growth with some variations; (ii) exports and imports declined sharply across the region, and domestic demand softened; (iii) trade protection (especially non-tariff barriers) increased, (iv) sharp rise in unemployment, and (v) anti-globalization sentiment has grown up, and, therefore, doubting the sustainability of export-led growth strategies pursued by the Asian countries. At the same time, a great deal of uncertainly has also started appearing about the global recovery prospects.[4]

The global crisis has affected the developing economies like India through financial and trade channels since they are more integrated with global market in the present era, compared to a decade and a half ago. The present crisis is, however, having major repercussions on Indian economy differently from the one witnessed during 1997 Asian financial crisis. With the increasing integration of the Indian economy and its financial markets with rest of the world, there is recognition that the country did face some downside risks from global financial and economic crisis. Moreover, the crisis appeared in India at a time when the region was suffering from a huge loss of income from a severe terms-of-trade shock owing to the surge in global commodity prices during 2003 to the middle of 2008. The magnitude of its impact on India was felt to be large, and it had potential to weaken the subregional economies through trade and financial channels.[5] India indeed faced deceleration in growth.[6]

Table 1: Crisis Impact - Stylized Observations

Fundamentals	Pattern	Studies
Growth	Decelerated	IMF (2009), ADB (2009)
Trade	Decelerated	WTO (2009), ESCAP (2009), ITC (2009)
Trade price	Fallen	WTO (2009)
Trade protection	Increased	WTO (2009)
Remittances	Declined	World Bank (2009)
FDI and equity investment	Slowed down	World Bank (2009), UNCTAD (2009)
Commercial lending	Slowed down	ODI (2009)
Domestic production	Slowed down – sectors (e.g. T&C)	ADB (2009), ADBI (2009)
Unemployment	Increased	ILO (2009)

Source: Compiled by authors.

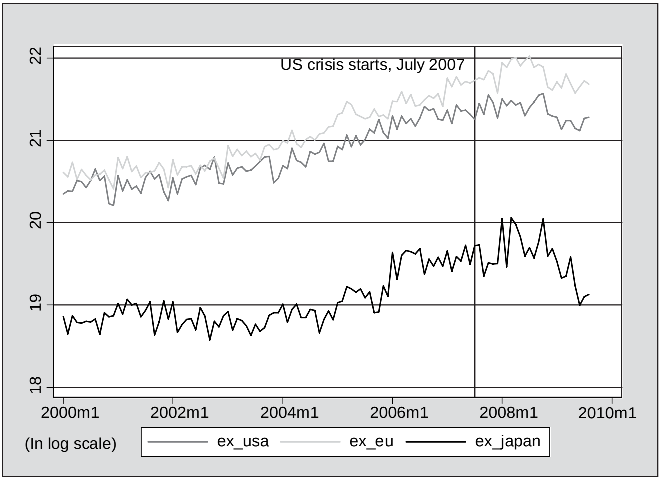
Table 2: Merchandise Exports to Advanced Economies

Country	1981	1991	2001	2002	2003	2004	2005	2006	2007	2008	2009
(% of country's total exports)											
Afghanistan	13.87	88.08	26.31	29.31	56.94	33.14	40.82	34.51	30.15	36.22	31.88
Bangladesh	44.56	79.27	77.38	76.76	77.77	80.29	77.17	78.37	76.55	74.98	75.25
India	46.26	66.16	63.12	60.43	58.12	56.24	56.57	55.32	53.15	50.17	46.31
Nepal	29.75	90.81	49.98	37.87	42.12	35.26	27.80	27.45	23.34	20.52	27.04
Pakistan	40.92	68.42	65.80	64.97	63.23	64.24	59.62	53.19	49.62	47.03	44.85
Sri Lanka	44.58	70.61	79.12	78.25	73.43	73.98	70.66	71.26	69.99	67.17	67.77

Source: IMF (2010).

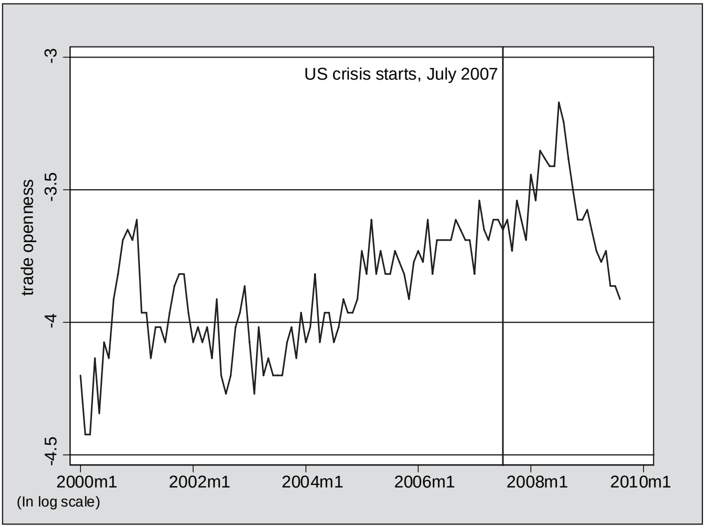
The most obvious areas of impact have been exports, which declined in India.[7] India depends on advanced economics since 2/4th of their global exports are directed to them (Table 2). For example, India's exports to EU, Japan and US decreased sharply (Figure 1(a)), resulting in sharp fall in trade openness (Figure 1(b)). At the same time, there was sharp fall in bank lending rate in India (Figure 2(a)), weakening dollar (Figure 2(b)), rise in inflation (Figure 2(c)), and steady fall in business confidence index (Figure 2(d). The overall economic situation

Figure 1(a): India's Month-wise Exports to EU, Japan and US



Note: EU represents 27 members of European Union.
Source: IMF (2009).

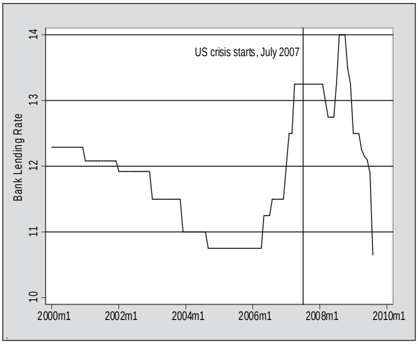
Figure 1(b): India's Month-wise Trade Openness*



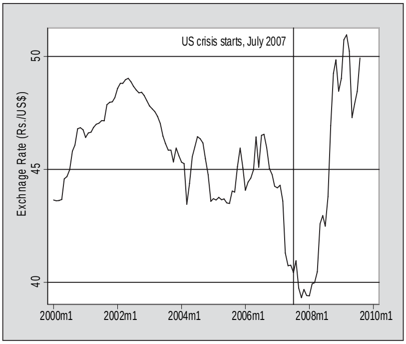
Note: *Trade as percentage of GDP
Source: IMF (2009)

Figure 2: Monthly Series of Selected Crisis Impact Indicators

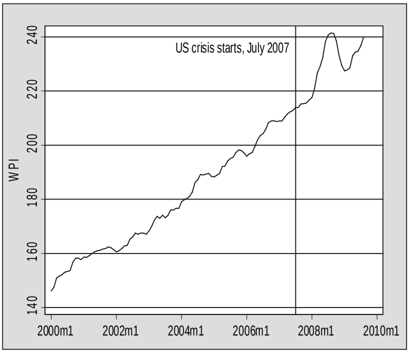
(a) Bank Lending Rate (%)



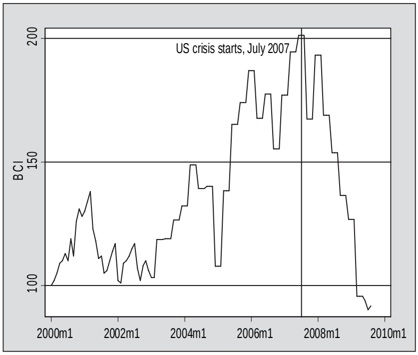
(b) Exchange Rate (Rs. per US$)



(c) Inflation



(d) Business Confidence Index*



Note: *Dan and Bradstreet index.
Source: Drawn based on CEIC Database.

in India thus remained serious. The demand from advanced economies for Indian exports decelerated, thereby posing threat to India's production, be it manufacturing or services. This sensitivity has been heightened by the export-led growth strategies followed by many countries including India. Critiques argue that Asia will lose its global economic strength considerably if it fails to enhance its exports and rebalance its growth strategy in medium to long run (ADB, 2009).

3. Compositional Change in Exports and Manufacturing Goods Production

Our objective is to find out the effect of change in trade on the industry at the product level. Our argument is when a country trades in differentiated goods, its production sector will have cyclical links with the trade sector. To a great extent, the product composition in production sector will necessarily be guided by the change in composition in traded goods. Therefore, we first measure a composition change index (CCI) for trade and industry. The index takes following shape:

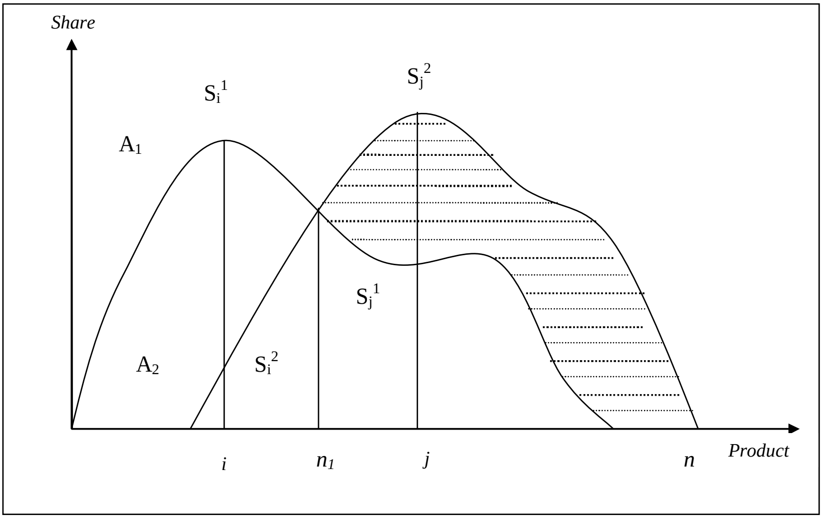
$$DS^{i}{}_{t,t+1} = \left(\frac{x^{i}_{t+1}}{\sum_{i=1}^{n} X^{i}_{t+1}} \right) - \left(\frac{x^{i}_{t}}{\sum_{i=1}^{n} X^{i}_{t}} \right) \qquad (1)$$

$$CCI_{t,t+1} = \sum DS^{i}_{t,t+1}, \text{ if } DS^{i}_{t,t+1} > 0 \qquad (2)$$

where DS stands for difference in shares, *i* is country, *t* is time, *x* is product.[8] Change in the share of each product is then calculated and we measure the change in the total shares of the products. Since the total of the shares is always equal to one, the sum of the change in shares will be always equal to zero. The composition change index varies from zero to one. If there is no change in the share of items then the index will be zero, and if a set of completely new items are produced or traded then the index will be one. We, therefore, take only the sum of the shares gained during the period as a product composition change and defined as composition change index (CCI).

CCI can be better explained from Figure 3. We spread products along the horizontal axis, assuming, for simplicity, that these products are continuous. The products manufactured in period 1, together with their respective shares, are depicted by contour A_1. Since the shares of all products sum to one, the area under A_1 is unity. Similarly, products manufactured in period 2 are depicted by contour A_2. For the i-th product, its share decreases from period 1 (S_i^1) to period 2 (S_i^2). For the j-th product, its share increases from period 1 (S_j^1) to period 2 (S_j^2). Our index measures total shares gained by products such as the j-th, or the area below the period 2 contour and above the period 1 contour, shaded in the figure. In Figure 3, for instance, the total number of products in the two periods is n, and the number of products that increased their shares is $(n-n_1)$; hence the product change index is $(n - n_1)/n$. Therefore, CCI may be a dynamic analysis in the sense that one can select any two periods with a finite gap and calculate the changes in shares. The selection of commodity groups in this paper has been done by looking at the trends in US import demand before and after the crisis, and the corresponding distribution of export goods in selected South Asian countries.

Figure 3: Measuring Changes in Product Composition



Source: Adapted from Chen and Ku (1998).

The composition change index (CCI) for trade and industry has been calculated following equations 1 and 2 for India based on monthly data from January 2007 to May 2009 for manufacturing goods and January 2007 to February 2009 for export goods. CCI scores for India's exports along with commodities with positive change are reported in Table 3, whereas the same for manufacturing is reported in Table 4. Following observations are worth noting.

First, variations in CCI scores in India's exports (Table 3) suggest shifting of products across periods is very frequent. A comparison between two relatively longer time points is likely to have higher CCI score, in case shifting is pervasive. This has been witnessed for the period January 2007 to January 2009 (0.168). During July 2008 to February 2009, CCI score decreased to 0.122 suggesting switching of products over 10 percent of export revenue came from new products or uneven expansion of old products, whereas the same contributed over 15 per cent of export revenue during January 2008 to January 2009 and January 2007 to January 2009.

Table 3: Changes in Export Composition in India

Period (Y to Y)	CCI	Products with Positive Changes
January 2007- January 2008	0.065	• Leather and Products • Jute and Products • Chemical and Products • Drugs, Pharmaceuticals and Fine Chemicals • Food and Beverages • Electronic Goods • Metals and Products • Machinery and Equipment • Cosmetics, Toiletries • Paper, Wood Products
January 2008- January 2009	0.147	• Readymade Garments • Electronic Goods • Transport Equipment • Marine Products • Cosmetics, Toiletries
January 2007- January 2009	0.168	• Leather • Jute and Products • Drugs, Pharmaceuticals and Fine Chemicals • Food and Beverages • Electronic Goods • Transport Equipment • Machinery and Equipment • Cosmetics, Toiletries
January 2007- February 2009	0.111	• Readymade Garments • Drugs, Pharmaceuticals and Fine Chemicals • Food and Beverages • Electronic Goods • Transport Equipment • Machinery and Equipment • Cosmetics, Toiletries
July 2008- February 2009	0.122	• Readymade Garments • Gems and Jewellery • Drugs, Pharmaceuticals and Fine Chemicals • Food and Beverages • Transport Equipment • Marine Products

Table 4: Changes in Manufacturing Composition in India

Period (Y to Y)	CCI	Products with Positive Changes
January 2007-January 2008	0.031	• Food Products • Beverages, Tobacco and Related Products • Jute and Other Vegetable Fibre Textiles (ex. cotton) • Leather and Fur Products • Basic Chemicals & Chemical Products • Metal Products and Parts (ex. Machinery and Equipment)
January 2008-January 2009	0.037	• Beverages, Tobacco and Related Products • Wool, Silk and Man Made Fibres Textiles • Basic Chemicals & Chemical Products • Machinery and Equipment (ex. Transport Equipment)
July 2007-July 2008	0.032	• Beverages, Tobacco and Related Products • Textile Products, Including Wearing Apparel • Basic Metal and Alloy Industries • Metal Products and Parts (ex. Machinery and Equipment) • Machinery and Equipment ex. Transport Equipment) • Transport Equipment and Parts
January 2007-May 2009	0.062	• Beverages, Tobacco and Related Products • Jute and Other Vegetable Fibre Textiles (ex. cotton) • Textile Products, Including Wearing Apparel • Wood and Wood Products; Furniture and Fixtures • Leather and Fur Products • Basic Chemicals & Chemical Products • Machinery and Equipment (ex. Transport Equipment)
July 2008-May 2009	0.030	• Wool, Silk and Man Made Fibres Textiles • Wood and Wood Products; Furniture and Fixtures • Leather and Fur Products • Rubber, Petroleum, Plastic and Coal Products • Machinery and Equipment (ex. Transport Equipment)
July 2008-February 2009	0.044	• Food Products • Beverages, Tobacco and Related Products • Wool, Silk and Man Made Fibres Textiles • Rubber, Petroleum, Plastic and Coal Products • Machinery and Equipment ex Transport Equipment

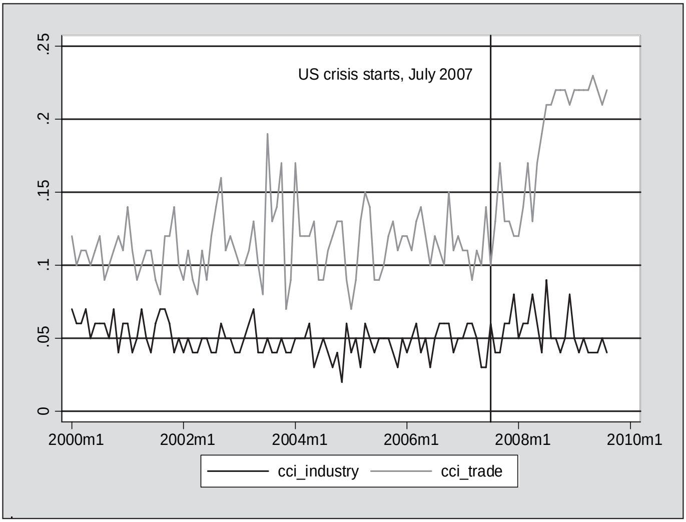
Second, expansions of existing products or creation of new products over the last two years in Indian exports have been noticed in readymade garments, leather and products, machinery and equipment, electronic goods, drugs, pharmaceuticals and fine chemicals, food and beverages, transport equipment, and cosmetics and toiletries. However, there has been a small compositional change during the ongoing crisis period (July 2008 onwards) in readymade garments; gems and jewellery; drugs, pharmaceuticals and fine chemicals; food and beverages; transport equipment; and marine products, whereas rest other exports witness either zero or negative change.

