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

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Abstract

This study investigates the impact of global crisis shocks on India's trade and industry. We use both panel data modeling and vector autoregression techniques to understand the dynamic effects of global crisis shocks on Indian industry and trade. The estimated results of panel data models show that changes in trade composition are positively associated with changes in manufacturing composition in India, controlling for other variables. However, there is no strong indication that Indian industry has been severely harmed by the fall in demand in crisis-affected advanced economies such as the United States (US), the European Union (EU), and Japan, holding other things constant. Since there may be lags between changes in composition in export and industry, the study then explores the dynamic effects of global crisis shocks on Indian industry and trade with the help of vector autoregression techniques. The findings of the study indicate that the compositional change in industry has responded significantly to exports to the US, Japan, and the EU in the crisis period. Variance decomposition of compositional change in industry reveals that during the pre-crisis period, almost 100% of the variation in compositional change in industry depended on its own variation, while in the crisis period about 20% of the variation in compositional change in industry has depended on the exports to the EU, Japan, and the US. Therefore, the effect of global crisis shocks of India's exports to advanced economies during the crisis period has been transmitted to Indian industry. However, Indian industry has not responded significantly to the shocks of imports from the advanced economies, while the response to its own shocks is significant during both pre- and postcrisis periods. The study also indicates that India's trade openness has responded mildly to the shock of exports to the US. India's trade with the US, coupled with US GDP, has significantly contributed to the variability of India's trade openness in the crisis period, accounting for 40% of the variation of the trade-GDP ratio of India, whereas India's trade with the EU and Japan has had either no effect or very insignificant effect on India's trade openness. This study suggests that Indian industry has not been significantly harmed by the ongoing global crisis. Even though India continues to enjoy relatively large domestic demand, the compositional change (positive) in the manufacturing sector would decrease if the crisis continues, resulting in a slowdown in growth and a rise in stagnation.

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

Contents

1. INTRODUCTION

In last two and a half years, the world witnessed a severe financial and economic crisis following the subprime mortgage crisis in the United States (Nanto 2009; Bosworth and Flaaen 2009). While the exact reasons are still unknown, the crisis could be ascribed to gross financial irregularities, excessive risk taking, and large and persistent global imbalances, which in turn are the outcome of excessively loose monetary policy in the major advanced economies in the first few years after 2000. The crisis has threatened 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 was the first global recession of the new era of globalization (Stiglitz 2008).

Over the past decades of globalization, economies in South Asia 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 South Asian economies achieve impressive economic development. Globalization has resulted in an increase in international trade in goods and services in both extensive and intensive margins in South Asia. Most South Asian economies have become part of growing international economic networks through exchange of goods, services, and capital. As a result, South Asia's production is more fragmented than what it was in the 1980s or early 1990s. As of 2009, South Asia accounted for over 5% of world trade in goods and services, about 3.5% of world GDP, and 23% of world population, respectively.[2] In a supply-constrained region like South Asia, promoting exports has always been a challenge, particularly when trade has been severely restricted by lack of external demand. Developing Asia will continue to suffer from demand decline in OECD countries, with the People's Republic of China and India being the most harmed (Jongwanich et al. 2009). Though South and Southeast Asia face reduced exports to the Organisation for Economic Co-ordination and Development (OECD) countries, their exports are also reduced significantly to other Asian exporters, demonstrating the indirect trade linkages that now exist in the global economy. Therefore, the past export slowdown surely has some long-term implications for trade and industrial development. In this paper, we are keen to understand the consequences of the present crisis on South Asia in general and its largest economy—that of India—in particular.[3]

The broad objectives of this study are to understand South Asia's emerging trade and industrial development scenario in view of changes in international demand from the advanced economies, and the remedies to strengthen the trade and industry in the region. The intention is to provide lessons for South Asian countries regarding trade and industrial policy responses and implications for regional cooperation.

2. GLOBAL FINANCIAL AND ECONOMIC CRISIS AND SOUTH ASIA: STYLIZED FACTS

The subprime mortgage market crisis that originated in the US in summer 2007 devastated the US's and EU's financial systems through the bursting of the housing bubble, numerous bankruptcies, and a credit crisis. A set of publications suggests that this crisis is a result of gross financial irregularities, excessive risk taking, large global imbalances, and loose

[1] It is 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% in volume terms in 2009, the biggest such contraction since World War II.

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

[3] According to World Development Indicators 2009, India in 2008 had a share of 64% of South Asia's surface area, 75% of regional population, and 80% of GDP (World Bank 2009a).

monetary policies in the US, among other reasons.[4] It has caused a worldwide economic recession primarily through three channels: collapse of exports, reversal of capital flows, and weakening of market confidence. Table 1 provides the major findings of some of these studies and reports. Some common features of crisis impacts on Asia are as follows: (i) countries have faced deceleration in growth with some variations; (ii) exports and imports have declined sharply across the region, and domestic demand has softened; (iii) trade protection (especially nontariff barriers) has increased; (iv) there has been a sharp rise in unemployment; and (v) "antiglobalization" sentiment has been growing, and therefore people are 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.[5]

The ongoing crisis has affected the major South Asian economies through financial and trade channels since they are more integrated with global market compared to the 1990s.The unfolding global financial crisis is therefore having different repercussions on South Asian economies than during the 1997 Asian financial crisis. With the increasing integration of the South Asian economies and their financial markets with the rest of the world, there is recognition that the region does face some downside risks from the global financial and economic crisis (World Bank 2009a). The crisis appeared in South Asia 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 from 2003 to the middle of 2008. Its impact on South Asia has been large, and it could weaken the subregional economies through trade and financial channels.[6] Hence, South Asia is facing deceleration in growth.[7]

[4] See, for example, ADB (2009a), ADBI (2009), UNESCAP (2009a, 2009b), Adams and Park (2009), and Bosworth and Flaaen (2009).

[5] Refer, for example, to Sheng (2010), who commented that "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."

[6] For example, the US was South Asia's major export destination (until the crisis). It accounted for one-fourth of South Asia's total exports in 2007 (IMF 2009). South Asia's exports to ASEAN and the EU were much lower. See, for example, Acharya (2009), and Rakshit (2009) for India.

[7] For example, the Reserve Bank of India in its 2009-2010 Annual Policy Statement, released on 21 April 2009, indicated that India's GDP growth in 2008-2009 would be in the range of 6.5-6.7%, decreased from the 7% forecast in the January 2009 RBI policy review. The same RBI Annual Policy Statement also indicated that deceleration of growth will continue in 2009-2010 at around 6% with the assumption of a normal monsoon. Forecasts by the IMF and other organizations on the growth of the Indian economy in 2009 and following years are not different either. See Reserve Bank of India (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 US (World Bank 2009b). Collectively, the region would grow by 5.2% in 2009, down from 9% last year and 13% in 2007. However, recent statistics show that India, along with the People's Republic of China and Indonesia, has witnessed higher than expected growth (as projected by the World Bank and IMF) during 2008 and 2009.

Table 1: Crisis Impact–Stylized Observations

Fundamentals	Pattern	Studies
Growth	Decelerated	IMF (2009b), ADB (2009a)
Trade	Decelerated	WTO (2009a), UNESCAP (2009a),
Trade price	Fallen	WTO (2009a)
Trade protection	Increased	WTO (2009a, 2009b)
Remittances	Declined	World Bank (2009b)
Foreign direct investment and equity investment	Slowed down	World Bank (2009b), UNCTAD (2009)
Commercial lending	Slowed down	ODI (2009)
Domestic production	Slowed down – sectors (e.g. textile & clothing)	ADB (2009b), ADBI (2009)
Unemployment	Increased	ILO (2009)

Sources: Compiled by the authors.