Third, CCI scores in Table 4 suggest that product shifting was relatively stronger during the period January 2007 to May 2009 (0.062), compared to other periods considered in this study. The usual caveat is that the estimated higher score of CCI is associated with longer period observations. The lower magnitude of CCI across different comparable periods in manufacturing also confirms that shifting of products is not very rapid in case of domestic manufacturing. It also suggests compositional change has always been less than 5 per cent in manufacturing sector in India. The positive compositional change witnessed in products like food and beverages, fibres textile, rubber, petroleum, plastic and coal products; leather and products, and machinery and equipment.

Fourth, there has not been big compositional change in manufactures in the past months (post-July 2008) that matches India's exports, except food and beverages. The compositional change in products in exports was seemingly different than the same observed in case of manufacturers during July 2008 to February 2009.

Fifth, the CCI scores also indicate that exports of manufacturing goods underwent relatively more changes in product composition than those in production of manufacturing sector. Given advantage of depreciating currency, this is not surprising because incentives are relatively higher in trade sector, ceteris paribus, than manufacturing, particularly in the short run. More sweeping changes take place in export sector than manufacturing. Month-wise aggregate CCI for manufacturing also confirms this (Figure 4). Therefore, export sector generates major compulsion for adjustment and restructuring. Bigger the export sector, larger is the restructuring need.

Figure 4: Month-wise Trends in CCI (Industry) and CCI (Trade)



Sixth, changes in relative prices for traded goods, in addition to changes in costs of production and transportation, lead to restructuring in product composition – serving domestic or external demand. Part of the change in product mix may be a natural response to change in relative prices without "reorganization" of the production structure or "retooling" of the production technology or reducing transportation costs. Hence, our index needs to be interpreted as a broad measure of restructuring in response to both price signals and cost factors.

Finally, the aforesaid analysis indirectly indicates that more attrition and dismantling of product lines took place among export goods. As trade is usually accompanied by product relocation (from import competing to export sector), new product will replace outgoing ones or existing products will expand to fill the space left by relocation. This relocation and adjustment will also have both economic and social costs, if not maneuvered properly.

4. Impact of Global Crisis Shocks on Industry and Trade

Sharp deceleration in global trade is a development in the world economy in the crisis period, which is posing a great challenge to us. The question is: how would an economy, specially a developing country like India, adjust to the new economic circumstances in the face of global crisis? We approach to this question in following two ways.

First, we take the help of a panel data modeling (PDM) in order to understand the impact of trade and other exogenous variables on India's industrial composition.

Second, we use the Vector Autoregression (VAR) technique to find the impact of the global crisis shocks on industrial composition and trade openness.

While the first model provides generalized impact of trade and other exogenous variables on industrial composition with special reference to ongoing crisis, the second model provides us how crisis hocks have transmitted from one entity (advanced economies) to another (Indian economy). The latter model is more appealing because it captures the shocks in a dynamic framework.

Panel Data Model (PDM)

To assess the trade impact on country's industrial composition, we use following PDM:

$$y_{it} = \alpha_1 + \beta_1 x_{it} + \beta_2 X'_{it} + \beta_3 CD + \varepsilon_{it} \qquad (3)$$

where y_{it} and x_{it} are the compositional change index (CCI) in industry and trade of country *i* for time *t* respectively, which we get from equations 1 and 2. *X* is a vector of additional regressors to control country's overall trade, FDI, exchange rate, etc. CD is considered as time dummy for crisis periods (1= in recession, 0 otherwise). To understand the impact of contraction in trade with advanced economies (US, Japan and EU) on compositional change in Indian industry, we then use advanced economy interactive term in equation (3). The final estimable equation then becomes:

$$y_{it} = \alpha_1 + \beta_1 x_{it} + \beta_2 X'_{it} + \beta_3 CD + \beta_4 (x_{ti} * CD) + \beta_5 Ex^j_{it} + \beta_6 (CD * Ex^j_{it}) + \varepsilon_{it} \qquad (4)$$

where (x_{it}*CD) represents an interactive term between CCI of trade and CD, which aims to capture the impact of compositional change in exports in recession period on industry, Ex_{it}^{j} is country *i*'s export to advanced economy *j* in period *t*, and the interactive term ($CD*Ex_{it}^{j}$) represents country's *i*'s export to advanced economy *j* in period *t*.

We use the equation 4 in a panel (unbalanced) data of 115 continuous months starting from January 2000 to August 2009. Appendix 1 provides the data sources. All the continuous variables are taken in log, thus estimated parameters show elasticity. We have estimated five different equations with different sets of independent variables. The results are presented in Table 5. Following findings are worth considering.

One, change in trade composition is positively associated with change in manufacturing composition in all the equations, controlling for other variables, but estimated coefficients are not statistically significant. To a smaller extent it may be said that there is a positive tendency of co-movement of compositional changes in export and industry.

Two, the estimated coefficients of CCI in exports in the crisis period (cci_ex*cd) show that falling export is likely to affect the compositional change in industrial sector negatively, but again estimated coefficients are not statistically significant. This directly suggests that if crisis continues, industrial restructuring in the medium to long run would perhaps be needed to support the economy. Thus, there is no strong indication to confirm that India's industrial sector has been affected by the ongoing global crisis, but its mild effect cannot be refuted.

Three, while compositional change in industry in India has been positively affected by India's exports to EU and Japan, its estimated parameter has appeared with negative sign in case of US. This may be due to that fact US is India's principal export market which is severely affected by the global crisis, or may be for some others reasons (e.g. distance) which the models fail to capture, or may be larger distance makes it more expensive to export so fall of demand impact has become stronger.

Table 5: PDM Regression Results

Dependent variable = Compositional change in industry

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Compositional change	0.046	0.0188	0.0781	0.0455	0.0222
in export (cci_ex)	(0.105)	(0.109)	(0.114)	(0.119)	(0.127)
Trade openness (to)	0.205	0.207	0.224	0.207	0.233
	(0.165)	(0.166)	(0.168)	(0.159)	(0.166)
Exchange rate (er)	-1.057**	-0.892	-0.616	-0.451	-0.605
	(0.469)	(0.549)	(0.634)	(0.684)	(0.717)
Bank lending rate (br)	0.562	0.323	0.411	0.117	0.219
	(0.427)	(0.605)	(0.596)	(0.62)	(0.64)
Foreign direct	0.0263	0.0239	0.0266	0.0161	0.0137
investment (fdi)	(0.0218)	(0.0226)	(0.0225)	(0.0248)	(0.0293)
Business confidence	-0.218	-0.137	-0.246	-0.303	-0.323
index (bci)	(0.16)	(0.188)	(0.201)	(0.216)	(0.222)
Inflation (wpi)	-0.579**	-0.805*	-0.565	-1.522*	-1.777**
	(0.25)	(0.444)	(0.479)	(0.897)	(0.891)
Crisis dummy (cd)		0.116	0.421	0.354	0.848
		(0.177)	(0.344)	(0.354)	(0.619)
Compositional change			-2.179	-1.362	-1.03
in export in crisis period			(2.003)	(2.113)	(1.98)
(cci_ex*cd)					
Export to US (ex_us)				-0.0308	-0.0228
				(0.053)	(0.0652)
Export to EU (ex_eu)				0.0181	0.0356
				(0.087)	(0.082)
Export to Japan (ex_japan)				0.0133	0.0113
				(0.033)	(0.0367)
Export to US in crisis					-0.442
period (ex_us*cd)					(0.718)
Export to EU in crisis					0.873
period (ex_eu*cd)					(0.251)
Export to Japan in crisis					0.029
period (ex_japan*cd)					(0.432)
Constant	4.093	4.809	2.976	8.025	9.793*
	(3.754)	(4.064)	(4.49)	(5.163)	(5.433)
Observations	115	115	115	115	115
R-sq.	0.1721	0.1781	0.1862	0.2147	0.2431
Wald chi2	26.17	26.95	29.48	31.32	32.82
(p-value)	(0.0005)	(0.0007)	(0.0005)	(0.0002)	(0.0002)
Method	RE (GLS)	RE (GLS)	RE (GLS)	RE (GLS)	RE (GLS)

Notes: Robust standard errors are in parenthesis;***, **, * significant at 1%, 5%, and 10% level. RE (GLS) stands for Random Effect (Generalized Least Squares). Selection of RE is based on Hausman test.

Four, compared to US, India's exports to Japan and EU have been less affected. However, none of the advanced economy interactive term has appeared significant. In other words, there is no strong indication to say that Indian industry has severely affected by the fall in demand in crisis-affected advanced economies like US, EU and Japan, given other things constant.

Five, control variables like FDI, trade openness, business confidence index, inflation, exchange rate, and bank lending rate have appeared with correct signs but statistically insignificant except inflation. Perhaps, price rise has negatively affected industrial composition. However, the estimated models explain only 17 to 24 per cent variations in observations. Although the regression models do not suffer much from multicollinearity (Appendix 2), omitted variable bias and endogeneity among the variables would be some reasons for getting relatively poor fits. We cannot also refute the presence of unit root and cointegration in the models.

Finally, since there may be lag(s) between changes in composition in export and industry, we, therefore, consider Vector Autoregression (VAR) to find out the effect of the global crisis shocks on India's industrial compositional change and the trade openness. The overriding objective is thus to examine the dynamic effects of global crisis shocks on Indian industry and trade.

Vector Autoregression (VAR)

VAR is a standard statistical procedure to investigate how shocks are transmitted from one entity (for example, advanced economies like USA) to another (for example, India). Using this model, we examine separately the impact of a shock that originates in US, EU and Japan on Indian industrial composition and trade openness.

It is observed in PDM that Indian industry and trade were not heavily affected by the financial crisis originated in US, EU and Japan. However, we would like to find out the effect of this shock on India's compositional change in industry (CCI industry) and trade openness (trade-GDP ratio) separately in a dynamic framework using VAR technique. Also, we examine the effect of crisis of these three countries measured in terms of their respective trade (India's import from and export to the respective countries) and GDP of the respective countries on the trade openness (trade-GDP ratio) of India.

In the present analysis we have taken the month-wise data on CCI (industry), export to and import from USA, Japan and EU, GDP of the respective countries and India's trade-GDP ratio. The time period chosen for the analysis is from January 2000 to August 2009. The total period is divided into two regimes, (i) a pre-crisis period starting from January 2000 to June 2007, and (ii) a crisis period starting from July 2007 to August 2009. First, using the VAR impulse responses function the extent of the effect of any perturbation in the innovation or shock of any of the variables on the current and future values of the endogenous variables are measured. We then try to measure the extent to which the total variance of respective shocks of India's exports to and imports from the aforesaid economies on changes of Indian industrial composition.

VAR is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables.[9] The VAR approach sidesteps the need for structural modelling by modelling every endogenous variable in the system as a function of the lagged values of all of the endogenous variables in the system. The functional form of a VAR is as follows:

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + Bx_t + \varepsilon_t \qquad (5)$$

where y_t is a k vector of endogenous variables, x_t is a d vector of exogenous variables, $A_1 .... A_p$ and B are matrices of coefficients to be estimated, and ε_t is stochastic error terms, called a vector of innovations (or impulses, or shocks) that may be contemporaneously correlated with each other but are uncorrelated with their own lagged values and uncorrelated with all of the right-hand side variables.

Since only lagged values of the endogenous variables appear on the right-hand side of each equation, there is no issue of simultaneity, and OLS is the appropriate estimation technique. Note that the assumption that the disturbances are not serially correlated is not restrictive because any serial correlation could be absorbed by adding more lagged *y*'s.

An impulse response function (IRF) traces the effect of one standard deviation shock to one of the innovations on current and future values of the endogenous variables, i.e., a perturbation in one innovation in the VAR set up a chain reaction over time in all variables in the VAR. Now to estimate the extent of the effect of perturbation on the endogenous variables a standard method is to set one standard deviation innovation in one of the variables calculated from the variance-covariance matrix. A shock to the i-th variable directly affects the i-th variable, and is also transmitted to all of the endogenous variables through the dynamic structure of the VAR. A change in one variable will immediately change the value of current values of other variables. It will also change all future values of all the variables considered in the model since lagged variables appear in all the equations. If the innovations are uncorrelated, interpretation of the impulse response is straightforward. The impulse response functions for measures the effect of a one standard deviation shock on current and future values of the concerned variables. The innovations are, however, usually correlated so that they have a common component that cannot be associated with a specific variable. A somewhat arbitrary but common method of dealing with this issue is to attribute all of the effect of any common component to the variable that comes first in the VAR system.

Before going to analysis the VAR analysis we have checked the stationarity of the concerned variables using Augmented Dickey-Fuller (ADF) test (see Appendix 3). In the first model we have taken the variables CCI (industry) and exports to USA, Japan and EU as endogenous variables. The values of test statistics of ADF test indicate that export figures are non-stationary at level but stationary at first difference. Thus, we have taken the first difference values of these variables in our analysis. In the second model, we have taken the variables CCI (industry) and imports from USA, Japan and EU as endogenous variables. Similar to export values the import series are also stationary at first difference. However, the series of CCI (industry) becomes stationary at level. We have thus taken the difference figures of exports and imports and the original series of CCI (industry) in our analysis. It is to be mentioned here that the values of exports and imports are taken in nominal price. Since it would be difficult to find out suitable price index to deflate the figures we did not convert the figures in real terms. Also, since the values are taken as first difference the effect of price changes will be dampened and should not affect the analysis in a significant way. Analyses are done for (i) pre-crisis, (ii) post-crisis and (iii) the total periods. Appendix 4 presents the estimated VAR results. Following results are worth noting.

First, CCI (industry) has responded significantly to the export to USA, Japan and EU during the crisis period. Figure 5 depicts the response of CCI (industry) in India to one standard deviation shock to CCI (industry), export to USA, Japan and EU. It has been observed that during the pre-crisis period the CCI (industry) did not respond significantly to a shock in USA export, Japan export and EU export. However, during the crisis period CCI (industry) has responded significantly to the export to USA, Japan and EU. But, the respond of CCI (industry) to export to Japan and EU are less, compared to export to USA, and the response to its own shock has declined significantly during the crisis period.

Second, variance decomposition of CCI (industry) in Figure 6 reveals that during the pre-crisis period almost 100 per cent of the variation in CCI (industry) depends on its own variation, while in the crisis period about 20 per cent of the variation in CCI (industry) depends on the exports to EU, Japan and US. Thus, effect of shocks of India’s exports to advanced economies during the crisis period has been transmitted to Indian industry.

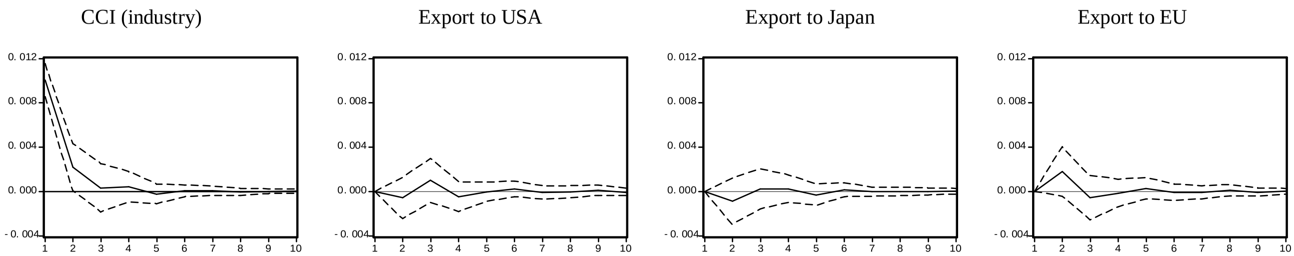
Third, financial crisis has no substantial effect on Indian industry for the total period - January 2000 to August 2009. Figure 7 shows the responsiveness of CCI (industry) to all these variables during the total period. It is observed that the response of CCI (industry) due to one standard deviation shock is very similar to the pre-crisis period. This similarity may be due to the higher weight of the pre-crisis period in the total period of study.

Fourth, Indian industry has not responded significantly to the shocks of imports from USA, Japan and EU, while the response to its own shocks is significant during both pre- and post- crisis periods. Figures 8 to 10 capture the estimated impulse response of CCI (industry) to its own shocks and import shocks. It is observed in Figure 8 that CCI (industry) has not responded significantly to the shocks of import from USA, Japan and EU, while the response to its own shocks is significant during both pre- and post- crisis periods. Figure 9 describes the variance of CCI (industry) that can be explained by a shock in import to USA, Japan and EU and by its own shock. The shocks in import to USA, Japan and EU had very little influence on the variance of CCI (industry) during pre- and post- crisis periods. Figure 10 provides the picture of impulse response and variance decomposition of CCI (industry) on imports for the total period and shows no significant dependence on the imports from other countries.