Table 2: Merchandise Exports to Advanced Economies

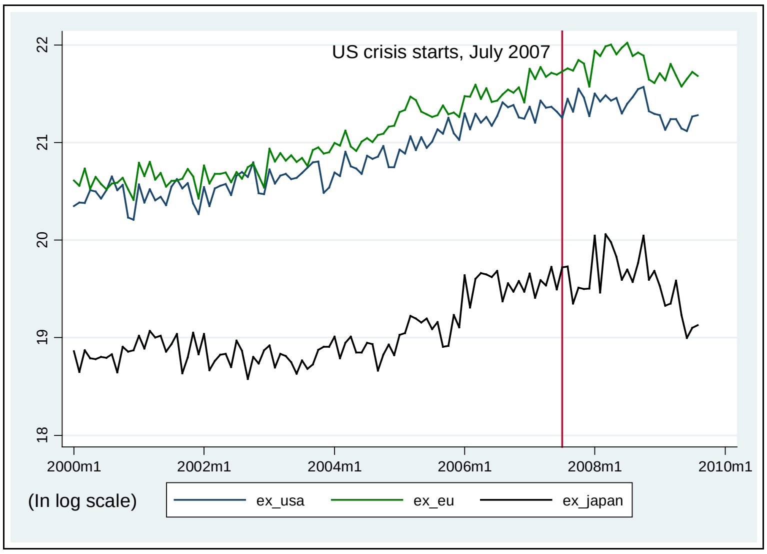
Country	1981	1991	2001	2002	2003	2004	2005	2006	2007	2008	2009
	(% of country's total exports)										
Afghanistan	13.87	88.08	26.31	29.31	56.94	33.14	40.82	34.51	30.15	36.22	31.88
Bangladesh	44.56	79.27	77.38	76.76	77.77	80.29	77.17	78.37	76.55	74.98	75.25
India	46.26	66.16	63.12	60.43	58.12	56.24	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 area of impact has been exports, which have declined in South Asian countries.[8] For example, India's exports to the EU, Japan, and the US have decreased sharply (Figure 1[a]), resulting in a sharp fall in trade openness (Figure 1[b]). At the same time, there has been a sharp fall in the bank lending rate in India (Figure 2[a]), weakening dollar (Figure 2[b]), a rise in inflation (Figure 2[c]), and a steady fall in the business confidence index (Figure 2[d]). The overall economic situation in South Asia thus remains serious. So far, the demand from advanced economies for South Asian exports has decelerated, thereby posing a threat to South Asia's production, be it manufacturing or services. This sensitivity has been heightened by the export-led growth strategies followed by many countries, including South Asian ones. Therefore, if the crisis continues, it is expected to damage Asia's trade pattern and subsequently its production structure, which were built over decades.

[8] See UNCTAD (2009), De (2009) for India, and De and Bhattacharyay (2009) for Asia.

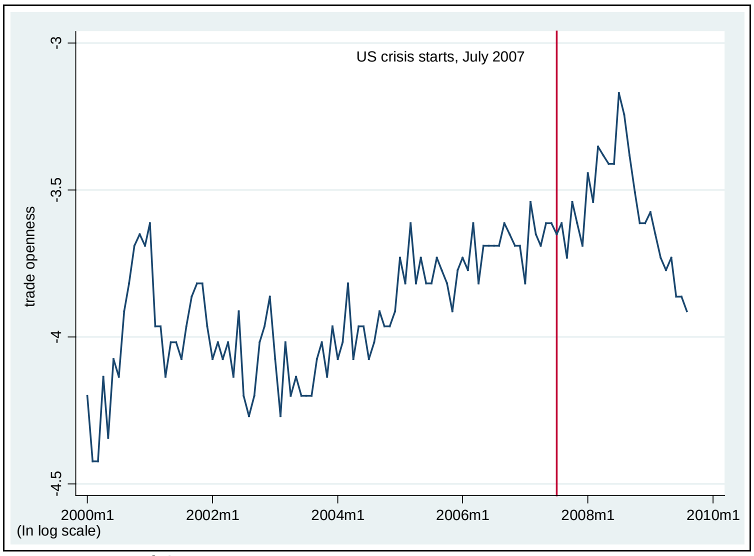
Figure 1(a): India's Monthly Exports to the EU, Japan, and the US



Note: EU represents 27 members of the European Union.

Source: IMF (2009a).

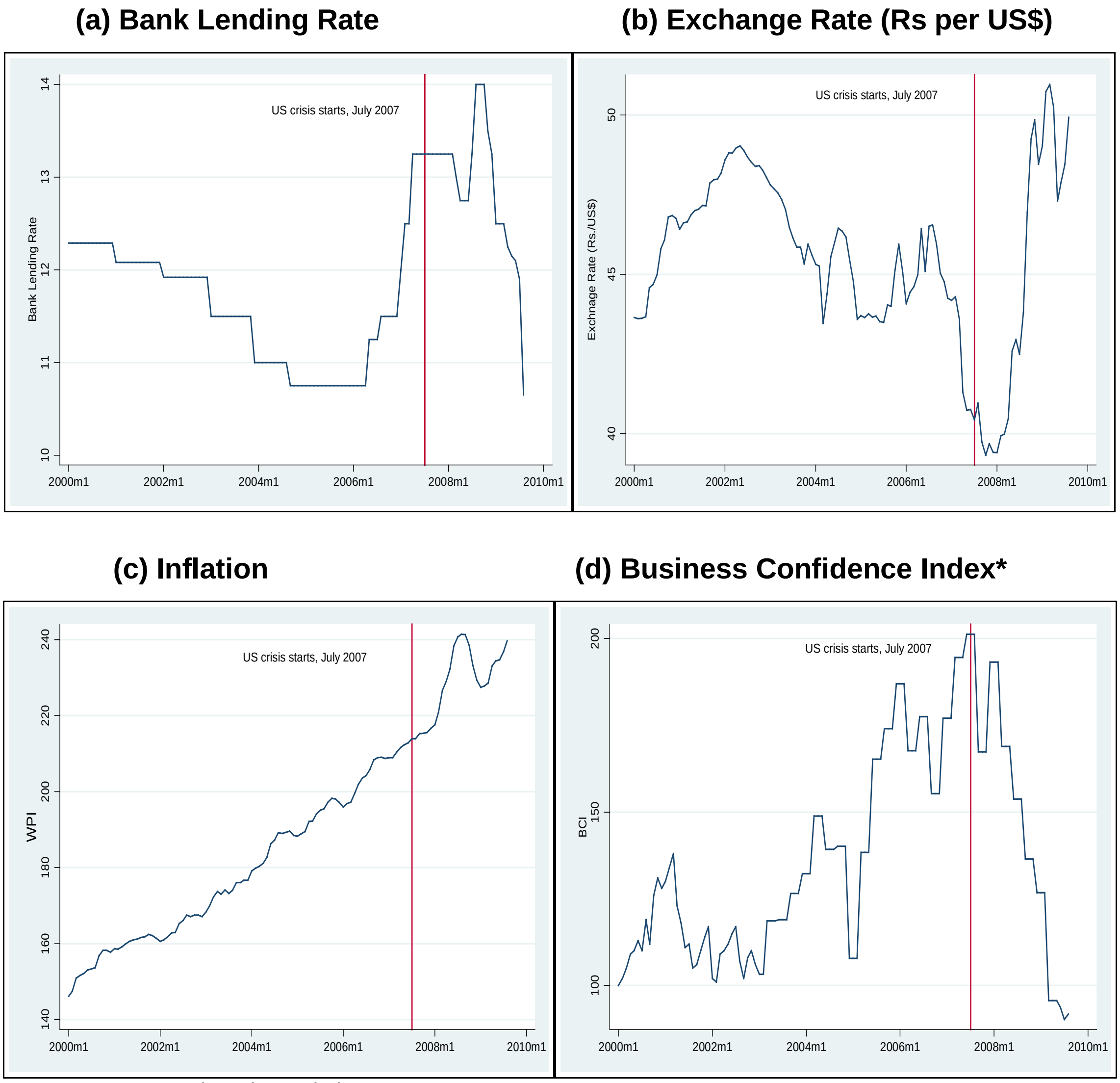
Figure 1(b): India's Monthly Trade Openness*



Note: *Trade as percentage of GDP.

Source: IMF (2009a).

Figure 2: Monthly Series of Selected Crisis Impact Indicators



Note: *Dun and Bradstreet index.

Source: Drawn based on CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

In relative terms, countries such as Bangladesh and Sri Lanka are likely to face deceleration in trade and subsequently in growth due to a fall in import demand in advanced economies since about two-thirds of their annual exports have been directed to advanced economies, percentages which have also increased over time (Table 2). Barring Afghanistan and Nepal, other South Asian countries such as India and Pakistan heavily depend on advanced economies since around one-half of their global exports are directed to them (Table 2). Critics argue that South Asia will lose much of its global economic strength if it fails to enhance its exports and rebalance its growth strategy.

3. FALLING IMPORT DEMAND IN ADVANCED ECONOMIES AND SOUTH ASIA'S EXPORT

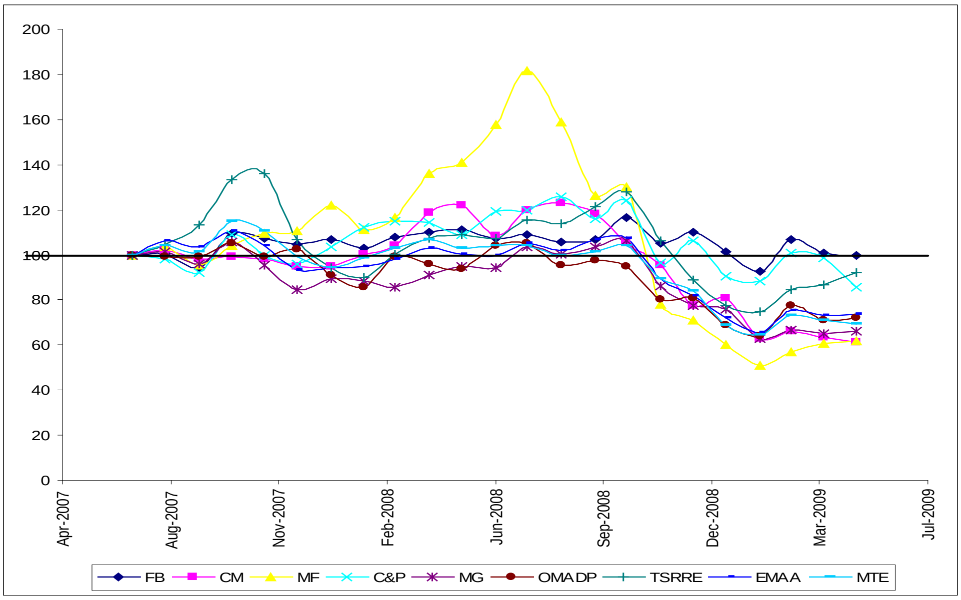
The fallout of the crisis is a deceleration in import demand in advanced economies (IMF 2009). A discussion on trends in imports in advanced economies will help us understand South Asia's position, particularly in the crisis period. We consider the trends in monthly imports in the US, Japan, and the EU. To understand the variations across products, we construct the import index with base July 2007 for imports into the US, Japan, and the EU.

Figures 3 to 5 and Tables 3 to 5 provide the trends in imports in three major advanced economies. The following observations are worth noting.

First, among the three economies, the fall in aggregate imports has been rapid in the US, particularly since the third quarter of 2008. The same trend has also continued in the EU with some variations. Imports did not pick up until May 2009 in the US and March 2009 in Japan, whereas there was a sign of slight recovery in the EU.

Second, barring food and beverages (FB), imports of major commodities have declined sharply in the US since July 2008. The fall in demand has been witnessed in crude materials, inedible except fuels (CM), as its index went down from 119.78 in July 2008 to 61.39 in May 2009, due mainly to a fall in global prices. A similar trend has continued with some variations in other commodities such as mineral fuels, lubricants and related materials; chemicals and related products; manufactured goods; office machinery and automatic data processing equipment; electrical machinery, apparatus and appliances; and machinery and transport equipment. However, imports of telecom, sound recording and reproducing equipment (TSRRE) have contracted relatively less as demand picked up again from March 2009. In general, imports of mineral fuels and manufactured goods into the US have declined sharply.

Figure 3: Monthly Import Index (July 2007=100): US



Notes: FB – Food and Beverages; CM – Crude Materials, Inedible except Fuels; MF – Mineral Fuels, Lubricants and Related Materials, C&P – Chemicals and Related Products; MG – Manufactured Goods; OMADP – Office Machinery and Automatic Data Processing Equipment; TSRRE – Telecomm, Sound Recording and Reproducing Equipment; EMAA – Electrical Machinery, Apparatus and Appliances; MTE – Machinery and Transport Equipment. Commodity groups followed SITC codes.

Source: Calculated based on US Census Bureau data, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

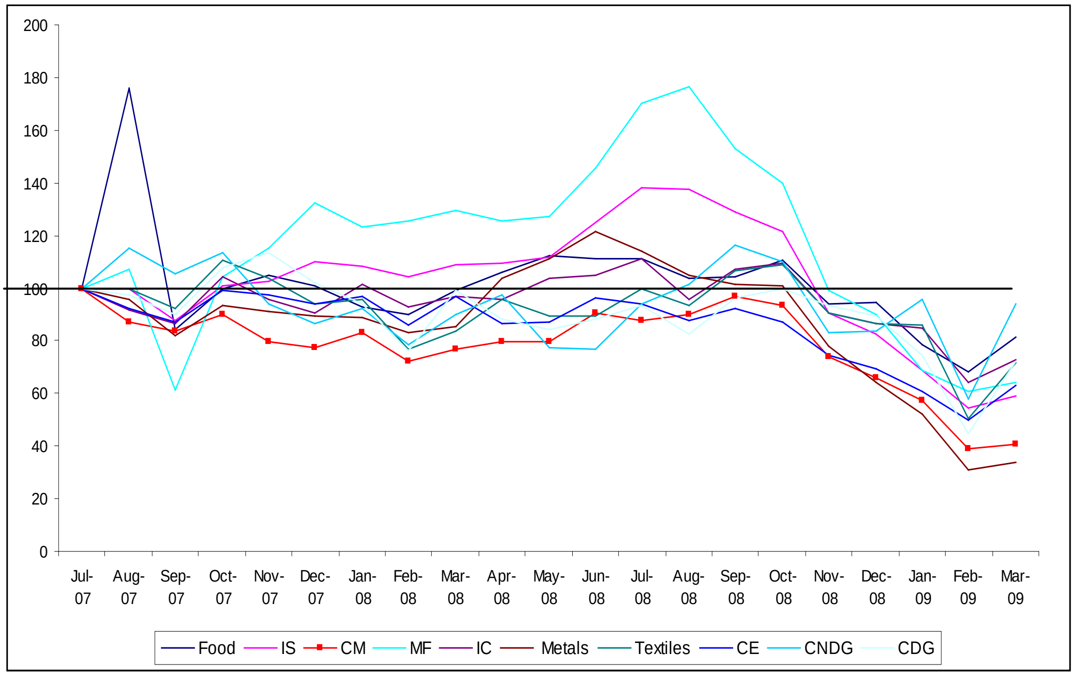
Table 3: Monthly Import Index (July 2007=100): US