Fifth, India's trade openness (trade-GDO) has responded mildly on the shock of export to US. Figures 11 to 19 present the effect of export, import and GDP of each country on the variation of trade openness (trade-GDP ratio) of India pre- and post- crisis, and also total periods. It is observed from Figure 11 that the trade-GDP ratio of India has responded mildly on the one standard deviation shock of export to USA. However, imports from USA and the US GDP have very little effect on variation of trade openness (trade-GDP ratio) of India. Figure 12 of variance decomposition shows that during post-crisis period the variance export to USA, import from USA and US GDP together have explained about 40 per cent of the variation of trade-GDP ratio of India. Figure 13 gives the response of trade-GDP ratio of India on these variables during the total period. Here, the results are very similar to that of pre-crisis period. The effect of variation of export to Japan, import from Japan and Japan GDP on the variation of India's trade-GDP ratio during pre- and post- crisis, and total periods are given in Figures 14 and 15. It is observed that during post-crisis period about 30 per cent of the

Figure 5

Impulse Response of CCI (Industry) (One St. Dev. Shock): Pre-Crisis



Impulse Response of CCI (Industry) (One St. Dev. Shock): Post-Crisis

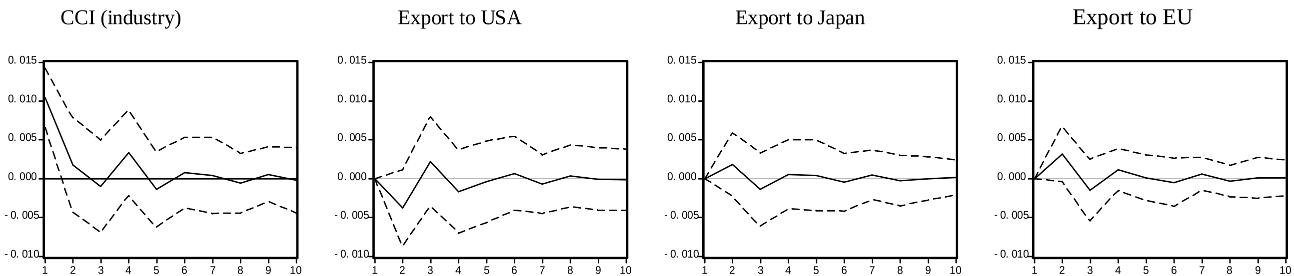
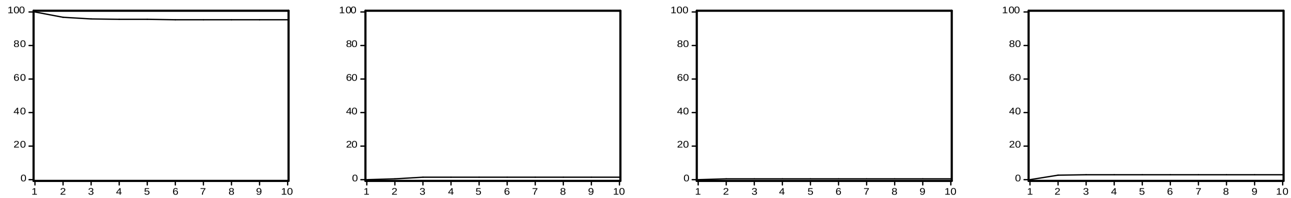


Figure 6

Variance Decomposition

Percent Variance of CCI (Industry) (Pre-Crisis) due to

CCI (industry) | Export to USA | Export to Japan | Export to EU



Percent Variance of CCI (Industry) (Post-Crisis) due to

CCI (industry) | Export to USA | Export to Japan | Export to EU

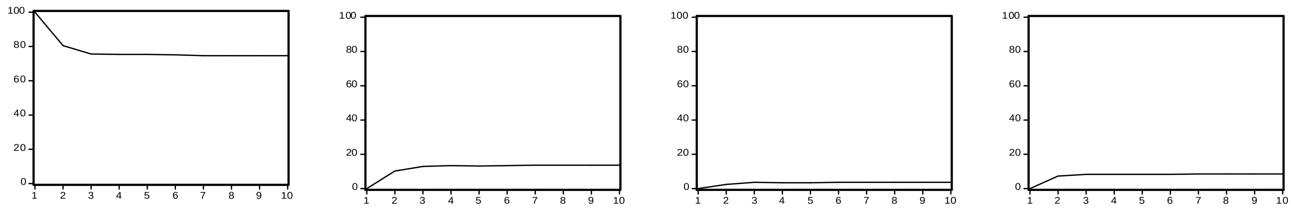
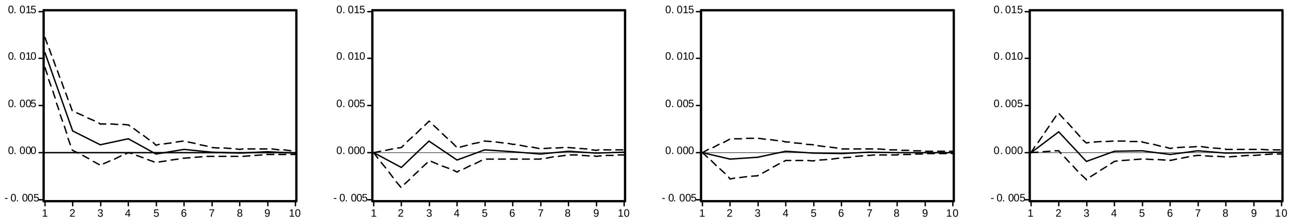


Figure 7

Impulse Response of CCI (Industry) (One St. Dev. Shock): Total Period

CCI (industry) | Export to USA | Export to Japan | Export to EU



Variance Decomposition
Percent Variance of CCI (Industry) (Total Period) due to

CCI (industry) | Export to USA | Export to Japan | Export to EU

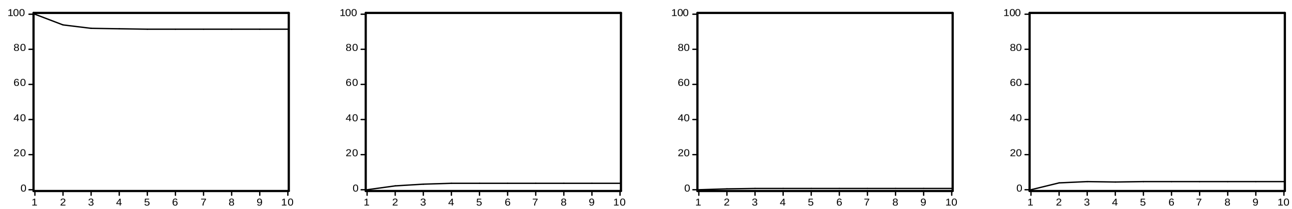
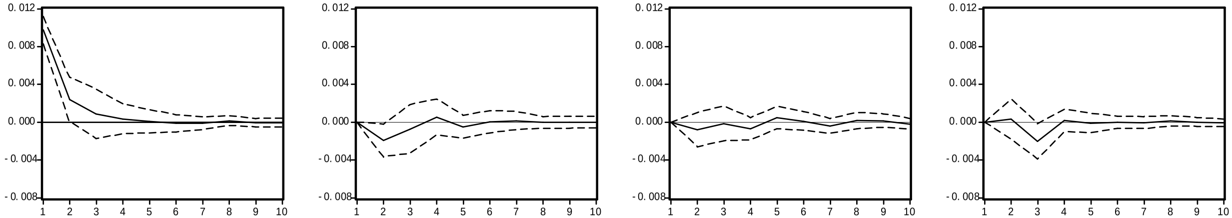


Figure 8

Impulse Response of CCI (Industry) (One St. Dev. Shock): Pre-Crisis

CCI (industry) | Import from USA | Import from Japan | Import from EU



Impulse Response of CCI (Industry) (One St. Dev. Shock): Post-Crisis

CCI (industry) | Import from USA | Import from Japan | Import from EU

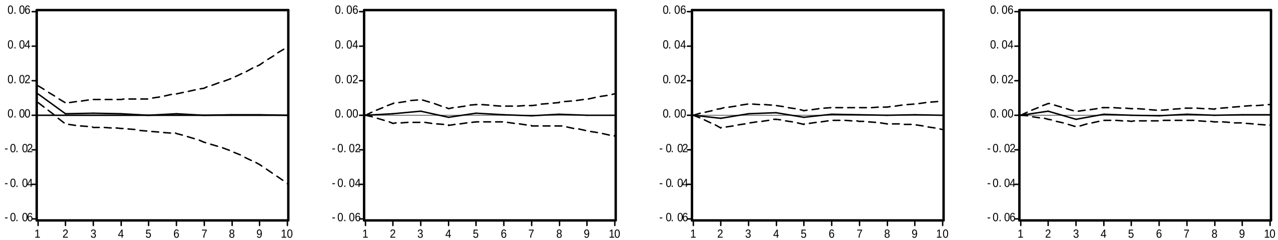
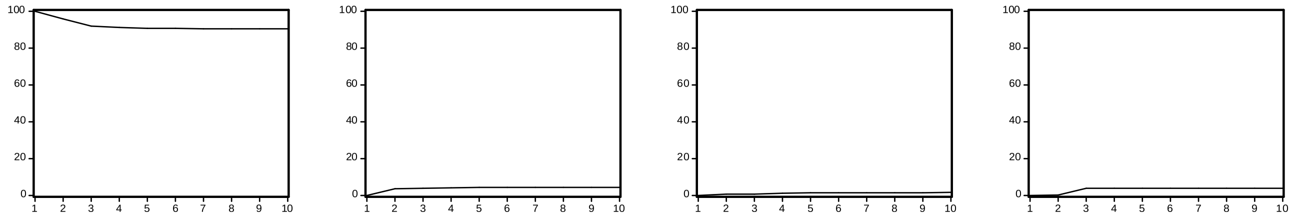


Figure 9

Variance Decomposition

Percent Variance of CCI (Industry) (Pre-Crisis) due to

CCI (industry) | Import from USA | Import from Japan | Import from EU



Percent Variance of CCI (Industry) (Post-Crisis) due to

CCI (industry) | Import from USA | Import from Japan | Import from EU

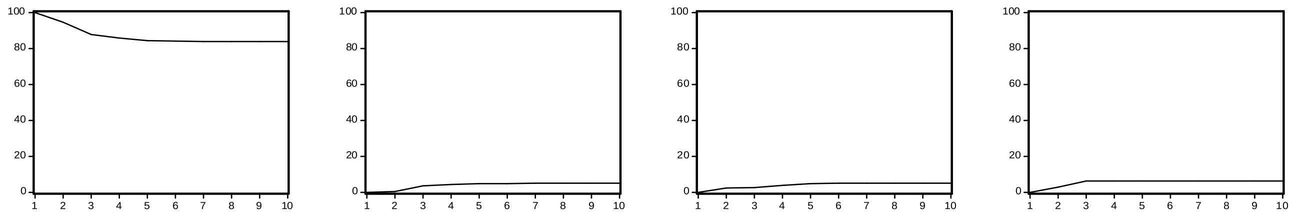
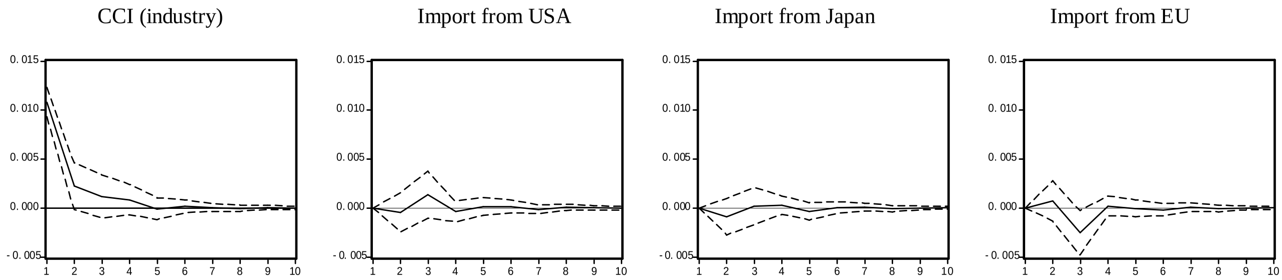


Figure 10

Impulse Response of CCI (Industry) (One St. Dev. Shock): Total Period



Variance Decomposition
Percent Variance of CCI (Industry) (Post-Crisis) due to

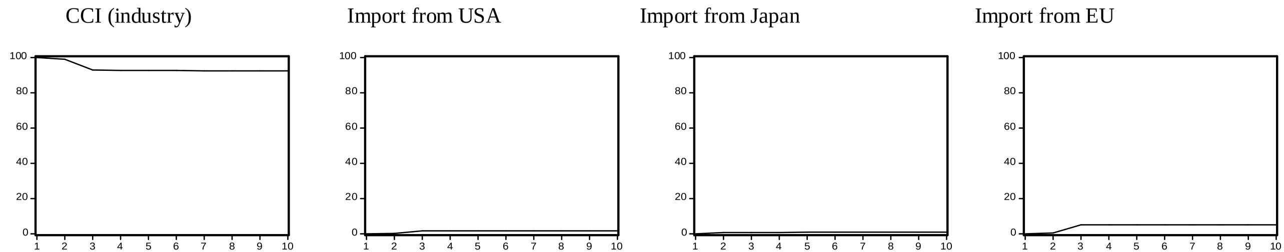
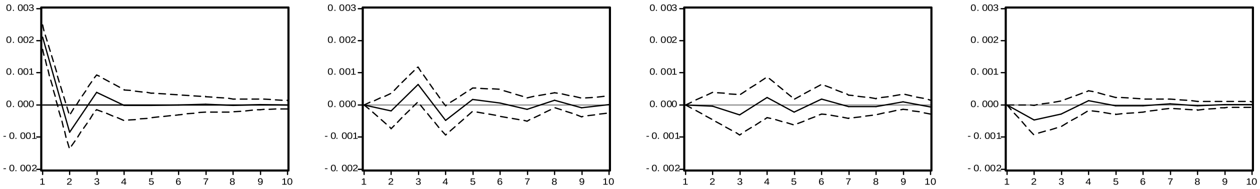


Figure 11

Impulse Response of India’s Trade-GDP Ratio (One St. Dev. Shock): Pre-crisis

Trade-GDP Ratio | Export to USA | Import from USA | USA GDP



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

Trade-GDP Ratio | Export to USA | Import from USA | USA GDP

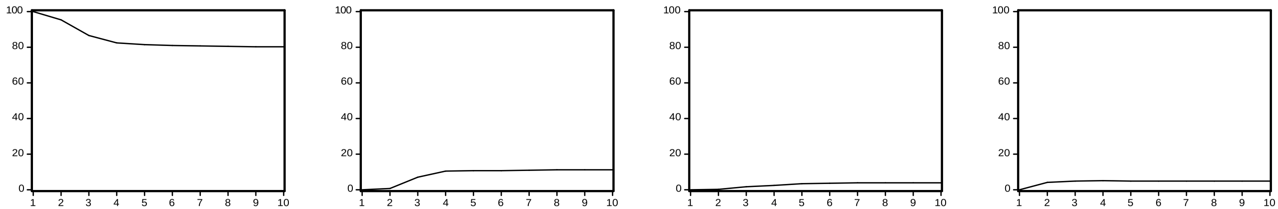
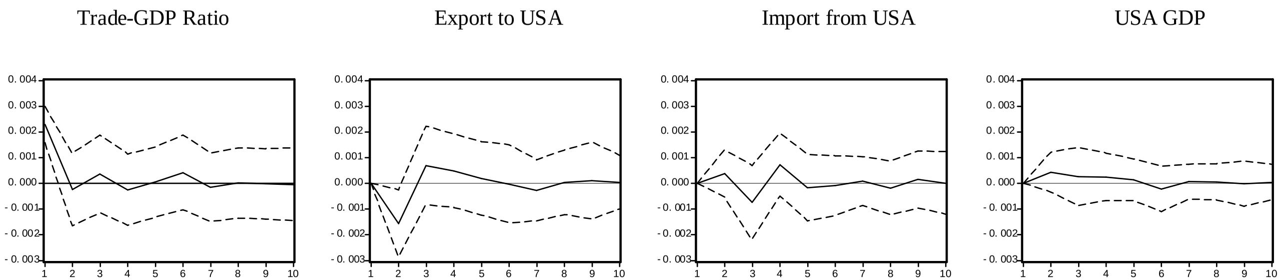


Figure 12

Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Post-Crisis



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Post-Crisis) due to

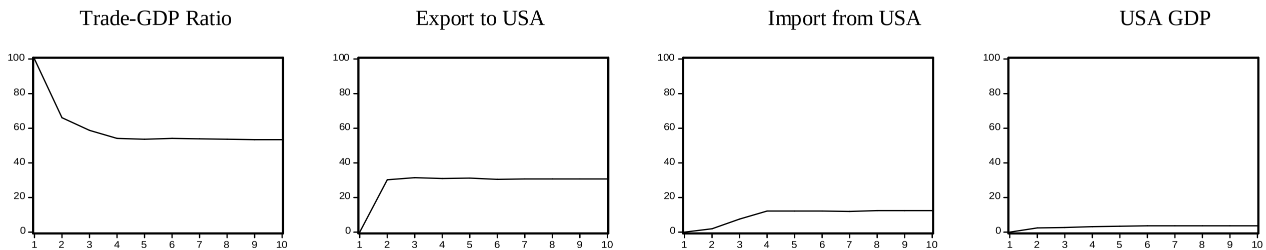
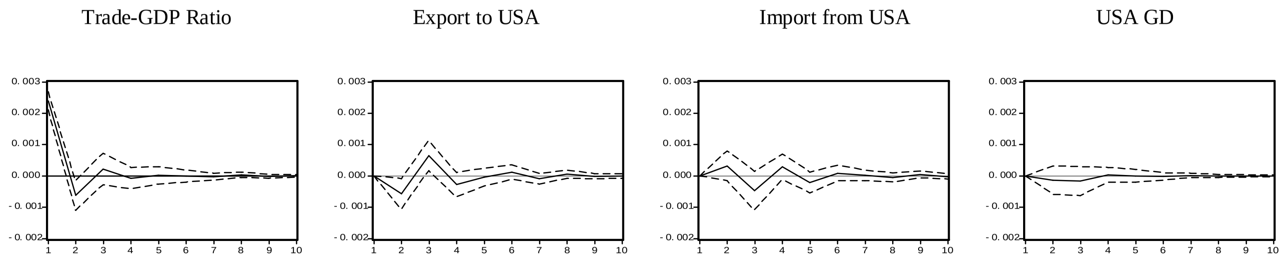


Figure 13

Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Total Period



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Total Period) due to

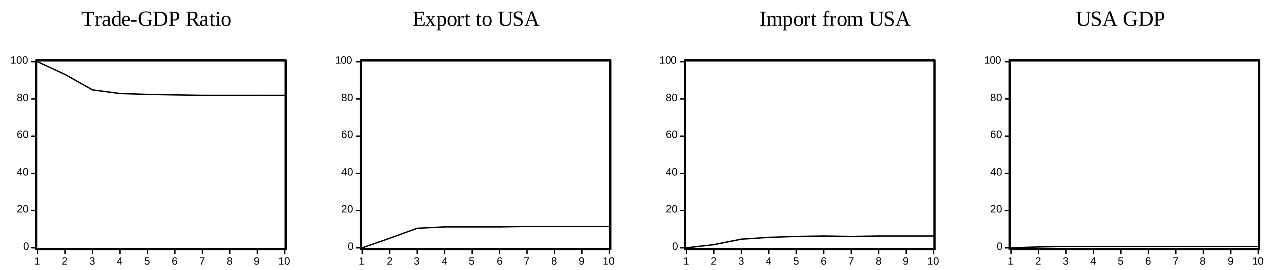
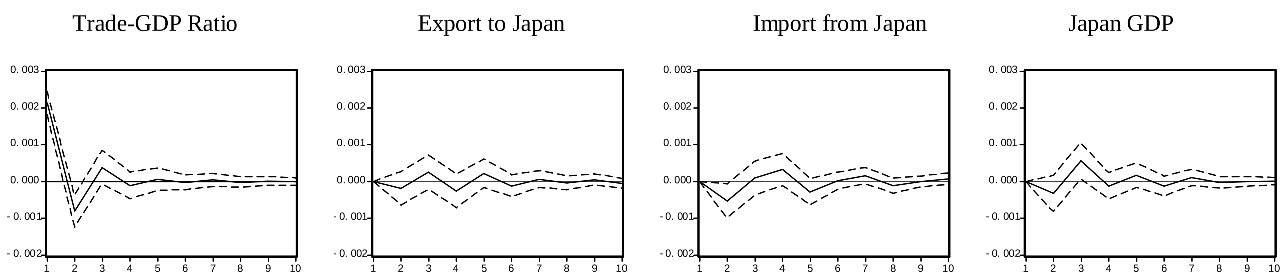


Figure 14

Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Pre-Crisis



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

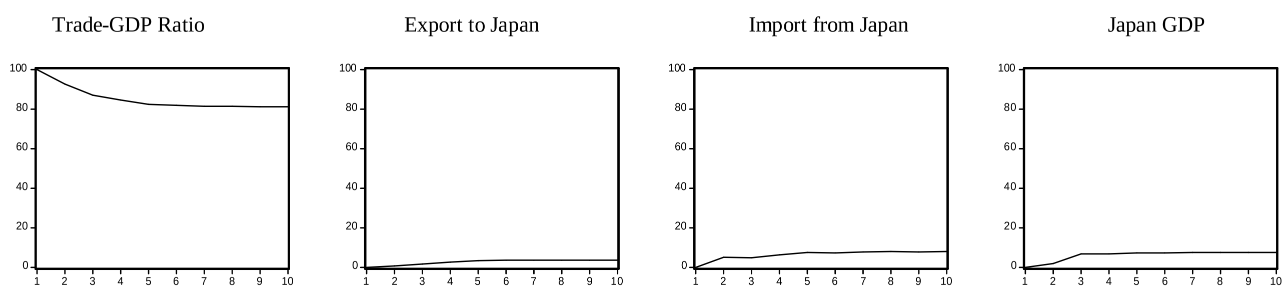
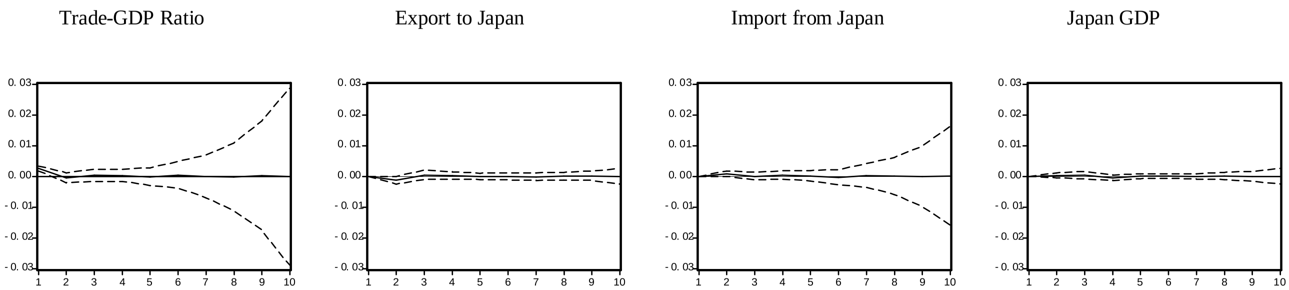


Figure 15

Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Post-crisis



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Post-Crisis) due to

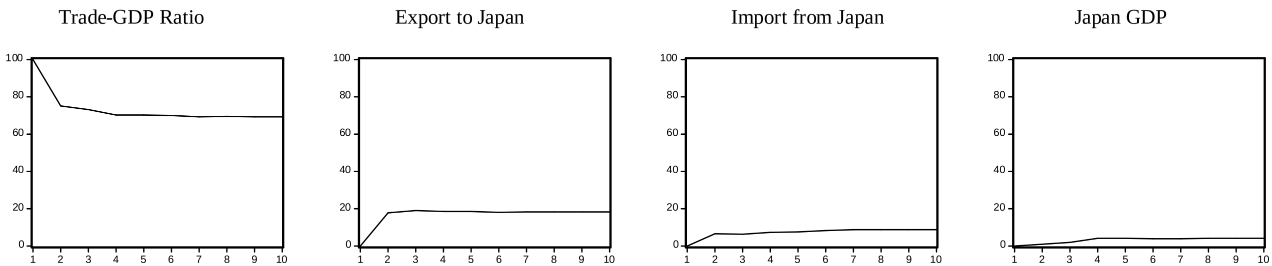
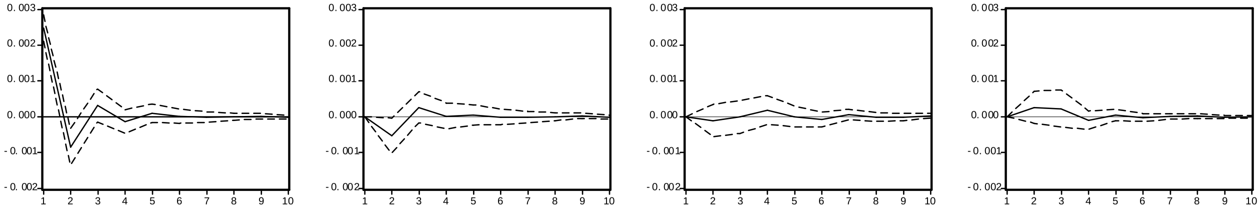


Figure 16

Impulse Response of India’s Trade-GDP Ratio (One St. Dev. Shock): Total Period

Trade-GDP Ratio | Export to Japan | Import from Japan | Japan GDP



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Total Period) due to

Trade-GDP Ratio | Export to Japan | Import from Japan | Japan GDP

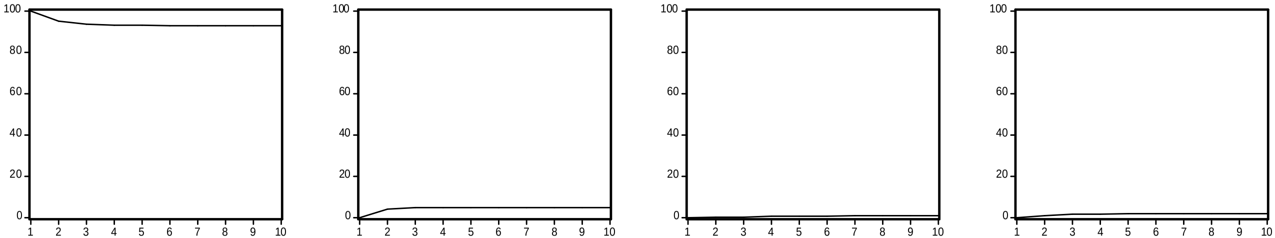
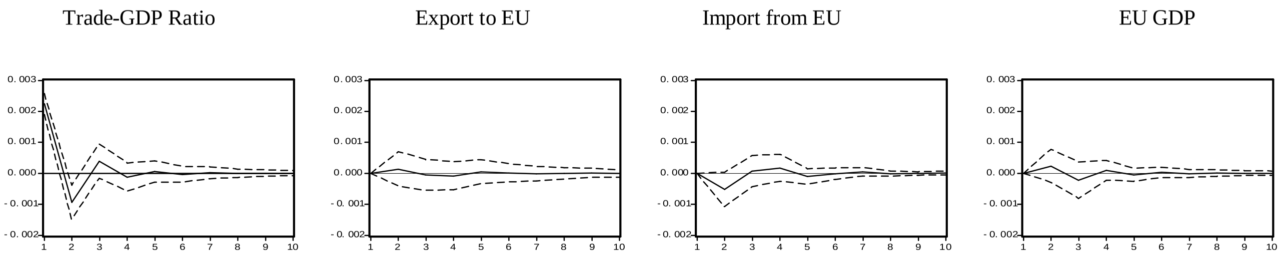


Figure 17

Impulse Response of India’s Trade-GDP Ratio (One St. Dev. Shock): Pre-crisis



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

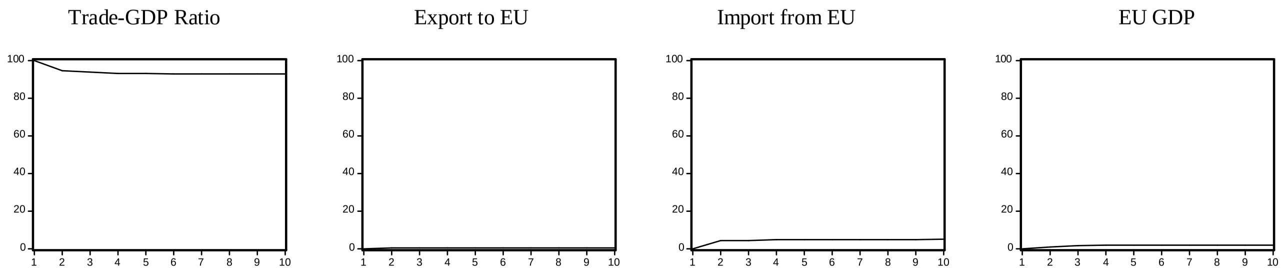
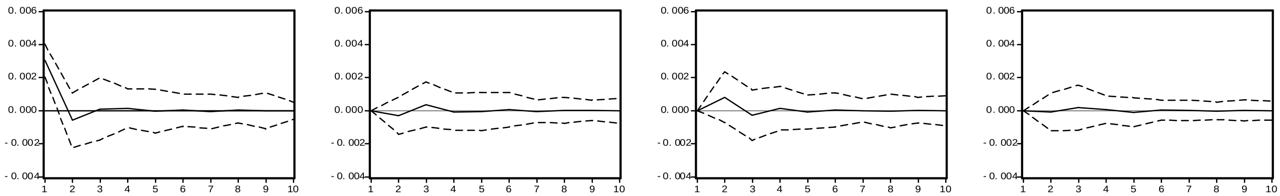


Figure 18

Impulse Response of India’s Trade-GDP Ratio (One St. Dev. Shock): Post-crisis

Trade-GDP Ratio | Export to EU | Import from EU | EU GDP



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Post-Crisis) due to

Trade-GDP Ratio | Export to EU | Import from EU | EU GDP

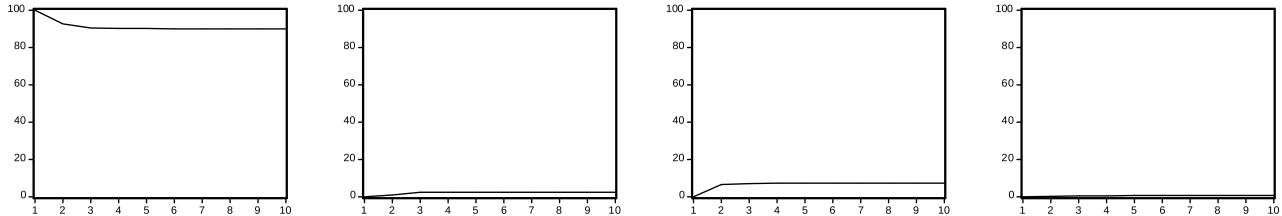
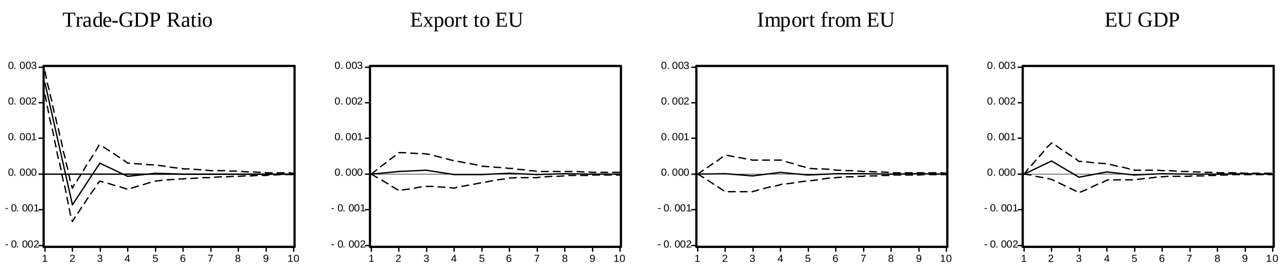
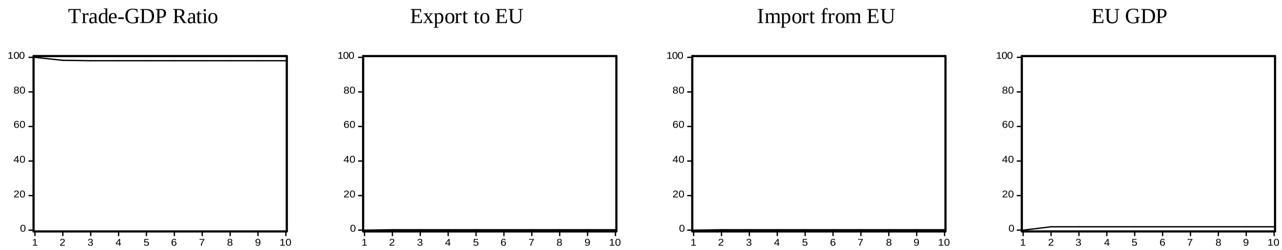


Figure 19

Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Total Period



Variance Decomposition
Percent Variance of Trade-GDP Ratio (Total Period) due to



variation of trade-GDP ratio of India is explained by the variation of export to Japan, while it was less than 20 per cent during the pre-crisis period. On the other hand, if we consider the entire period (Figure 16) the variation in export, import and GDP explain very little the variation of trade-GDP ratio of India. Figures 17, 18 and 19 show the effect of the variation of export to EU, import from EU and GDP of EU on the variation of trade-GDP ratio of India for the two sub-periods and for the entire period. It is found that the variation of these variables have very little or no effect on the trade-GDP ratio of India in both pre- and post- crisis period as well as for the total period as a whole.