	FB	CM	MF	C&P	MG	OMADP	TSRRE	EMAA	MTE
Jul-2007	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Aug-2007	100.24	101.75	103.34	98.15	101.31	99.31	104.54	106.27	104.20
Sep-2007	94.22	97.98	95.65	92.40	96.04	99.39	113.21	103.78	101.22
Oct-2007	109.61	99.39	104.12	109.18	105.83	104.89	133.08	110.84	115.16
Nov-2007	107.48	98.33	109.58	99.77	95.32	99.19	136.20	104.20	110.63
Dec-2007	104.41	95.01	110.54	96.06	84.43	102.70	106.57	93.30	99.17
Jan-2008	106.71	94.92	122.16	103.76	89.43	90.88	94.57	94.14	94.13
Feb-2008	102.73	100.53	110.93	112.08	88.45	85.61	89.83	95.00	98.89
Mar-2008	107.70	104.14	116.35	114.87	85.52	99.36	100.30	97.99	103.15
Apr-2008	110.11	118.97	136.17	114.45	91.12	96.12	107.22	103.20	106.95
May-2008	110.95	122.20	140.99	108.91	94.86	93.56	108.96	100.37	103.12
Jun-2008	107.05	108.54	157.83	119.23	94.29	104.05	107.10	99.47	104.03
Jul-2008	109.01	119.78	181.31	120.00	103.41	105.21	115.40	105.23	104.24
Aug-2008	105.60	122.87	158.98	125.50	100.23	95.31	113.83	102.10	99.65
Sep-2008	106.83	117.92	126.25	116.12	103.34	97.40	121.65	106.75	101.24
Oct-2008	116.61	105.00	130.11	124.02	106.08	95.02	127.92	107.24	103.89
Nov-2008	105.14	95.31	78.18	96.49	86.20	80.10	106.17	89.34	89.22
Dec-2008	109.96	77.67	71.24	106.07	77.71	80.65	88.97	81.82	83.84
Jan-2009	101.48	80.88	60.16	90.43	76.04	69.05	77.25	72.04	69.04
Feb-2009	92.77	63.01	51.13	88.60	63.03	63.75	74.54	65.83	64.40
Mar-2009	106.76	66.16	57.02	100.95	66.85	77.55	84.38	75.13	73.04
Apr-2009	100.63	63.26	60.91	98.46	64.79	70.89	86.67	73.08	71.25
May-2009	99.90	61.39	62.05	85.72	65.97	71.99	92.28	73.79	69.21

Notes: FB – Food and Beverages; CM – Crude Materials, Inedible except Fuels; MF – Mineral Fuels, Lubricants and Related Materials, C&P – Chemicals and Related Products; MG – Manufactured Goods; OMADP – Office Machinery and Automatic Data Processing Equipment; TSRRE – Telecomm, Sound Recording and Reproducing Equipment; EMAA – Electrical Machinery, Apparatus and Appliances; MTE – Machinery and Transport Equipment. Commodity groups followed SITC codes.

Source: Calculated based on US Census Bureau date, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

Figure 4: Monthly Import Index (July 2007=100): Japan



Notes: IS – Industrial Supplies; CM – Crude Materials; MF – Mineral Fuels; IC – Industrial Chemicals; CE – Capital Equipment; CNDG – Consumer Nondurable Goods; CDG – Consumer Durable Goods. Commodity groups follow SITC codes.

Source: Calculated based on Japan Ministry of Finance data, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

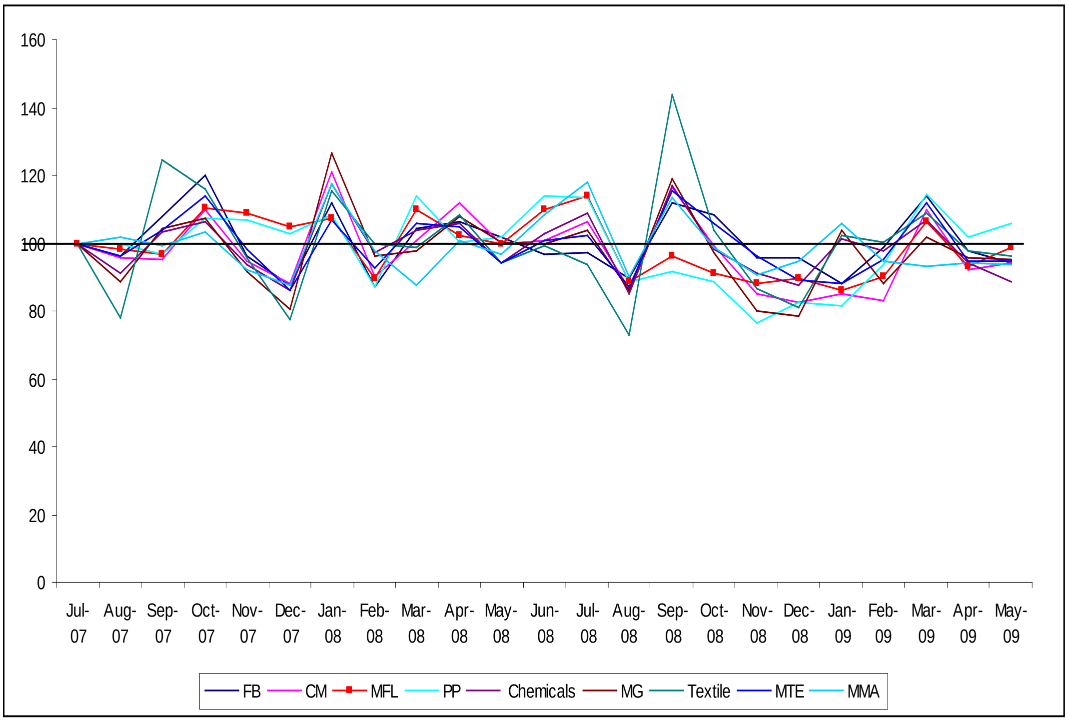
Table 4: Monthly Import Index (July 2007=100): Japan

	Food	IS	CM	MF	IC	Metals	Textiles	CE	CNDG	CDG
Jul-2007	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Aug-2007	175.89	99.79	87.33	107.16	91.85	95.61	99.83	92.29	115.23	97.64
Sep-2007	84.13	87.83	83.86	61.12	86.75	82.12	92.15	86.97	105.55	89.77
Oct-2007	99.82	100.96	89.80	104.24	104.29	93.69	110.42	99.31	113.65	107.52
Nov-2007	104.67	102.86	79.68	114.97	95.70	91.40	103.79	97.23	93.73	113.43
Dec-2007	100.87	110.19	77.27	132.46	90.53	89.31	94.21	94.18	86.60	102.19
Jan-2008	92.97	108.06	83.21	123.24	101.34	88.87	95.72	96.69	92.14	93.95
Feb-2008	90.18	104.55	71.94	125.32	93.03	83.13	76.55	85.91	78.49	76.22
Mar-2008	99.26	109.14	76.76	129.59	97.11	85.58	83.40	96.65	90.18	99.27
Apr-2008	106.14	109.28	79.58	125.52	95.71	103.69	95.76	86.74	97.46	88.25
May-2008	112.41	111.93	79.45	126.97	103.44	111.40	89.35	87.23	77.41	84.18
Jun-2008	110.99	124.80	90.71	145.73	104.67	121.36	89.25	96.42	77.00	88.30
Jul-2008	111.36	137.86	87.76	170.14	111.31	113.87	99.94	94.26	94.19	93.37
Aug-2008	103.79	137.68	90.21	176.30	95.74	104.84	93.30	87.83	101.33	82.76
Sep-2008	104.09	128.70	96.84	153.03	106.89	101.64	106.65	92.50	116.27	95.99
Oct-2008	110.75	121.43	93.68	139.81	109.29	100.91	109.15	86.95	109.95	99.84
Nov-2008	94.17	90.66	73.91	99.01	90.58	78.04	90.52	74.67	83.17	93.64
Dec-2008	94.40	82.27	65.76	90.24	86.29	63.93	86.40	69.43	83.40	89.68
Jan-2009	78.75	68.53	57.03	68.86	84.75	52.20	86.23	60.62	95.62	74.59
Feb-2009	68.25	54.42	39.19	60.87	64.23	31.18	50.46	49.96	57.86	44.88
Mar-2009	81.50	59.01	40.48	64.03	72.51	34.00	71.53	63.27	94.09	72.13

Notes: FB – Food and Beverages; CM – Crude Materials, Inedible except Fuels; MF – Mineral Fuels, Lubricants and Related Materials, C&P – Chemicals and Related Products; MG – Manufactured Goods; OMADP – Office Machinery and Automatic Data Processing Equipment; TSRRE – Telecomm, Sound Recording and Reproducing Equipment; EMAA – Electrical Machinery, Apparatus and Appliances; MTE – Machinery and Transport Equipment. Commodity groups followed SITC codes.