To conclude, findings of the VAR analysis clearly demonstrate that India's trade with US coupled with US GDP significantly contribute to the variability of India's trade openness in the crisis period, accounting for 40 per cent of the variation of trade-GDP ratio of India, whereas the same of EU and Japan have either no effect or very insignificant effect on India's trade openness.

5. Conclusions and Policy Implications

Variations in CCI scores in India's exports suggest shifting of products across periods is very frequent. Expansions of exiting products or creation of new products over the last two years in Indian exports have been noticed in readymade garments, leather and products, machinery and equipment, electronic goods, drugs, pharmaceuticals and fine chemicals, food and beverages, transport equipment, and cosmetics and toiletries. However, there has been a small compositional change during the ongoing crisis period in readymade garments; gems and jewellery; drugs, pharmaceuticals and fine chemicals; food and beverages; transport equipment; and marine products, whereas rest other exports witnessed either zero or negative change. The estimates CCI scores indicate that compositional change has always been less than 5 per cent in industrial sector in India. The positive compositional change witnessed in products like food and beverages, fibres textile, rubber, petroleum, plastic and coal products, leather and products, and machinery and equipment. There has not been much compositional change in manufactures in the post-July 2008 months that matches India's exports, except food and beverages.

The CCI scores also indicate that exports of manufacturing goods have underwent relatively more changes in product composition than those in production of manufacturing sector. Given advantage of depreciating currency, this is not surprising because incentives are relatively higher in trade sector, ceteris paribus, than manufacturing, particularly in the short run. More sweeping changes have taken places in export sector than manufacturing. Month-wise aggregate CCI for manufacturing also confirms this. Therefore, export sector generates major compulsions for adjustment and restructuring. Bigger the export sector, larger is the restructuring need.

Changes in relative prices for traded goods, in addition to changes in costs of production and transportation, lead to restructuring in product composition – serving domestic or external demand. Part of the change in product mix may be a natural response to change in relative prices without “reorganization” of the production structure or “retooling” of the production technology or reducing transportation costs. Hence, our index needs to be interpreted as a broad measure of restructuring in response to both price signals and cost factors.

The analysis carried out in this study indirectly indicates that more attrition and dismantling of product lines took place among export goods. As trade is usually accompanied by product relocation (from import competing to export sector), new product will replace outgoing ones or existing products will expand to fill the vacuum left by relocation. This relocation and adjustment will also have both economic and social costs, if not guided properly.

While assessing the impact of global crisis on trade and industry in India, the estimated results of panel data models show that change in trade composition is positively associated with change in manufacturing composition, controlling for other variables, but estimated coefficients are not statistically significant. However, there is a positive tendency of co-movement of compositional changes in export and industry. Although the impact might be mild, falling export is likely to affect the compositional change in industrial sector negatively. Therefore, there is no strong indication to confirm that India’s industrial sector has been affected by the global financial crisis, but its mild effect cannot be refuted. This also directly suggests that if crisis continues, industrial restructuring in the medium to long run would perhaps be needed to support the economy. While compositional change in industry in India has been positively affected by India’s exports to EU and Japan, its estimated parameter has appeared with negative sign in case of US. This may be due to that fact US is India’s principal export market which is severely affected by global crisis, or may be for some other reasons (e.g. distance) which the models fail to capture, or may be larger distance makes it more expensive to export so fall of demand impact has become stronger. Compared to US, India’s exports to Japan and EU have been less affected. There is no strong indication to say that Indian industry has severely affected by the fall in demand in crisis-affected advanced economies like US, EU and Japan, given other things constant. The estimated models also show that price rise has negatively affected industrial composition in India.

Since there may be lag(s) between changes in composition in export and industry, we have, therefore, used VAR technique to find out the effect of the global crisis shocks on India’s industrial compositional change and the trade openness. We found that CCI (industry) has responded significantly to the export to USA, Japan and EU during the crisis period. It has been observed that during the pre-crisis period the CCI (industry) did not respond significantly to a shock in USA export, Japan export and EU export. However, during the crisis period CCI (industry) has responded significantly to the export to USA, Japan and EU. But, the respond of CCI (industry) to export to Japan and EU are less, compared to export to USA, and the response to its own shock has declined significantly during the crisis period. Variance decomposition of CCI (industry) reveals that during the pre-crisis period almost 100 per cent of the variation in CCI (industry) depends on its own variation, while in the crisis period about 20 per cent of the variation in CCI (industry) depends on the exports to EU, Japan and US. Thus, effect of shocks of India’s exports to advanced economies during the crisis period has been transmitted to Indian industrial sector.

Indian industry has not responded significantly to the shocks of imports from USA, Japan and EU, while the response to its own shocks is significant during both pre- and post- crisis periods. CCI (industry) has not responded significantly to the shocks of import from USA, Japan and EU, while the response to its own shocks is significant during both pre- and post- crisis periods. The shocks in import to USA, Japan and EU had very little influence on the variance of CCI (industry) during pre- and post- crisis periods.

Finally, India's trade openness (trade-GDO ratio) has responded mildly on the shock of export to US. However, imports from USA and the US GDP have very little effect on the variation of trade openness (trade-GDP ratio) of India. India's trade with US coupled with US GDP significantly contribute to the variability of India's trade openness in the crisis period, accounting for 40 per cent of the variation of trade-GDP ratio of India, whereas the same of EU and Japan have either no effect or very insignificant effect on India's trade openness.

This study suggests that Indian industry has not been significantly affected by the global financial crisis. Although India continues to enjoy relatively large domestic demand, the compositional change (positive) in manufacturing sector would become less if crisis continues, resulting in slowdown in growth and rise in economic stagnancy. This would also cause huge social problems in India, particularly in those export sectors which are labour-intensive. Therefore, there is a need for industrial restructuring to strengthen India's vast manufacturing and growing trade sector, and also for the greater cause of social protection and for building an effective safety net.

Sustained economic growth can contribute significantly to poverty reduction. Indeed, countries that have enjoyed economic growth for long periods of time have witnessed marked declines in poverty incidence. But an economic crisis of this nature can frustrate such development. The crisis of present nature is, therefore, quite worrisome for those countries which are heavily dependent on earnings from trade sector for their own social sector development programmes. Even though countries can recover quickly from the crisis, they may not return to the same growth path as before the crisis, thus delaying further the development process. This underlines strong policy initiatives for the social sector in the entire region.

The crisis impact on India - a country less dependent on merchandise exports for growth - is far less dramatic. The point is that it is not India's less damaging performance in the export that would count, but the performance of the domestic market and domestic demand. In a supply-constrained economy like India, promoting exports has always been a challenge particularly at a time when trade has been severely affected by lack of external demand. There is no doubt that India has to unfold another set of reforms to enhance its global and regional integration and to strengthen the globalization process. More importantly, export promotion and industrial restructuring need special attention in the post-crisis period. At the same time, this would require in the first instance a sharp shift in other developing countries (read, China) from growth dependent on external markets to growth dependent on domestic consumption. A properly drawn mechanism should then be implemented in India for a return to high growth based on domestic demand, export promotion and industrial restructuring, without spurring inflation.

Endnotes

1 Reported in WTO (2009a) that the collapse in global demand brought on by the biggest economic downturn in decades will drive exports down by roughly 10 per cent in volume terms in 2009, the biggest such contraction since the Second World War.

2 Calculated based on World Development Indicators 2009 (World Bank, 2009a).

3 See, for example, ADB (2009), ADBI (2009), UNESCAP (2009a, 2009b), Adams and Park (2009), and Bosworth and Flaaen (2009), to mention a few.

4 Refer, for example, Sheng (2010), who commented "The general prognosis is that the advanced economies will still have sluggish growth, whereas the emerging markets will see some growth recovery. There is concern whether there will be a double dip in many economies and whether a second round of fiscal stimulus package is necessary. Unemployment level is very high in many countries."

5 For example, USA has been India's major export destination (until the crisis). It accounted for 1/4th of India's total exports in 2007 (IMF, 2009). India's exports to ASEAN and EU were even much less. See, for example, Acharya (2009), and Rakshit (2009).

6 For example, Reserve Bank of India (RBI) in its 2009-10 Annual Policy Statement (APS), released on 21 April 2009, indicated that India's GDP growth in 2008-09 would be in the range of 6.5-6.7 percent, decreased from 7 per cent forecasted in the January 2009 RBI policy review. The same RBI APS also indicated that deceleration of growth would continue in 2009-10 to around 6 percent with the assumption of a normal monsoon in 2009-10. Forecasts by IMF and others organizations on growth of Indian economy in coming years are not different either. See, RBI (2009). The World Bank in its forecast in May 2009 said economic growth

among the developing economies of Asia including those in South Asia would slow in 2009 to less than half its rate in 2007 because of slumping demand in Europe and the USA (World Bank, 2009b). Collectively, the region would grow by 5.2 per cent in 2009, down from 9 per cent last year and 13 per cent in 2007. However, recent statistics shows India along with China and Indonesia have witnessed more than expected growth (as projected by WB and IMF) during 2008 and 2009.

7 See, UNCTAD (2009), De (2009) in case of India, and De and Bhattacharyay (2009) in case of Asia.

8 Refer, for example, Chen and Ku (1998).

9 Pioneered by Sims (1980)

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Appendix 1: Data Sources

Variables (monthly series)	Sources
CCI (Industry), CCI (Trade)	Calculated based on CEIC Database
Exports to US, EU(27) and Japan	CEIC Database
Trade openness (trade-GDP ratio)	Calculated based on CEIC Databse
Foreign direct investment	CEIC Database
Dan and Bradstreet Business confidence index	CEIC Database
Prime lending rate of major banks	CEIC Database
Period average, foreign exchange rate (RBI)	CEIC Database
Inflation rate (Wholesale Price Index)	CEIC Database

Appendix 2: Correlation Matrix

	cci_ind	cci_ex	to	er	br	fdi	bci	wpi
cci_ind	1							
cci_ex	0.0181	1						
to	0.1848*	0.4325*	1					
er	-0.1896*	0.1851*	-0.4054*	1				
br	0.3129*	0.3669*	0.4701*	-0.1975*	1			
fdi	0.2027*	0.4885*	0.5416*	-0.2263*	0.5361*	1		
bci	-0.0084	-0.0914	0.5678*	-0.6925*	0.115	0.1671	1	
wpi	-0.0336	0.6562*	0.75 22*	-0.2616*	0.3132*	0.5710*	0.4861*	1

*Significant at 5% level.

Appendix 3: ADF Results

$$\Delta y_t = a_0 + \beta_1 y_{t-1} + \beta_2 t + \beta_3 \Delta y_{t-1} + \beta_4 \Delta y_{t-2} + \varepsilon$$

Notes: EXUSA, EXJAPAN, EXEU represent exports to USA, Japan and European Union, whereas IMUSA, IMJAPAN, IMEU represent imports from USA, Japan and European Union, respectively. Prefix D indicates difference; whereas Suffix (-1) and (-2) indicates one and two period lag.

(a) Export to US

(i) ADF equation on level

ADF Test Statistic	-2.344304	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXUSA)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXUSA(-1)	-0.194272	0.082870	-2.344304	0.0209
D(EXUSA(-1))	-0.433059	0.108998	-3.973088	0.0001
D(EXUSA(-2))	-0.125938	0.098627	-1.276914	0.2044
Constant	122000000	51197209	2.386391	0.0188
TREND(2000:01)	2464688.0	1206076.0	2.043560	0.0434
R-squared	0.291160	Mean dependent var		9149584.
Adjusted R-squared	0.264907	S.D. dependent var		1.80E+08
S.E. of regression	1.55E+08	Akaike info criterion		40.59360
Sum squared resid	2.58E+18	Schwarz criterion		40.71428
Log likelihood	-2288.538	F-statistic		11.09042
Durbin-Watson stat	1.983899	Prob(F-statistic)		0.000000

(ii) ADF equation on 1st difference

ADF Test Statistic	-7.585237	1% Critical Value*	-4.0422
		5% Critical Value	-3.4501
		10% Critical Value	-3.1501

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXUSA,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXUSA(-1))	-1.812814	0.238992	-7.585237	0.0000
D(EXUSA(-1),2)	0.239297	0.181413	1.319075	0.1900
D(EXUSA(-2),2)	0.022753	0.097766	0.232727	0.8164
Constant	23035126	31727221	0.726037	0.4694
TREND(2000:01)	-131988.6	466209.0	-0.283110	0.7776
R-squared	0.747501	Mean dependent var	-636366.1	
Adjusted R-squared	0.738062	S.D. dependent var	3.11E+08	

Appendix 3 continued

S.E. of regression	1.59E+08	Akaike info criterion	40.65017
Sum squared resid	2.70E+18	Schwarz criterion	40.77153
Log likelihood	-2271.410	F-statistic	79.19113
Durbin-Watson stat	2.011578	Prob(F-statistic)	0.000000

(b) Export to Japan

(i) ADF equation on level

ADF Test Statistic	-1.889786	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXJAPAN)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXJAPAN(-1)	-0.166891	0.088312	-1.889786	0.0615
D(EXJAPAN(-1))	-0.545848	0.113996	-4.788316	0.0000
D(EXJAPAN(-2))	-0.136714	0.099039	-1.380400	0.1703
Constant	21706540	12307630	1.763665	0.0806
TREND(2000:01)	279632.5	239437.9	1.167871	0.2454
R-squared	0.361138	Mean dependent var		414185.8
Adjusted R-squared	0.337476	S.D. dependent var		58126045
S.E. of regression	47312020	Akaike info criterion		38.22567
Sum squared resid	2.42E+17	Schwarz criterion		38.34635
Log likelihood	-2154.750	F-statistic		15.26264
Durbin-Watson stat	1.971829	Prob(F-statistic)		0.000000

(ii) ADF equation on 1st difference

ADF Test Statistic	-7.276781	1% Critical Value*	-4.0422
		5% Critical Value	-3.4501
		10% Critical Value	-3.1501

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXJAPAN,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXJAPAN(-1))	-1.792362	0.246313	-7.276781	0.0000
D(EXJAPAN(-1),2)	0.130160	0.187240	0.695150	0.4885
D(EXJAPAN(-2),2)	-0.043520	0.096725	-0.449933	0.6537
Constant	6154663.0	9592856.0	0.641588	0.5225
TREND(2000:01)	-89624.07	141647.0	-0.632728	0.5283
R-squared	0.788355	Mean dependent var		160776.8
Adjusted R-squared	0.780443	S.D. dependent var		1.03E+08
S.E. of regression	48265305	Akaike info criterion		38.26594
Sum squared resid	2.49E+17	Schwarz criterion		38.38730
Log likelihood	-2137.893	F-statistic		99.64115
Durbin-Watson stat	1.993511	Prob(F-statistic)		0.000000

Appendix 3 continued

(c) Export to EU

(i) ADF equation on level

ADF Test Statistic	-2.371075	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXEU)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXEU(-1)	-0.156761	0.066114	-2.371075	0.0195
D(EXEU(-1))	-0.414429	0.102577	-4.040162	0.0001
D(EXEU(-2))	-0.068201	0.095944	-0.710842	0.4787
Constant	78791373	46280465	1.702476	0.0915
TREND(2000:01)	3731862.0	1659925.0	2.248211	0.0266
R-squared	0.262911	Mean dependent var		14198407
Adjusted R-squared	0.235612	S.D. dependent var		2.32E+08
S.E. of regression	2.03E+08	Akaike info criterion		41.13726
Sum squared resid	4.44E+18	Schwarz criterion		41.25794
Log likelihood	-2319.255	F-statistic		9.630602
Durbin-Watson stat	1.983960	Prob(F-statistic)		0.000001

(ii) ADF equation on 1st difference

ADF Test Statistic	-7.126322	1% Critical Value*	-4.0422
		5% Critical Value	-3.4501
		10% Critical Value	-3.1501

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXEU,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXEU(-1))	-1.629407	0.228646	-7.126322	0.0000
D(EXEU(-1),2)	0.116293	0.176330	0.659515	0.5110
D(EXEU(-2),2)	-0.003927	0.097268	-0.040369	0.9679
Constant	26625413	41460723	0.642184	0.5221
TREND(2000:01)	-16463.35	609935.7	-0.026992	0.9785
R-squared	0.733979	Mean dependent var		769250.0
Adjusted R-squared	0.724034	S.D. dependent var		3.97E+08
S.E. of regression	2.09E+08	Akaike info criterion		41.19359
Sum squared resid	4.66E+18	Schwarz criterion		41.31495
Log likelihood	-2301.841	F-statistic		73.80581
Durbin-Watson stat	1.999296	Prob(F-statistic)		0.000000

Appendix 3 continued

(d) Import from US

(i) ADF equation on level

ADF Test Statistic	-1.731703	1% Critical Value*	-3.4890
		5% Critical Value	-2.8870
		10% Critical Value	-2.5802

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMUSA)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMUSA(-1)	-0.079672	0.046008	-1.731703	0.0862
D(IMUSA(-1))	-0.261039	0.099707	-2.618070	0.0101
D(IMUSA(-2))	-0.080597	0.112026	-0.719449	0.4734
Constant	61186656	44434151	1.377019	0.1713
R-squared	0.110951	Mean dependent var		-2501823.
Adjusted R-squared	0.086482	S.D. dependent var		2.82E+08
S.E. of regression	2.69E+08	Akaike info criterion		41.69602
Sum squared resid	7.91E+18	Schwarz criterion		41.79257
Log likelihood	-2351.825	F-statistic		4.534326
Durbin-Watson stat	1.968987	Prob(F-statistic)		0.004911

#We have omitted time trend due to its statistical insignificance

(ii) ADF equation on 1st difference

ADF Test Statistic	-5.656769	1% Critical Value*	-3.4895
		5% Critical Value	-2.8872
		10% Critical Value	-2.5803

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMUSA,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMUSA(-1))	-1.428264	0.252488	-5.656769	0.0000
D(IMUSA(-1),2)	0.117122	0.205094	0.571066	0.5691
D(IMUSA(-2),2)	0.004823	0.118051	0.040853	0.9675
Constant	-1211024.	26019510	-0.046543	0.9630
R-squared	0.643246	Mean dependent var		777330.4
Adjusted R-squared	0.633336	S.D. dependent var		4.53E+08
S.E. of regression	2.74E+08	Akaike info criterion		41.73192
Sum squared resid	8.12E+18	Schwarz criterion		41.82901
Log likelihood	-2332.987	F-statistic		64.90976
Durbin-Watson stat	1.972445	Prob(F-statistic)		0.000000

#We have omitted time trend due to its statistical insignificance

Appendix 3 continued

(e) Import from Japan

(i) ADF equation on level

ADF Test Statistic	-2.064696	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMJAPAN)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMJAPAN(-1)	-0.130797	0.063350	-2.064696	0.0413
D(IMJAPAN(-1))	-0.411125	0.098453	-4.175864	0.0001
D(IMJAPAN(-2))	-0.249237	0.092977	-2.680619	0.0085
Constant	7451280.	11346042	0.656729	0.5128
TREND(2000:01)	701590.4	373108.4	1.880393	0.0627
R-squared	0.249542	Mean dependent var		2289673.
Adjusted R-squared	0.221747	S.D. dependent var		65180470
S.E. of regression	57501333	Akaike info criterion		38.61575
Sum squared resid	3.57E+17	Schwarz criterion		38.73643
Log likelihood	-2176.790	F-statistic		8.978013
Durbin-Watson stat	1.976584	Prob(F-statistic)		0.000003

(ii) ADF equation on 1st difference

ADF Test Statistic	-7.259867	1% Critical Value*	-4.0422
		5% Critical Value	-3.4501
		10% Critical Value	-3.1501

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(IMJAPAN,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMJAPAN(-1))	-1.682410	0.231741	-7.259867	0.0000
D(IMJAPAN(-1),2)	0.207411	0.171741	1.207692	0.2298
D(IMJAPAN(-2),2)	-0.058867	0.097288	-0.605076	0.5464
Constant	4220462.	11633963	0.362771	0.7175
TREND(2000:01)	-1962.751	171775.8	-0.011426	0.9909
R-squared	0.718568	Mean dependent var		102339.3
Adjusted R-squared	0.708047	S.D. dependent var		1.09E+08
S.E. of regression	58754870	Akaike info criterion		38.65926
Sum squared resid	3.69E+17	Schwarz criterion		38.78062
Log likelihood	-2159.919	F-statistic		68.29957
Durbin-Watson stat	1.976584	Prob(F-statistic)		0.000000

Appendix 3 continued

(f) USA GDP

(i) ADF equation on level

ADF Test Statistic	-1.509704	1% Critical Value*	-3.4890
		5% Critical Value	-2.8870
		10% Critical Value	-2.5802

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(USAGDP)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
USAGDP(-1)	-0.044382	0.029398	-1.509704	0.1340
D(USAGDP(-1))	0.065787	0.095829	0.686501	0.4939
D(USAGDP(-2))	0.065663	0.095725	0.685951	0.4942
Constant	1.85E+11	1.26E+11	1.465464	0.1457
R-squared	0.024019	Mean dependent var		-5.54E+09
Adjusted R-squared	-0.002843	S.D. dependent var		1.02E+11
S.E. of regression	1.02E+11	Akaike info criterion		53.57352
Sum squared resid	1.14E+24	Schwarz criterion		53.67007
Log likelihood	-3022.904	F-statistic		0.894160
Durbin-Watson stat	2.009861	Prob(F-statistic)		0.446708

#We have omitted time trend due to its statistical insignificance

(ii) ADF equation on 1st difference

ADF Test Statistic	-5.647858	1% Critical Value*	-3.4895
		5% Critical Value	-2.8872
		10% Critical Value	-2.5803

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(USAGDP,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(USAGDP(-1))	-0.895882	0.158623	-5.647858	0.0000
D(USAGDP(-1),2)	-0.068236	0.132122	-0.516458	0.6066
D(USAGDP(-2),2)	-0.033608	0.095546	-0.351747	0.7257
Constant	-4.23E+09	9.82E+09	-0.431162	0.6672
R-squared	0.483058	Mean dependent var		4.73E+08
Adjusted R-squared	0.468698	S.D. dependent var		1.42E+11
S.E. of regression	1.03E+11	Akaike info criterion		53.59804
Sum squared resid	1.16E+24	Schwarz criterion		53.69513
Log likelihood	-2997.490	F-statistic		33.64026
Durbin-Watson stat	2.006009	Prob(F-statistic)		0.000000

#We have omitted time trend due to its statistical insignificance

(g) Japan GDP

(i) ADF equation on level

ADF Test Statistic	-1.262334	1% Critical Value*	-3.4890
		5% Critical Value	-2.8870
		10% Critical Value	-2.5802

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(JAPGDP)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
JAPGDP(-1)	-0.032289	0.025578	-1.262334	0.2095
D(JAPGDP(-1))	0.075859	0.096094	0.789426	0.4316
D(JAPGDP(-2))	0.073822	0.096306	0.766537	0.4450
Constant	3.81E+11	3.11E+11	1.222032	0.2243
R-squared	0.021037	Mean dependent var		-9.45E+09
Adjusted R-squared	-0.005907	S.D. dependent var		4.56E+11
S.E. of regression	4.57E+11	Akaike info criterion		56.57013
Sum squared resid	2.28E+25	Schwarz criterion		56.66668
Log likelihood	-3192.212	F-statistic		0.780781
Durbin-Watson stat	2.006603	Prob(F-statistic)		0.507159

#We have omitted time trend due to its statistical insignificance

(ii) ADF equation on 1st difference

ADF Test Statistic	-5.354357	1% Critical Value*	-3.4895
		5% Critical Value	-2.8872
		10% Critical Value	-2.5803

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(JAPGDP,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(JAPGDP(-1))	-0.843131	0.157466	-5.354357	0.0000
D(JAPGDP(-1),2)	-0.101644	0.132527	-0.766969	0.4448
D(JAPGDP(-2),2)	-0.049424	0.096385	-0.512773	0.6092
Constant	-9.02E+09	4.37E+10	-0.206542	0.8368
R-squared	0.471822	Mean dependent var		-2.37E+09
Adjusted R-squared	0.457150	S.D. dependent var		6.27E+11
S.E. of regression	4.62E+11	Akaike info criterion		56.59167
Sum squared resid	2.31E+25	Schwarz criterion		56.68876
Log likelihood	-3165.134	F-statistic		32.15879
Durbin-Watson stat	2.002914	Prob(F-statistic)		0.000000

#We have omitted time trend due to its statistical insignificance

Appendix 3 continued

(h) EU GDP

(i) ADF equation on level

ADF Test Statistic	-1.313183	1% Critical Value*	-3.4890
		5% Critical Value	-2.8870
		10% Critical Value	-2.5802

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EUGDP)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EUGDP(-1)	-0.014722	0.011211	-1.313183	0.1919
D(EUGDP(-1))	0.052897	0.094989	0.556878	0.5788
D(EUGDP(-2))	0.049932	0.095069	0.525223	0.6005
Constant	2.60E+11	1.60E+11	1.628027	0.1064
R-squared	0.021046	Mean dependent var		6.42E+10
Adjusted R-squared	-0.005898	S.D. dependent var		4.24E+11
S.E. of regression	4.25E+11	Akaike info criterion		56.42360
Sum squared resid	1.97E+25	Schwarz criterion		56.52014
Log likelihood	-3183.933	F-statistic		0.781105
Durbin-Watson stat	2.003961	Prob(F-statistic)		0.506977

#We have omitted time trend due to its statistical insignificance

(ii) ADF equation on 1st difference

ADF Test Statistic	-5.425397	1% Critical Value*	-3.4895
		5% Critical Value	-2.8872
		10% Critical Value	-2.5803

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EUGDP,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EUGDP(-1))	-0.858312	0.158203	-5.425397	0.0000
D(EUGDP(-1),2)	-0.090323	0.132750	-0.680396	0.4977
D(EUGDP(-2),2)	-0.043199	0.096353	-0.448344	0.6548
Constant	5.46E+10	4.20E+10	1.299561	0.1965
R-squared	0.473795	Mean dependent var		-1.64E+09
Adjusted R-squared	0.459178	S.D. dependent var		5.85E+11
S.E. of regression	4.30E+11	Akaike info criterion		56.44696
Sum squared resid	2.00E+25	Schwarz criterion		56.54404
Log likelihood	-3157.029	F-statistic		32.41442
Durbin-Watson stat	2.002044	Prob(F-statistic)		0.000000

Appendix 3 continued

Appendix 3 continued

(i) CCI

ADF equation on level

ADF Test Statistic	-4.607976	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CCI)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CCI(-1)	-0.647812	0.140585	-4.607976	0.0000
D(CCI(-1))	-0.209201	0.122876	-1.702539	0.0915
D(CCI(-2))	-0.153720	0.094627	-1.624490	0.1072
Constant	0.032169	0.007439	4.324377	0.0000
TREND(2000:01)	5.26E-07	3.30E-05	0.015958	0.9873
R-squared	0.432709	Mean dependent var		-0.000177
Adjusted R-squared	0.411698	S.D. dependent var		0.014903
S.E. of regression	0.011431	Akaike info criterion		-6.061763
Sum squared resid	0.014112	Schwarz criterion		-5.941083
Log likelihood	347.4896	F-statistic		20.59459
Durbin-Watson stat	2.029389	Prob(F-statistic)		0.000000

(j) Trade-GDP Ratio

(i) ADF equation on level

ADF Test Statistic	-2.498275	1% Critical Value*	-4.0414
		5% Critical Value	-3.4497
		10% Critical Value	-3.1499

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRADEGDP)
Method: Least Squares
Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TRADEGDP(-1)	-0.172822	0.069176	-2.498275	0.0140
D(TRADEGDP(-1))	-0.227335	0.104533	-2.174780	0.0318
D(TRADEGDP(-2))	0.070621	0.097464	0.724589	0.4703
Constant	0.003103	0.001140	2.722216	0.0076
TREND(2000:01)	1.38E-05	1.13E-05	1.220059	0.2251
R-squared	0.169803	Mean dependent var		6.96E-05
Adjusted R-squared	0.139055	S.D. dependent var		0.002754
S.E. of regression	0.002555	Akaike info criterion		-9.057976
Sum squared resid	0.000705	Schwarz criterion		-8.937295
Log likelihood	516.7757	F-statistic		5.522392
Durbin-Watson stat	1.978899	Prob(F-statistic)		0.000440

(ii) ADF equation on 1st difference

ADF Test Statistic	-6.276428	1% Critical Value*	-3.4895
		5% Critical Value	-2.8872
		10% Critical Value	-2.5803

*MacKinnon critical values for rejection of hypothesis of a unit root.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TRADEGDP,2)
Method: Least Squares
Sample(adjusted): 2000:05 2009:08
Included observations: 112 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TRADEGDP(-1))	-1.262449	0.201141	-6.276428	0.0000
D(TRADEGDP(-1),2)	-0.068099	0.158846	-0.428708	0.6690
D(TRADEGDP(-2),2)	-0.036347	0.095023	-0.382512	0.7028
Constant	5.56E-05	0.000247	0.224868	0.8225
R-squared	0.673393	Mean dependent var		-4.60E-05
Adjusted R-squared	0.664321	S.D. dependent var		0.004506
S.E. of regression	0.002611	Akaike info criterion		-9.023387
Sum squared resid	0.000736	Schwarz criterion		-8.926298
Log likelihood	509.3097	F-statistic		74.22419
Durbin-Watson stat	1.968072	Prob(F-statistic)		0.000000

#We have omitted time trend due to its statistical insignificance

Appendix 4: VAR Results

(a) EXUSA, EXJAPAN, EXEU represent exports to USA, Japan and European Union. CCII represents Index of changes in Industrial composition in India. Prefix D indicates difference; Suffix (-1) and (-2) indicates one and two period lag.

Sample(adjusted): 2000:04 2007:06
Included observations: 87 after adjusting endpoints
t-statistics in parentheses

	CCI	DEXUSA	DEXJAPAN	DEXEU
CCI(-1)	0.250285	8.19E+08	-74804151	-1.35E+09
	(2.09372)	(0.62053)	(-0.26054)	(-0.90432)
CCI(-2)	0.023420	-3.76E+09	-57555840	-1.42E+09
	(0.19585)	(-2.84682)	(-0.20041)	(-0.94713)
DEXUSA(-1)	-1.34E-11	-0.465826	-0.034811	0.196767
	(-1.25035)	(-3.95072)	(-1.35713)	(1.47200)
DEXUSA(-2)	3.90E-12	-0.217568	-0.101821	-0.314028
	(0.36685)	(-1.85511)	(-3.99080)	(-2.36181)
DEXJAPAN(-1)	-3.77E-11	-1.543251	-0.623642	-0.963705
	(-0.86377)	(-3.20683)	(-5.95690)	(-1.76638)
DEXJAPAN(-2)	-1.37E-11	-0.064494	-0.157894	1.494220
	(-0.29444)	(-0.12512)	(-1.40801)	(2.55688)
DEXEU(-1)	1.54E-11	-0.057575	0.009324	-0.418314
	(1.61556)	(-0.54539)	(0.40601)	(-3.49523)
DEXEU(-2)	-2.56E-12	0.016703	0.096754	0.143031
	(-0.26253)	(0.15493)	(4.12519)	(1.17019)
Constant	0.035080	1.72E+08	9857277.	1.63E+08
	(4.80297)	(2.13676)	(0.56192)	(1.77837)
R-squared	0.111293	0.508143	0.565865	0.509204
Adj. R-squared	0.020144	0.457696	0.521339	0.458866
Sum sq. resids	0.008646	1.05E+18	4.99E+16	1.35E+18
S.E. equation	0.010528	1.16E+08	25286658	1.32E+08
Log likelihood	277.4723	-1734.385	-1601.681	-1745.303
Akaike AIC	277.6792	-1734.178	-1601.474	-1745.096
Schwarz SC	277.9343	-1733.923	-1601.219	-1744.841
Mean dependent	0.048488	12610034	1559448.	18757471
S.D. dependent	0.010636	1.58E+08	36549144	1.79E+08
Determinant Residual Covariance		7.67E+42		
Log Likelihood		-4789.258		
Akaike Information Criteria		-4788.430		
Schwarz Criteria		-4787.410		