Source: Calculated based on US Census Bureau date, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

Figure 5: Monthly Import Index (July 2007=100): EU27



Notes: FB – Food and Beverages; CM – Crude Materials; MFL – Mineral Fuels and Lubricants; PP –Petroleum Products; MG – Manufactured Goods; MTE – Machinery and Transport Equipment; MMA – Miscellaneous Manufactured Articles. Commodity groups follow SITC codes.

Source: Calculated based on Euro Stat data, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

Table 5: Monthly Import Index (July 2007=100): EU27

	FB	CM	MFL	PP		MG	Textile	MTE	MMA
Jul-2007	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Aug-	96.33	95.58	98.47	99.73	91.17	88.74	78.04	96.19	101.53
Sep-	107.72	94.97	96.63	96.74	103.45	104.32	124.32	103.86	99.14
Oct-2007	119.77	109.96	110.36	107.47	106.46	107.54	115.85	114.04	103.18
Nov-	96.22	94.48	108.68	106.89	93.91	91.51	95.66	98.25	92.05
Dec-	87.64	88.01	104.84	102.70	86.24	80.27	77.35	86.01	87.78
Jan-2008	111.73	121.18	107.17	108.14	117.71	126.36	115.63	106.99	117.45
Feb-	87.32	90.38	89.71	87.08	97.27	96.02	99.56	92.44	97.95
Mar-	104.47	100.66	109.69	114.07	103.95	97.48	98.62	105.59	87.65
Apr-2008	106.43	111.89	102.08	100.30	105.98	107.83	108.57	104.99	100.80
May-	101.56	99.95	99.82	101.96	93.97	100.25	94.22	94.38	96.70
Jun-2008	96.96	100.61	109.96	114.12	102.80	99.91	99.39	100.60	108.30
Jul-2008	97.23	106.52	113.92	113.58	108.98	103.99	93.84	102.28	118.22
Aug-	89.75	86.42	88.69	88.81	85.32	86.22	72.92	86.96	90.10
Sep-	111.97	116.55	96.17	91.46	116.76	118.99	143.64	115.48	113.48
Oct-2008	108.27	99.03	91.38	88.85	98.15	97.01	103.68	105.69	98.52
Nov-	95.72	85.19	87.86	76.27	91.30	80.24	86.46	96.15	90.53
Dec-	95.87	82.30	89.42	82.31	87.82	78.71	80.94	89.24	94.84
Jan-2009	87.98	84.95	85.88	81.51	101.27	103.96	102.43	88.20	105.89
Feb-	98.99	83.19	89.90	93.63	97.88	88.14	100.12	94.98	94.88
Mar-	114.04	110.09	106.12	114.43	107.09	101.98	108.68	111.67	92.98
Apr-2009	97.57	92.03	93.18	101.68	94.00	95.61	97.55	94.45	94.41
May-	94.26	94.19	98.61	105.73	88.62	95.22	96.09	94.71	93.51

Notes: FB – Food and Beverages; CM – Crude Materials, Inedible except Fuels; MF – Mineral Fuels, Lubricants and Related Materials, C&P – Chemicals and Related Products; MG – Manufactured Goods; OMADP – Office Machinery and Automatic Data Processing Equipment; TSRRE – Telecomm, Sound Recording and Reproducing Equipment; EMAA – Electrical Machinery, Apparatus and Appliances; MTE – Machinery and Transport Equipment. Commodity groups followed SITC codes.

Source: Calculated based on US Census Bureau data, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

Table 6: Monthly Import Index (July 2007=100)

	Importer: US			Importer: Japan			Importer: EU 15
Exporter	Pakistan	Sri Lanka	India	India	Pakistan	Sri Lanka	India
Jul-2007	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Aug-2007	106.17	110.99	122.50	96.42	92.74	71.37	100.96
Sep-2007	90.44	94.93	88.43	67.64	101.87	87.36	99.78
Oct-2007	106.24	86.59	124.69	118.26	130.25	147.96	103.56
Nov-2007	86.20	90.97	91.80	94.67	334.78	68.83	91.33
Dec-2007	92.77	111.71	84.80	101.11	75.24	95.18	83.67
Jan-2008	101.41	114.65	121.59	165.48	138.84	128.76	140.87
Feb-2008	90.77	91.62	92.44	55.45	51.51	80.77	98.44
Mar-2008	120.06	108.69	107.02	170.48	112.34	132.83	102.11
Apr-2008	96.81	80.01	94.49	94.51	58.42	81.43	100.11
May-2008	113.91	93.22	102.67	89.48	215.65	88.84	94.44
Jun-2008	92.82	115.94	85.96	81.08	169.98	107.88	107.22
Jul-2008	102.92	112.77	110.05	107.99	34.23	97.48	103.88
Aug-2008	115.17	92.67	107.57	91.95	202.21	99.21	91.85
Sep-2008	84.19	101.35	107.70	117.05	43.72	103.20	106.62
Oct-2008	120.55	99.38	102.01	123.13	116.75	98.72	104.70
Nov-2008	83.40	86.04	78.39	61.57	38.76	81.68	83.15
Dec-2008	97.85	108.69	96.51	103.29	192.95	105.72	93.68
Jan-2009	83.67	103.35	99.08	85.03	58.94	111.60	107.57
Feb-2009	101.75	90.30	86.36	83.31	75.40	75.23	97.48
Mar-2009	95.92	107.56	112.09	108.57	136.35	138.42	114.72
Apr-2009	98.28	93.81	99.83	127.51	191.80	82.29	85.05
May-2009	115.85	67.50	91.13	83.46	73.41	71.83	95.37
Jun-2009	106.19	110.45	97.34	85.59	82.68	117.61	96.00

Notes: FB – Food and Beverages; CM – Crude Materials, Inedible except Fuels; MF – Mineral Fuels, Lubricants and Related Materials, C&P – Chemicals and Related Products; MG – Manufactured Goods; OMADP – Office Machinery and Automatic Data Processing Equipment; TSRRE – Telecomm, Sound Recording and Reproducing Equipment; EMAA – Electrical Machinery, Apparatus and Appliances; MTE – Machinery and Transport Equipment. Commodity groups followed SITC codes.

Source: Calculated based on US Census Bureau date, available at CEIC Database, http://www.ceicdata.com (accessed 7 August 2009).

Third, Japan repeats the trends observed in the US. Imports of metals have drastically fallen from 113.87 in July 2008 to 34.00 in March 2009, the largest fall among the goods reported here. Imports of industrial supplies (IS), crude materials (CM), mineral fuels (MF), industrial chemicals (IC), textiles, capital equipment (CE), consumer nondurable goods, and consumer durable goods (CDG) also followed the same direction with some variations.

Fourth, unlike the US and Japan, the EU has higher intraregional trade. Imports by the EU also declined, but the fall was not so steep. In some commodities, imports rose in the EU and US from March 2009.

Fifth, India, Sri Lanka, and Pakistan could not escape the subsequent fall in their exports to advanced economies. While South Asia’s exports to the US, Japan, and the EU have been fluctuating and unsteady since July 2007, their exports to these economies have witnessed a sharp fall since the middle of the third quarter of 2008 (Table 6). For example, Japan’s imports from Pakistan went down by over 41 index points to 58.94 in January 2009; the US’s imports from Sri Lanka fell by 26.3 index points in May 2009; and the EU’s imports from India declined to 83.15 in November 2008. Due to weakening demand, US imports from developing South Asia contracted in almost all commodities during the fourth quarter of 2008 and the first quarter of 2009 (see Appendix 1). Nonetheless, compared to May 2009, there is a slight change in the trend in June 2009, when imports of Japan, the US, and the EU from the three South Asian countries generally rose.