Appendix 4 continued

Sample: 2007:07 2009:08
Included observations: 26
t-statistics in parentheses

	CCI	DEXUSA	DEXJAPAN	DEXEU
CCI(-1)	0.071009	4.41E+09	1.79E+09	-2.78E+09
	(0.32445)	(1.08727)	(1.14258)	(-0.49525)
CCI(-2)	0.172340	-2.63E+09	-1.21E+09	4.54E+09
	(0.91949)	(-0.75581)	(-0.90303)	(0.94248)
DEXUSA(-1)	-3.78E-11	-0.354969	0.010247	-0.509685
	(-2.16512)	(-1.09631)	(0.08203)	(-1.13662)
DEXUSA(-2)	2.01E-11	0.080775	0.152118	-0.653765
	(1.05437)	(0.22886)	(1.11707)	(-1.33750)
DEXJAPAN(-1)	5.80E-12	-0.918419	-0.599427	-1.142748
	(0.14913)	(-1.27320)	(-2.15373)	(-1.14388)
DEXJAPAN(-2)	-2.28E-11	-0.762190	-0.364315	-1.174913
	(-0.62812)	(-1.13266)	(-1.40317)	(-1.26070)
DEXEU(-1)	1.77E-11	0.140076	-0.015756	-0.213724
	(1.71715)	(0.73285)	(-0.21365)	(-0.80737)
DEXEU(-2)	-2.67E-13	-0.007624	-0.003911	0.099575
	(-0.02326)	(-0.03585)	(-0.04767)	(0.33814)
Constant	0.041511	-1.12E+08	-38945795	-1.19E+08
	(2.91044)	(-0.42438)	(-0.38173)	(-0.32367)
R-squared	0.372996	0.347586	0.448435	0.427095
Adj. R-squared	0.077935	0.040567	0.188876	0.157492
Sum sq. resids	0.002835	9.75E+17	1.45E+17	1.87E+18
S.E. equation	0.012914	2.39E+08	92379516	3.32E+08
Log likelihood	81.71616	-533.0067	-508.2457	-541.4737
Akaike AIC	82.40846	-532.3144	-507.5534	-540.7814
Schwarz SC	82.84396	-531.8789	-507.1179	-540.3459
Mean dependent	0.054559	-2429615.	-3418038.	-1056923.
S.D. dependent	0.013449	2.44E+08	1.03E+08	3.61E+08
Determinant Residual Covariance		4.97E+44		
Log Likelihood		-1485.483		
Akaike Information Criteria		-1482.714		
Schwarz Criteria		-1480.972		

Appendix 4 continued

Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints
t-statistics in parentheses

	CCI	DEXUSA	DEXJAPAN	DEXEU
CCI (-1)	0.225681	1.65E+09	3.24E+08	-1.14E+09
	(2.32968)	(1.26314)	(0.80016)	(-0.66465)
CCI(-2)	0.076062	-3.68E+09	-6.74E+08	-5.43E+08
	(0.79903)	(-2.86912)	(-1.69549)	(-0.32074)
DEXUSA(-1)	-1.85E-11	-0.478147	-0.028280	-0.150270
	(-2.19417)	(-4.21716)	(-0.80479)	(-1.00442)
DEXUSA(-2)	1.01E-11	-0.176992	-0.020739	-0.411437
	(1.16037)	(-1.50432)	(-0.56875)	(-2.65018)
DEXJAPAN(-1)	-3.01E-11	-0.769163	-0.542968	-1.149247
	(-1.22636)	(-2.32671)	(-5.29959)	(-2.63465)
DEXJAPAN(-2)	-1.32E-11	-0.371126	-0.266283	-0.511549
	(-0.53564)	(-1.12108)	(-2.59540)	(-1.17109)
DEXEU(-1)	1.44E-11	0.037944	-0.020354	-0.356364
	(2.23421)	(0.43685)	(-0.75611)	(-3.10937)
DEXEU(-2)	-4.11E-12	0.066866	0.055891	0.059712
	(-0.61519)	(0.74306)	(2.00406)	(0.50289)
Constant	0.034707	1.16E+08	18333347	1.09E+08
	(5.72608)	(1.41581)	(0.72434)	(1.01013)
R-squared	0.150514	0.365150	0.413292	0.332636
Adj. R-squared	0.085169	0.316315	0.368160	0.281300
Sum sq. resids	0.012733	2.31E+18	2.22E+17	4.02E+18
S.E. equation	0.011065	1.49E+08	46203428	1.97E+08
Log likelihood	353.3005	-2282.310	-2149.939	-2313.640
Akaike AIC	353.4598	-2282.150	-2149.779	-2313.481
Schwarz SC	353.6770	-2281.933	-2149.562	-2313.264
Mean dependent	0.049885	9149584.	414185.8	14198407
S.D. dependent	0.011568	1.80E+08	58126045	2.32E+08
Determinant Residual Covariance		9.50E+43		
Log Likelihood		-6362.709		
Akaike Information Criteria		-6362.072		
Schwarz Criteria		-6361.203		

Appendix 4 continued

(b) IMUSA, IMJAPAN, IMEU represent imports from USA, Japan and European Union. CCII represents Index of changes in Industrial composition in India. Prefix D indicates difference; Suffix (-1) and (-2) indicates one and two period lag.

Sample(adjusted): 2000:04 2007:06 Included observations: 87 after adjusting endpoints t-statistics in parentheses				
	CCI	DIMUSA	DIMJAPAN	DIMEU
CCI(-1)	0.237362	-1.07E+08	-9.92E+08	-5.18E+09
	(2.11989)	(-0.09003)	(-2.43691)	(-2.61314)
CCI(-2)	-0.003429	3.37E+08	3.77E+08	3.25E+09
	(-0.02921)	(0.27001)	(0.88318)	(1.56345)
DIMUSA(-1)	-1.91E-11	-0.627555	-0.046065	0.129381
	(-1.89547)	(-5.86855)	(-1.25841)	(0.72621)
DIMUSA(-2)	-1.15E-11	-0.471535	-0.035288	0.114356
	(-0.83840)	(-3.23991)	(-0.70831)	(0.47162)
DIMJAPAN(-1)	-2.70E-11	0.124260	-0.521443	1.008861
	(-0.87202)	(0.37833)	(-4.63785)	(1.84366)
DIMJAPAN(-2)	1.25E-11	0.524166	-0.448991	-0.941873
	(0.42084)	(1.65581)	(-4.14333)	(-1.78585)
DIMEU(-1)	1.98E-12	-0.103136	-0.046232	-0.470204
	(0.28450)	(-1.39459)	(-1.82623)	(-3.81623)
DIMEU(-2)	-1.59E-11	0.056292	-0.015762	-0.053497
	(-2.26659)	(0.75514)	(-0.61767)	(-0.43075)
Constant	0.037857	11062958	39306849	1.36E+08
	(5.36516)	(0.14766)	(1.53262)	(1.09209)
R-squared	0.151344	0.418338	0.496371	0.351339
Adj. R-squared	0.064302	0.358680	0.444717	0.284810
Sum sq. resids	0.008256	9.31E+17	1.09E+17	2.58E+18
S.E. equation	0.010288	1.09E+08	37395269	1.82E+08
Log likelihood	279.4783	-1728.987	-1635.721	-1773.397
Akaike AIC	279.6852	-1728.780	-1635.514	-1773.190
Schwarz SC	279.9402	-1728.525	-1635.259	-1772.935
Mean dependent	0.048488	10203609	3540931.	30968851
S.D. dependent	0.010636	1.36E+08	50183327	2.15E+08
Determinant Residual Covariance		2.91E+43		
Log Likelihood		-4847.289		
Akaike Information Criteria		-4846.461		
Schwarz Criteria		-4845.441		

Appendix 4 continued

Appendix 4 continued

Sample: 2007:07 2009:08
Included observations: 26
t-statistics in parentheses

	CCI	DIMUSA	DIMJAPAN	DIMEU
CCI(-1)	0.071411	-9.62E+09	-2.11E+09	-1.82E+10
	(0.30629)	(-1.03466)	(-1.39117)	(-2.41256)
CCI(-2)	0.105620	9.11E+09	2.53E+09	9.81E+09
	(0.43528)	(0.94106)	(1.60800)	(1.24700)
DIMUSA(-1)	2.10E-12	-0.259003	0.013424	0.002203
	(0.34757)	(-1.07434)	(0.34191)	(0.01124)
DIMUSA(-2)	5.46E-12	-0.110214	0.052160	-0.087351
	(0.77407)	(-0.39191)	(1.13885)	(-0.38207)
DIMJAPAN(-1)	-3.18E-11	1.022379	-0.258858	-1.156684
	(-0.88543)	(0.71366)	(-1.10949)	(-0.99318)
DIMJAPAN(-2)	1.80E-11	0.098820	-0.091066	1.227518
	(0.47115)	(0.06471)	(-0.36616)	(0.98876)
DIMEU(-1)	5.48E-12	0.147326	0.044248	0.067142
	(0.74901)	(0.50471)	(0.93075)	(0.28294)
DIMEU(-2)	-6.19E-12	-0.034445	-0.027060	-0.046667
	(-0.94105)	(-0.13129)	(-0.63332)	(-0.21880)
C	0.045029	-27536694	-24386500	4.82E+08
	(2.73432)	(-0.04192)	(-0.22795)	(0.90221)
R-squared	0.161527	0.166373	0.381398	0.483558
Adj. R-squared	-0.233048	-0.225921	0.090292	0.240527
Sum sq. resids	0.003791	6.03E+18	1.60E+17	3.99E+18
S.E. equation	0.014934	5.96E+08	97016476	4.84E+08
Log likelihood	77.93798	-556.7053	-509.5191	-551.3214
Akaike AIC	78.63029	-556.0130	-508.8268	-550.6291
Schwarz SC	79.06578	-555.5775	-508.3913	-550.1936
Mean dependent	0.054559	-45016154	-1897231.	14784231
S.D. dependent	0.013449	5.38E+08	1.02E+08	5.56E+08
Determinant Residual Covariance		2.84E+46		
Log Likelihood		-1538.071		
Akaike Information Criteria		-1535.302		
Schwarz Criteria		-1533.560		

Appendix 4 continued

Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints
t-statistics in parentheses

	CCI	DIMUSA	DIMJAPAN	DIMEU
CCI(-1)	0.220067	-3.15E+09	-1.40E+09	-9.57E+09
	(2.24421)	(-1.31241)	(-2.90705)	(-3.81123)
CCI(-2)	0.050243	2.15E+09	8.94E+08	4.77E+09
	(0.48827)	(0.85306)	(1.77211)	(1.81208)
DIMUSA(-1)	-1.21E-12	-0.328430	0.010857	0.037453
	(-0.29576)	(-3.28969)	(0.54287)	(0.35851)
DIMUSA(-2)	5.41E-12	-0.141851	0.049798	0.055913
	(1.11371)	(-1.19381)	(2.09214)	(0.44970)
DIMJAPAN(-1)	-2.20E-11	0.382792	-0.390516	-0.208311
	(-1.09804)	(0.78099)	(-3.97740)	(-0.40617)
DIMJAPAN(-2)	1.74E-11	0.281182	-0.313320	-0.045683
	(0.88117)	(0.58136)	(-3.23385)	(-0.09027)
DIMEU(-1)	2.76E-12	0.031927	-0.010443	-0.279294
	(0.68621)	(0.32487)	(-0.53047)	(-2.71603)
DIMEU(-2)	-9.61E-12	0.012567	-0.014926	-0.123568
	(-2.39734)	(0.12813)	(-0.75970)	(-1.20403)
Constant	0.036449	45449744	29240131	2.78E+08
	(5.78197)	(0.29460)	(0.94615)	(1.72147)
R-squared	0.117423	0.109591	0.331859	0.259119
Adj. R-squared	0.049533	0.041098	0.280463	0.202128
Sum sq. resids	0.013229	7.92E+18	3.18E+17	8.67E+18
S.E. equation	0.011278	2.76E+08	55289658	2.89E+08
Log likelihood	351.1414	-2351.912	-2170.226	-2357.034
Akaike AIC	351.3007	-2351.752	-2170.066	-2356.875
Schwarz SC	351.5179	-2351.535	-2169.849	-2356.658
Mean dependent	0.049885	-2501823.	2289673.	27244956
S.D. dependent	0.011568	2.82E+08	65180470	3.23E+08
Determinant Residual Covariance		1.47E+45		
Log Likelihood		-6517.535		
Akaike Information Criteria		-6516.898		
Schwarz Criteria		-6516.029		

Appendix 4 continued

(c) TRADEGDP indicates Trade-GDP ratio of India; USAGDP, JAPGDP and EUGDP indicate GDPs of USA, Japan and European Union, respectively.

Sample(adjusted): 2000:04 2007:06
Included observations: 87 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXUSA	DIMUSA	DUSAGDP
DTRADEGDP(-1)	-0.461857	-1.34E+08	-3.04E+09	-7.12E+12
	(-4.11610)	(-0.01982)	(-0.59155)	(-1.37160)
DTRADEGDP(-2)	-0.114617	1.47E+09	-4.83E+09	-4.17E+10
	(-1.04614)	(0.22273)	(-0.96075)	(-0.00824)
DEXUSA(-1)	-9.50E-13	-0.600250	0.095839	-104.3048
	(-0.51100)	(-5.37334)	(1.12468)	(-1.21308)
DEXUSA(-2)	4.02E-12	-0.189053	0.358391	-191.1487
	(2.12198)	(-1.65859)	(4.12179)	(-2.17871)
DIMUSA(-1)	3.07E-14	-0.057537	-0.654350	77.04887
	(0.01432)	(-0.44662)	(-6.65841)	(0.77701)
DIMUSA(-2)	-2.67E-12	-0.341982	-0.488618	131.5944
	(-0.88767)	(-1.89331)	(-3.54618)	(0.94652)
DUSAGDP(-1)	-5.07E-15	-5.43E-05	-7.58E-05	0.013231
	(-2.02796)	(-0.36159)	(-0.66156)	(0.11442)
DUSAGDP(-2)	-5.35E-15	-2.13E-06	-0.000190	0.047283
	(-2.17253)	(-0.01438)	(-1.67934)	(0.41520)
Constant	0.000218	26460924	18201101	3.03E+09
	(0.88106)	(1.77756)	(1.60284)	(0.26429)
R-squared	0.317869	0.347004	0.491262	0.082439
Adj. R-squared	0.247907	0.280030	0.439083	-0.011669
Sum sq. resids	0.000387	1.40E+18	8.14E+17	8.29E+23
S.E. equation	0.002228	1.34E+08	1.02E+08	1.03E+11
Log likelihood	412.5671	-1746.713	-1723.160	-2324.916
Akaike AIC	412.7740	-1746.506	-1722.953	-2324.709
Schwarz SC	413.0291	-1746.251	-1722.698	-2324.454
Mean dependent	0.000168	12610034	10203609	-2.66E+08
S.D. dependent	0.002570	1.58E+08	1.36E+08	1.02E+11
Determinant Residual Covariance		5.67E+48		
Log Likelihood		-5377.082		
Akaike Information Criteria		-5376.255		
Schwarz Criteria		-5375.234		

Appendix 4 continued

Sample: 2007:07 2009:08
Included observations: 26
t-statistics in parentheses

	DTRADEGDP	DEXUSA	DIMUSA	DUSAGDP
DTRADEGDP(-1)	0.156528	-1.85E+09	4.15E+10	1.09E+13
	(0.63286)	(-0.09288)	(0.81962)	(1.25128)
DTRADEGDP(-2)	-0.028974	2.67E+10	4.87E+10	-5.14E+12
	(-0.14234)	(1.62565)	(1.16911)	(-0.71969)
DEXUSA(-1)	-9.03E-12	-0.385910	-0.053594	41.36500
	(-3.12317)	(-1.65560)	(-0.09055)	(0.40813)
DEXUSA(-2)	-3.70E-13	-0.381386	0.347970	329.0719
	(-0.10257)	(-1.31030)	(0.47081)	(2.60010)
DIMUSA(-1)	9.14E-13	0.056355	-0.287746	26.01027
	(0.81876)	(0.62569)	(-1.25815)	(0.66414)
DIMUSA(-2)	-1.18E-12	-0.123461	-0.183557	29.53390
	(-0.88129)	(-1.14046)	(-0.66777)	(0.62743)
DUSAGDP(-1)	5.61E-15	0.000507	0.000301	0.026146
	(0.99267)	(1.11159)	(0.26017)	(0.13189)
DUSAGDP(-2)	6.65E-15	-0.000195	-0.000251	-0.083407
	(1.12779)	(-0.41034)	(-0.20760)	(-0.40327)
Constant	5.30E-05	6494716.	-34735159	-1.63E+10
	(0.00059)	(4.7E+07)	(1.2E+08)	(2.1E+10)
	(0.09009)	(0.13686)	(-0.28826)	(-0.79015)
R-squared	0.510615	0.407545	0.211506	0.339256
Adj. R-squared	0.280316	0.128743	-0.159550	0.028318
Sum sq. resids	0.000136	8.85E+17	5.71E+18	1.67E+23
S.E. equation	0.002829	2.28E+08	5.79E+08	9.92E+10
Log likelihood	121.1944	-531.7535	-555.9817	-689.7015
Akaike AIC	121.8867	-531.0612	-555.2894	-689.0092
Schwarz SC	122.3222	-530.6257	-554.8539	-688.5737
Mean dependent	-0.000260	-2429615.	-45016154	-2.32E+10
S.D. dependent	0.003335	2.44E+08	5.38E+08	1.01E+11
Determinant Residual Covariance		1.68E+50		
Log Likelihood		-1650.978		
Akaike Information Criteria		-1648.208		
Schwarz Criteria		-1646.466		

Appendix 4 continued

Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXUSA	DIMUSA	DUSAGDP
DTRADEGDP(-1)	-0.252892	5.26E+09	1.59E+10	-3.30E+12
	(-2.50253)	(0.83319)	(1.48039)	(-0.78140)
DTRADEGDP(-2)	-0.014371	9.29E+09	1.79E+10	2.01E+12
	(-0.15052)	(1.55785)	(1.76399)	(0.50353)
DEXUSA(-1)	-3.52E-12	-0.548109	0.044491	-5.595266
	(-2.26223)	(-5.63712)	(0.26898)	(-0.08614)
DEXUSA(-2)	1.43E-12	-0.199208	0.401147	-17.07139
	(0.87918)	(-1.96278)	(2.32340)	(-0.25178)
DIMUSA(-1)	1.28E-12	0.036812	-0.307144	37.27234
	(1.42960)	(0.65951)	(-3.23469)	(0.99955)
DIMUSA(-2)	-9.44E-13	-0.127749	-0.159641	56.73938
	(-0.88336)	(-1.91312)	(-1.40534)	(1.27189)
DUSAGDP(-1)	-1.41E-15	0.000103	0.000148	0.029302
	(-0.58826)	(0.68877)	(0.57977)	(0.29320)
DUSAGDP(-2)	-1.87E-15	2.61E-05	-4.07E-05	0.052033
	(-0.79112)	(0.17674)	(-0.16183)	(0.52693)
Constant	0.000105	16861589	-6215997.	-5.25E+09
	(0.44218)	(1.13816)	(-0.24664)	(-0.53082)
R-squared	0.236120	0.304444	0.176365	0.031578
Adj. R-squared	0.177360	0.250940	0.113009	-0.042916
Sum sq. resids	0.000649	2.53E+18	7.33E+18	1.13E+24
S.E. equation	0.002498	1.56E+08	2.65E+08	1.04E+11
Log likelihood	521.4794	-2287.469	-2347.507	-3022.465
Akaike AIC	521.6387	-2287.310	-2347.348	-3022.306
Schwarz SC	521.8559	-2287.093	-2347.131	-3022.088
Mean dependent	6.96E-05	9149584.	-2501823.	-5.54E+09
S.D. dependent	0.002754	1.80E+08	2.82E+08	1.02E+11
Determinant Residual Covariance		7.57E+49		
Log Likelihood		-7130.457		
Akaike Information Criteria		-7129.820		
Schwarz Criteria		-7128.951		

Appendix 4 continued

Sample(adjusted): 2000:04 2007:06
Included observations: 87 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXJAPAN	DIMJAPAN	DJAPGDP
DTRADEGDP(-1)	-0.356092	1.47E+09	1.68E+08	2.72E+12
	(0.11019)	(1.3E+09)	(1.9E+09)	(2.2E+12)
DTRADEGDP(-2)	0.107058	1.30E+09	3.06E+08	1.25E+12
	(0.99416)	(1.02477)	(0.16656)	(0.57831)
DEXJAPAN(-1)	-6.42E-12	-0.721730	-0.033565	190.9471
	(-0.69702)	(-6.64386)	(-0.21361)	(1.03402)
DEXJAPAN(-2)	4.83E-12	0.004250	0.194698	75.20764
	(0.51003)	(0.03802)	(1.20413)	(0.39579)
DIMJAPAN(-1)	-1.33E-11	0.246595	-0.619519	-50.87428
	(-2.29138)	(3.60423)	(-6.25977)	(-0.43742)
DIMJAPAN(-2)	-1.17E-11	0.176122	-0.514319	-60.17209
	(-1.98737)	(2.54644)	(-5.14077)	(-0.51178)
DJAPGDP(-1)	-7.68E-15	-2.34E-05	-2.54E-05	0.117646
	(-1.35549)	(-0.35024)	(-0.26257)	(1.03500)
DJAPGDP(-2)	1.09E-14	1.79E-05	-0.000160	0.107353
	(1.93137)	(0.26799)	(-1.65554)	(0.94441)
Constant	0.000154	2069377.	15781824	3.65E+10
	(0.35337)	(0.40296)	(2.12450)	(4.18342)
R-squared	0.305296	0.522322	0.469824	0.055212
Adj. R-squared	0.234044	0.473330	0.415447	-0.041690
Sum sq. resids	0.000394	5.49E+16	1.15E+17	1.59E+23
S.E. equation	0.002249	26524466	38368198	4.51E+10
Log likelihood	411.7726	-1605.839	-1637.956	-2252.974
Akaike AIC	411.9795	-1605.632	-1637.749	-2252.767
Schwarz SC	412.2346	-1605.377	-1637.494	-2252.512
Mean dependent	0.000168	1559448.	3540931.	4.82E+10
S.D. dependent	0.002570	36549144	50183327	4.42E+10
Determinant Residual Covariance		6.48E+45		
Log Likelihood		-5082.409		
Akaike Information Criteria		-5081.581		
Schwarz Criteria		-5080.561		

Appendix 4 continued

Sample: 2007:07 2009:08
Included observations: 26
t-statistics in parentheses

	DTRADEGDP	DEXJAPAN	DIMJAPAN	DJAPGDP
DTRADEGDP(-1)	0.009665	-5.93E+09	2.02E+09	4.87E+13
	(0.04119)	(-1.00328)	(0.32259)	(0.69225)
DTRADEGDP(-2)	-0.095464	5.43E+09	1.75E+10	1.47E+13
	(-0.41692)	(0.94033)	(2.85375)	(0.21388)
DEXJAPAN(-1)	-2.71E-11	-0.510209	0.207768	-1260.911
	(-2.77169)	(-2.06917)	(0.79468)	(-0.42956)
DEXJAPAN(-2)	-1.09E-11	-0.281469	0.192428	3151.109
	(-1.24536)	(-1.27977)	(0.82515)	(1.20353)
DIMJAPAN(-1)	1.12E-11	0.388766	-0.367641	1313.229
	(1.47718)	(2.03543)	(-1.81532)	(0.57757)
DIMJAPAN(-2)	1.28E-11	-0.072704	-0.049161	4380.989
	(1.45400)	(-0.32717)	(-0.20864)	(1.65608)
DJAPGDP(-1)	3.94E-16	-3.12E-06	7.56E-06	0.045871
	(0.53712)	(-0.16853)	(0.38555)	(0.20839)
DJAPGDP(-2)	2.87E-16	1.58E-05	-2.05E-05	-0.205245
	(0.38486)	(0.84405)	(-1.02973)	(-0.91840)
Constant	-0.000365	-6770545.	1431997.	-2.04E+11
	(-0.55684)	(-0.41022)	(0.08183)	(-1.03992)
R-squared	0.385850	0.587566	0.528476	0.296926
Adj. R-squared	0.096839	0.393480	0.306582	-0.033933
Sum sq. resids	0.000171	1.08E+17	1.22E+17	1.54E+25
S.E. equation	0.003169	79883022	84701651	9.51E+11
Log likelihood	118.2422	-504.4668	-505.9897	-748.4680
Akaike AIC	118.9345	-503.7745	-505.2974	-747.7757
Schwarz SC	119.3700	-503.3390	-504.8619	-747.3402
Mean dependent	-0.000260	-3418038.	-1897231.	-2.02E+11
S.D. dependent	0.003335	1.03E+08	1.02E+08	9.35E+11
Determinant Residual Covariance		4.65E+49		
Log Likelihood		-1634.288		
Akaike Information Criteria		-1631.519		
Schwarz Criteria		-1629.777		

Appendix 4 continued

Appendix 4 continued

Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXJAPAN	DIMJAPAN	DJAPGDP
DTRADEGDP(-1)	-0.313526	-1.13E+09	3.22E+09	2.50E+13
	(-3.22040)	(-0.69977)	(1.57599)	(1.55273)
DTRADEGDP(-2)	-0.000430	1.53E+09	4.49E+09	9.79E+12
	(-0.00450)	(0.96662)	(2.24250)	(0.62123)
DEXJAPAN(-1)	-1.34E-11	-0.671431	0.164320	404.8191
	(-2.26751)	(-6.83465)	(1.32540)	(0.41464)
DEXJAPAN(-2)	-7.34E-12	-0.164378	0.397701	2916.889
	(-1.34180)	(-1.80604)	(3.46244)	(3.22478)
DIMJAPAN(-1)	-3.55E-12	0.339748	-0.477768	548.3420
	(-0.81878)	(4.71884)	(-5.25820)	(0.76635)
DIMJAPAN(-2)	1.92E-13	0.043893	-0.331816	1909.913
	(0.03972)	(0.54641)	(-3.27317)	(2.39243)
DJAPGDP(-1)	6.68E-16	5.40E-06	1.19E-05	0.067854
	(1.18706)	(0.57660)	(1.01125)	(0.72965)
DJAPGDP(-2)	8.49E-16	9.97E-06	-1.50E-05	-0.069438
	(1.49249)	(1.05460)	(-1.25349)	(-0.73893)
Constant	0.000121	53562.88	3587015.	-1.86E+10
	(0.49725)	(0.01322)	(0.70140)	(-0.46300)
R-squared	0.184853	0.494073	0.359219	0.188167
Adj. R-squared	0.122149	0.455156	0.309928	0.125718
Sum sq. resids	0.000692	1.91E+17	3.05E+17	1.89E+25
S.E. equation	0.002580	42904904	54145798	4.26E+11
Log likelihood	517.8093	-2141.569	-2167.863	-3181.636
Akaike AIC	517.9686	-2141.410	-2167.704	-3181.476
Schwarz SC	518.1858	-2141.192	-2167.487	-3181.259
Mean dependent	6.96E-05	414185.8	2289673.	-9.45E+09
S.D. dependent	0.002754	58126045	65180470	4.56E+11
Determinant Residual Covariance		4.00E+48		
Log Likelihood		-6964.281		
Akaike Information Criteria		-6963.644		
Schwarz Criteria		-6962.775		

Appendix 4 continued

Sample(adjusted): 2000:04 2007:06
Included observations: 87 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXEU	DIMEU	DEUGDP
DTRADEGDP(-1)	-0.392134	6.80E+09	8.08E+09	-2.37E+12
	(-3.34999)	(0.91439)	(0.88319)	(-0.15126)
DTRADEGDP(-2)	0.013329	-7.99E+08	-6.42E+09	2.52E+12
	(0.11762)	(-0.11092)	(-0.72458)	(0.16658)
DEXEU(-1)	6.19E-13	-0.572902	-0.167113	-361.6706
	(0.33534)	(-4.88760)	(-1.15845)	(-1.46725)
DEXEU(-2)	5.40E-13	0.122680	0.303546	-215.2201
	(0.27774)	(0.99310)	(1.99663)	(-0.82847)
DIMEU(-1)	-2.80E-12	0.112298	-0.351596	-46.90054
	(-1.99553)	(1.25892)	(-3.20274)	(-0.25002)
DIMEU(-2)	-1.87E-12	0.018529	-0.304123	-107.6033
	(-1.37164)	(0.21429)	(-2.85796)	(-0.59178)
DEUGDP(-1)	8.40E-16	4.69E-05	-6.57E-06	0.083256
	(0.92800)	(0.81466)	(-0.09282)	(0.68833)
DEUGDP(-2)	-6.00E-16	-6.02E-05	-1.66E-05	0.054473
	(-0.66608)	(-1.05201)	(-0.23566)	(0.45292)
Constant	0.000314	25190233	48707243	1.12E+11
	(1.05468)	(1.33339)	(2.09494)	(2.82512)
R-squared	0.230532	0.360858	0.329300	0.042060
Adj. R-squared	0.151612	0.295305	0.260510	-0.056190
Sum sq. resids	0.000437	1.76E+18	2.67E+18	7.80E+24
S.E. equation	0.002367	1.50E+08	1.85E+08	3.16E+11
Log likelihood	407.3263	-1756.791	-1774.850	-2422.435
Akaike AIC	407.5332	-1756.584	-1774.643	-2422.229
Schwarz SC	407.7883	-1756.329	-1774.388	-2421.973
Mean dependent	0.000168	18757471	30968851	1.11E+11
S.D. dependent	0.002570	1.79E+08	2.15E+08	3.08E+11
Determinant Residual Covariance		2.30E+50		
Log Likelihood		-5538.073		
Akaike Information Criteria		-5537.246		
Schwarz Criteria		-5536.225		

Appendix 4 continued

Sample: 2007:07 2009:08
Included observations: 26
t-statistics in parentheses

	DTRADEGDP	DEXEU	DIMEU	DEUGDP
DTRADEGDP(-1)	-0.047924	1.91E+10	3.88E+09	-2.59E+13
	(-0.15986)	(0.68869)	(0.08261)	(-0.49165)
DTRADEGDP(-2)	-0.058558	2.63E+10	5.69E+10	-1.27E+13
	(-0.20075)	(0.97245)	(1.24459)	(-0.24830)
DEXEU(-1)	-2.51E-12	-0.602507	0.295733	1041.063
	(-0.77991)	(-2.02024)	(0.58584)	(1.84315)
DEXEU(-2)	3.04E-13	-0.594726	-0.392846	1299.216
	(0.09296)	(-1.96593)	(-0.76721)	(2.26764)
DIMEU(-1)	1.88E-12	0.062137	-0.393408	-299.6273
	(1.04954)	(0.37425)	(-1.39990)	(-0.95288)
DIMEU(-2)	5.40E-14	0.039939	0.061368	-150.6071
	(0.03013)	(0.24027)	(0.21811)	(-0.47840)
DEUGDP(-1)	-2.10E-16	8.45E-06	4.40E-05	0.145707
	(-0.14610)	(0.06360)	(0.19541)	(0.57891)
DEUGDP(-2)	3.77E-16	-0.000215	-0.000222	0.175220
	(0.26916)	(-1.65724)	(-1.00932)	(0.71319)
Constant	-0.000326	-9322778.	23034410	-6.41E+10
	(-0.42888)	(-0.13226)	(0.19307)	(-0.48013)
R-squared	0.137282	0.368877	0.235837	0.337530
Adj. R-squared	-0.268703	0.071877	-0.123769	0.025779
Sum sq. resids	0.000240	2.06E+18	5.90E+18	7.39E+24
S.E. equation	0.003756	3.48E+08	5.89E+08	6.59E+11
Log likelihood	113.8242	-542.7318	-556.4151	-738.9382
Akaike AIC	114.5165	-542.0395	-555.7228	-738.2459
Schwarz SC	114.9520	-541.6040	-555.2873	-737.8104
Mean dependent	-0.000260	-1056923.	14784231	-9.21E+10
S.D. dependent	0.003335	3.61E+08	5.56E+08	6.68E+11
Determinant Residual Covariance		1.50E+52		
Log Likelihood		-1709.408		
Akaike Information Criteria		-1706.639		
Schwarz Criteria		-1704.897		

Appendix 4 continued

Appendix 4 continued

Sample(adjusted): 2000:04 2009:08
Included observations: 113 after adjusting endpoints
t-statistics in parentheses

	DTRADEGDP	DEXEU	DIMEU	DEUGDP
DTRADEGDP(-1)	-0.315101	1.15E+10	1.68E+10	7.10E+11
	(-2.99026)	(1.40466)	(1.37926)	(0.04266)
DTRADEGDP(-2)	-0.002387	2.72E+09	5.44E+09	7.13E+12
	(-0.02308)	(0.33817)	(0.45588)	(0.43662)
DEXEU(-1)	3.22E-13	-0.562075	0.032343	368.1461
	(0.24230)	(-5.43630)	(0.21073)	(1.75219)
DEXEU(-2)	5.79E-13	-0.136991	0.180441	568.1539
	(0.43383)	(-1.32103)	(1.17218)	(2.69612)
DIMEU(-1)	-2.72E-13	0.023878	-0.373452	-65.04226
	(-0.30878)	(0.34912)	(-3.67839)	(-0.46798)
DIMEU(-2)	-2.38E-13	-0.043405	-0.180230	-61.80230
	(-0.27206)	(-0.63884)	(-1.78696)	(-0.44761)
DEUGDP(-1)	9.47E-16	1.26E-05	-2.91E-05	0.063190
	(1.50505)	(0.25702)	(-0.40118)	(0.63621)
DEUGDP(-2)	-7.11E-18	-7.83E-05	-3.05E-05	0.076228
	(-0.01121)	(-1.58796)	(-0.41698)	(0.76069)
Constant	3.27E-05	29296090	41444725	4.34E+10
	(0.12610)	(1.45610)	(1.38768)	(1.06252)
R-squared	0.134912	0.264476	0.165257	0.089511
Adj. R-squared	0.068367	0.207897	0.101046	0.019474
Sum sq. resids	0.000735	4.44E+18	9.77E+18	1.83E+25
S.E. equation	0.002658	2.07E+08	3.07E+08	4.20E+11
Log likelihood	514.4497	-2319.135	-2363.774	-3179.837
Akaike AIC	514.6090	-2318.976	-2363.614	-3179.678
Schwarz SC	514.8262	-2318.758	-2363.397	-3179.460
Mean dependent	6.96E-05	14198407	27244956	6.42E+10
S.D. dependent	0.002754	2.32E+08	3.23E+08	4.24E+11
Determinant Residual Covariance		2.72E+51		
Log Likelihood		-7332.738		
Akaike Information Criteria		-7332.101		
Schwarz Criteria		-7331.232		

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