Finally, India's production and export structure is different. In part India's ostensible resilience in the face of the global crisis, reflected in a much smaller proportionate decline in its GDP in 2008 relative to the People's Republic of China, appears to be because of its much smaller export dependence on manufacturing. Therefore, the fall in import demand in advanced economies has led to corresponding falls in exports of India, Pakistan, and Sri Lanka in the crisis period. The short-term implication of this declining trend on developing countries like India, Pakistan, and Sri Lanka is presumably economic turmoil. If the crisis continues, there will be a drastic change in composition of traded goods and subsequently their production in South Asia and also elsewhere. To ascertain whether or not such compositional change is a matter for industrial restructuring, we attempt to find out the change in composition of South Asian countries' production.[9]

4. COMPOSITIONAL CHANGE IN EXPORTS AND MANUFACTURING GOODS PRODUCTION

Our objective is to find out the effect of change in trade on the industry on particular products. Our argument is when a country trades in differentiated goods, its production sector will have cyclical links with the trade sector. The product composition in the 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 the following shape:

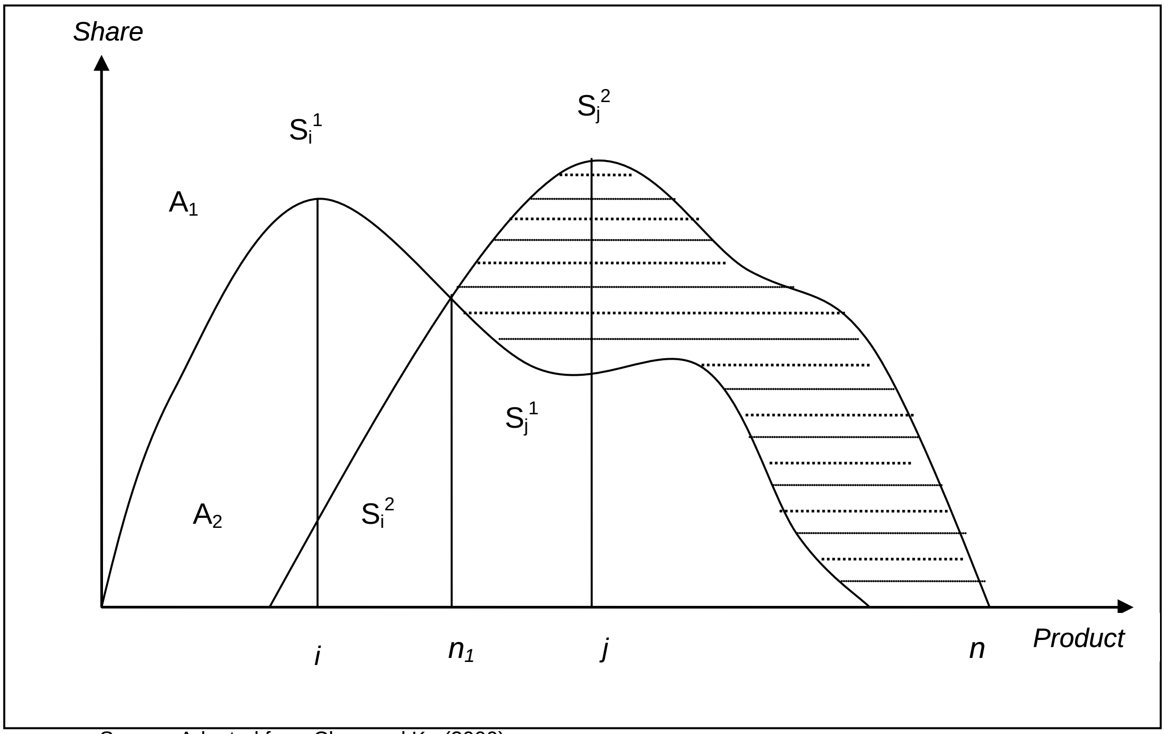
$$DS^{i}_{t,t+1} = \left(\frac{x^{i}_{t+1}}{\sum_{i=1}^{n} X^{i}_{t+1}} \right) - \left(\frac{x^{i}_{t}}{\sum_{i=1}^{n} X^{i}_{t}} \right) \quad (1)$$

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

where DS stands for difference in shares, *i* is country, *t* is time, and *x* is product (Chen and Ku 2000). 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 the composition change index (CCI).

[9] Due to lack of data, we measure this compositional change in the rest of the paper only on India.

Figure 6: Measuring Changes in Product Composition



Source: Adapted from Chen and Ku (2000).

The CCI can be better explained from Figure 6. 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 6, 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, the 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.

Table 7: Changes in Export Composition in India

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

Source: Calculated by the authors.

Table 8: 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 Fiber Textiles (ex. cotton) • Leather and Fur Products • Basic Chemicals and Chemical Products • Metal Products and Parts (ex. Machinery and Equipment)
January 2008–January 2009	0.037	• Beverages, Tobacco, and Related Products • Wool, Silk, and Manmade Fiber Textiles • Basic Chemicals and 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 Fiber Textiles (ex. cotton) • Textile Products, Including Wearing Apparel • Wood and Wood Products; Furniture and Fixtures • Leather and Fur Products • Basic Chemicals and Chemical Products • Machinery and Equipment (ex. Transport Equipment)
July 2008–May 2009	0.030	• Wool, Silk, and Manmade Fiber 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 Manmade Fiber Textiles • Rubber, Petroleum, Plastic, and Coal Products • Machinery and Equipment (ex. Transport Equipment)

* CCI = Composition Change Index.

Source: Calculated by the authors.

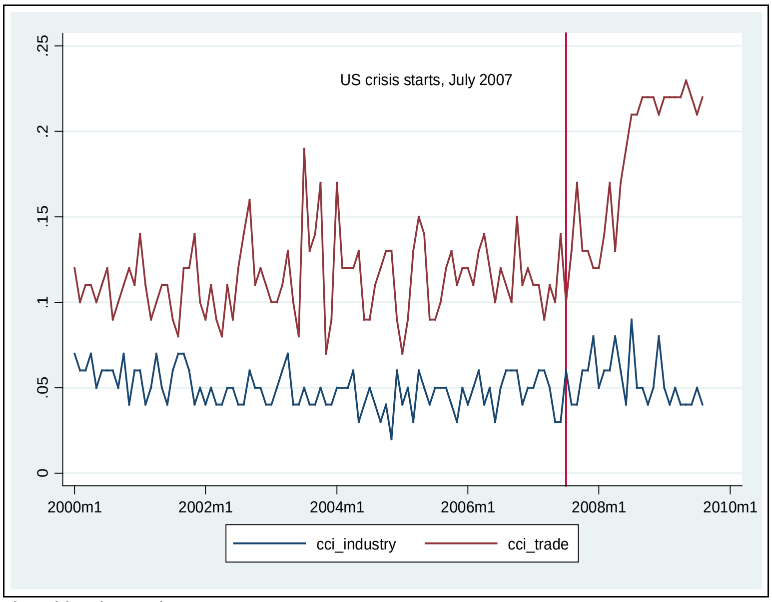
The composition change index (CCI) for trade and industry has been calculated following equations 1 and 2 for India based on monthly data from January 2007 to May 2009 for manufacturing goods and from January 2007 to February 2009 for export goods. CCI scores for India's exports along with commodities with positive change are reported in Table 7, whereas the same scores for manufacturing are reported in Table 8. The following observations are worth noting.

First, variations in CCI scores in India's exports (Table 7) suggest shifting of products across periods is very frequent. A comparison between two relatively longer time points is likely to have a 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, the CCI score decreased to 0.122, suggesting switching of products. Over 10% of export revenue came from new products or uneven expansion of old products, whereas the same factors contributed over 15% of export revenue during January 2008 to January 2009 and January 2007 to January 2009.

Second, expansions of existing products or creation of new products from January 2007 to January 2009 in Indian exports have been noticed in readymade garments; leather and leather products; jute and jute 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 jewelry; drugs, pharmaceuticals, and fine chemicals; food and beverages; transport equipment; and marine products, whereas the other exports witnessed either zero or negative change.

Third, CCI scores in Table 8 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 the CCI is associated with longer-period observations. The lower magnitude of the CCI across different comparable periods in manufacturing also confirms that shifting of products is not very rapid in domestic manufacturing. It also suggests compositional change has always been less than 5% in manufacturing in India. The positive compositional change was witnessed in categories such as food products; beverages, tobacco, and related products; jute and other vegetable fiber textiles; rubber, petroleum, plastic, and coal products; leather and fur products; and machinery and equipment.

Figure 7: Monthly Trends in CCI (Industry) and CCI (Trade)



Source: Calculated by the authors.

Fourth, there has not been much compositional change in manufacturing post-July 2008 that matches India's exports, except in food and beverages. The compositional change in products in exports was seemingly different than the compositional changes observed in manufacturing from July 2008 to February 2009.

Fifth, the CCI scores also indicate that exports of manufacturing goods underwent more sweeping changes in product composition than those in production of manufacturing goods. Given the advantage of depreciating currency, this is not surprising because incentives are relatively higher in trade, other things being equal, than in manufacturing, particularly in the short run. More sweeping changes are taking place in exports than manufacturing. The monthly aggregate CCI for manufacturing also confirms this (Figure 7). Therefore, the export sector generates major compulsion for adjustment and restructuring. The bigger the export sector, the larger is the restructuring need.

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 reorganizing the production structure 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 competing imports to the export sector), new products 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.

5. IMPACT OF GLOBAL CRISIS SHOCKS ON INDUSTRY AND TRADE

Sharp deceleration in global trade is posing a great challenge to us. The question is, how will an economy, especially that of a developing country like India, adjust to the new economic circumstances in the face of the global crisis? We approach this question in the following two ways.

First, we use a panel data model (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 the ongoing crisis, the second model demonstrates how crisis shocks have been 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.

6. PANEL DATA MODEL (PDM)

To assess the trade impact on a country's industrial composition, we use the 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 respectively the compositional change index (CCI) in industry and trade of country *i* for time *t*, which we get from equations 1 and 2. *X* is a vector of additional regressors to control the country's overall trade, foreign direct investment, exchange rate, and so on. CD is considered as a 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 the advanced economy interactive term in equation (3). The final estimable equation then becomes

$$y_{it} = \alpha_1 + \beta_1 x_{it} + \beta_2 X_{it}^{'} + \beta_3 CD + \beta_4 (x_{ti} * CD) + \beta_5 Ex_{it}^{j} + \beta_6 (CD * Ex_{it}^{j}) + \varepsilon_{it} \quad (4)$$

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

We use equation 4 in a panel (unbalanced) of data of 115 continuous months from January 2000 to August 2009. Due to lack of consistent data on other South Asian economies, we only consider India in this part of the study. Appendix 2 provides the data sources. All the continuous variables are taken in logarithmic terms; thus estimated parameters show elasticity. We have estimated five different equations with different sets of independent variables. The results are presented in Table 9. The following findings are worth considering.

First, 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. There is a small tendency toward co-movement of compositional changes in export and industry.

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

Third, while compositional change in industry in India has been stimulated by India's exports to the EU and Japan, its estimated parameter is negative in the case of the US. This may be because the US is India's principal export market, which has been severely harmed by the global crisis; because there are some other reasons (e.g., distance) which the models fail to capture; or because larger distance makes it more expensive to export, so the fall of demand impact has become stronger.

Table 9: PDM Regression Results
Dependent variable = Compositional change in industry

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Compositional change in exports (cci_ex)	0.046	0.0188	0.0781	0.0455	0.0222
	(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 investment (fdi)	0.0263	0.0239	0.0266	0.0161	0.0137
	(0.0218)	(0.0226)	(0.0225)	(0.0248)	(0.0293)
Business confidence index (bci)	-0.218	-0.137	-0.246	-0.303	-0.323
	(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 in exports in crisis period (cci_ex*cd)			-2.179	-1.362	-1.03
			(2.003)	(2.113)	(1.98)
Exports to US (ex_us)				-0.0308	-0.0228
				(0.053)	(0.0652)
Exports to EU (ex_eu)				0.0181	0.0356
				(0.087)	(0.082)
Exports to Japan (ex_japan)				0.0133	0.0113
				(0.033)	(0.0367)
Exports to US in crisis period (ex_us*cd)					-0.442
					(0.718)
Exports to EU in crisis period (ex_eu*cd)					0.873
					(0.251)
Exports to Japan in crisis period (ex_japan*cd)					0.029
					(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 chi^2	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)

RE (GLS) = Random Effect (Generalized Least Squares).

Notes: Robust standard errors are in parenthesis; ***, **, * = significant at 1%, 5%, and 10% level. Selection of RE is based on Hausman test.

Source: Calculated by the authors.

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

Fifth, control variables like foreign direct investment, trade openness, business confidence index, inflation, exchange rate, and bank lending rate have appeared with correct signs but are statistically insignificant except inflation. Perhaps price rise has diminished industrial composition. However, the estimated models explain only 17% to 24% of the variations in observations. Although the regression models do not suffer much from multicollinearity (Appendix 3), 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 roots and cointegration in the models.

Finally, since there may be lags 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 trade openness. The overriding objective is thus to examine the dynamic effects of global crisis shocks on Indian industry and trade.

7. VECTOR AUTOREGRESSION (VAR)

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

It is observed in the PDM that Indian industry and trade were not heavily affected by the ongoing crisis originated in the US, the 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 the VAR technique. Also, we examine the effect of the crisis of these three countries measured in terms of their respective trade (India's imports from and exports to the respective countries) and the effect of the GDPs of the respective countries on the trade openness (trade-GDP ratio) of India.

In the present analysis we have taken the monthly data on CCI (industry), exports to and imports from the US, Japan, and the EU; the GDPs 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 from January 2000 to June 2007, and (ii) a crisis period 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 affects 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.[10] The VAR approach sidesteps the need for structural modeling by modeling 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:

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

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 represents 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.

[10] Pioneered by Sims (1980).

Since only lagged values of the endogenous variables appear on the right-hand side of each equation, there is no issue of simultaneity, and ordinary least squares 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 traces the effect of a 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 sets 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 a 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 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 function measures the effect of a one standard deviation shock on current and future values of the variables concerned. 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 the VAR analysis we have checked the stationarity of the concerned variables using an Augmented Dickey-Fuller (ADF) test (see Appendix 4). In the first model we have taken the variables CCI (industry) and exports to the US, Japan, and the EU as endogenous variables. The values of ADF test statistics indicate that export figures are nonstationary 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 the US, Japan, and the EU as endogenous variables. Similar to export values, the import series is 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. Note that the values of exports and imports are taken in nominal price. Since it would be difficult to find a 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 the pre-crisis, postcrisis, and total periods. Appendix 5 presents the estimated VAR results. The following results are worth noting.

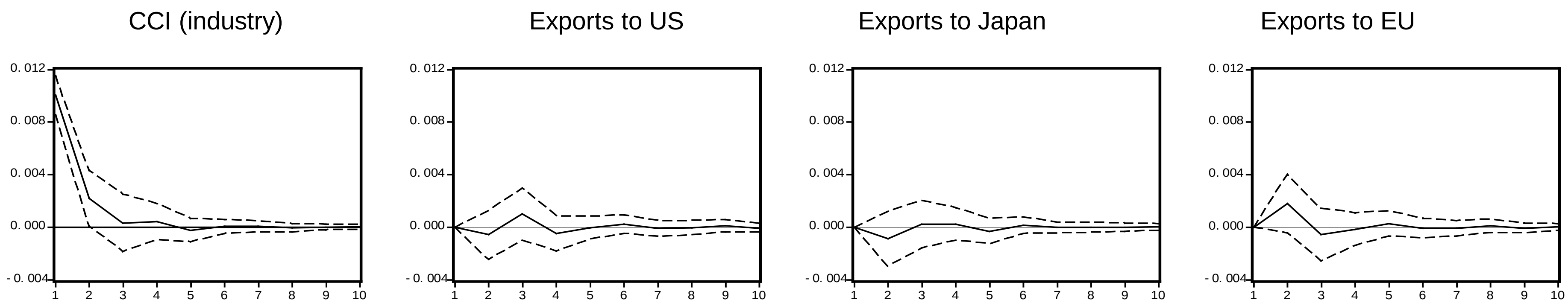
First, CCI (industry) has responded significantly to the exports to the US, Japan, and the EU during the crisis period. Figure 8 depicts the response of CCI (industry) in India to one standard deviation shock to CCI (industry), exports to the US, Japan, and the EU. During the pre-crisis period CCI (industry) did not respond significantly to a shock in US exports, Japan exports, and EU exports. However, during the postcrisis period CCI (industry) has responded significantly to the exports to the US, Japan, and the EU. But, the responses of CCI (industry) to exports to Japan and the EUare lower, compared to exports to US, and the response to its own shock has declined significantly during the postcrisis period.

Second, variance decomposition of CCI (industry) in Figure 9 reveals that during the pre-crisis period almost 100% of the variation in CCI (industry) depends on its own variation, while in the postcrisis period about 20% of the variation in CCI (industry) depends on the combined exports to the EU, Japan, and the US. Thus, the effect of shocks on India's exports to advanced economies during the crisis period has been transmitted to Indian industry.

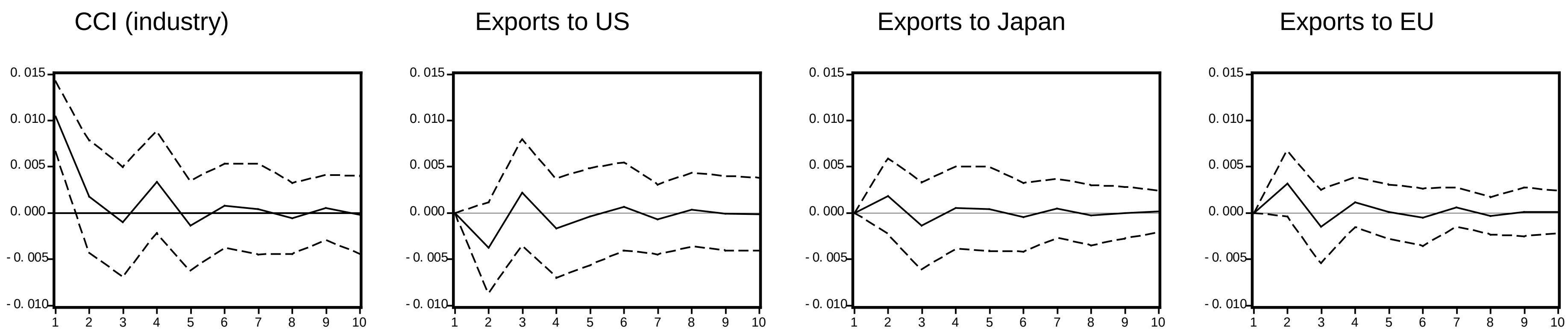
Third, the ongoing crisis has no substantial effect on Indian industry for the total period from January 2000 to August 2009. Figure 10 shows the responsiveness of CCI (industry) to all these variables during the total period. It is observed that the response of CCI (industry) due to one standard deviation shock is similar to the response during 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 the US, Japan, and the EU, while the response to its own shocks is significant during both pre- and postcrisis periods. Figures 11 to 13 capture the estimated impulse response of CCI (industry) to its own shocks and import shocks. It is observed in Figure 11 that CCI (industry) has not responded significantly to the shocks of imports from the US, Japan, and the EU, while the response to its own shocks is significant during both pre- and postcrisis periods. Figure 12 describes the variance of CCI (industry) that can be explained by a shock in imports to the US, Japan, and the EU and by its own shock. The shocks in imports to the US, Japan, and the EU had very little influence on the variance of CCI (industry) during pre- and postcrisis periods. Figure 13 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.

Figure 8: Impulse Response of CCI (Industry) (One St. Dev. Shock): Pre-Crisis



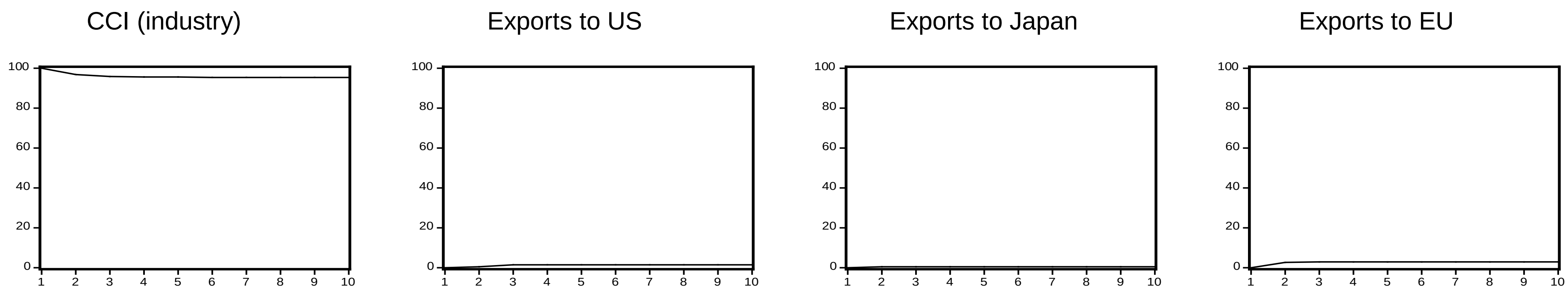
Impulse Response of CCI (Industry) (One St. Dev. Shock): Postcrisis



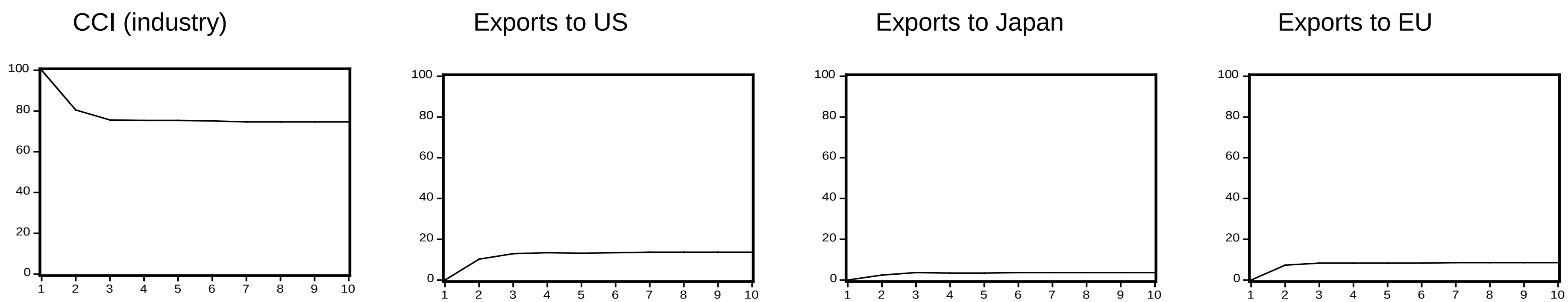
Source: Calculated by the authors.

Figure 9: Variance Decomposition

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

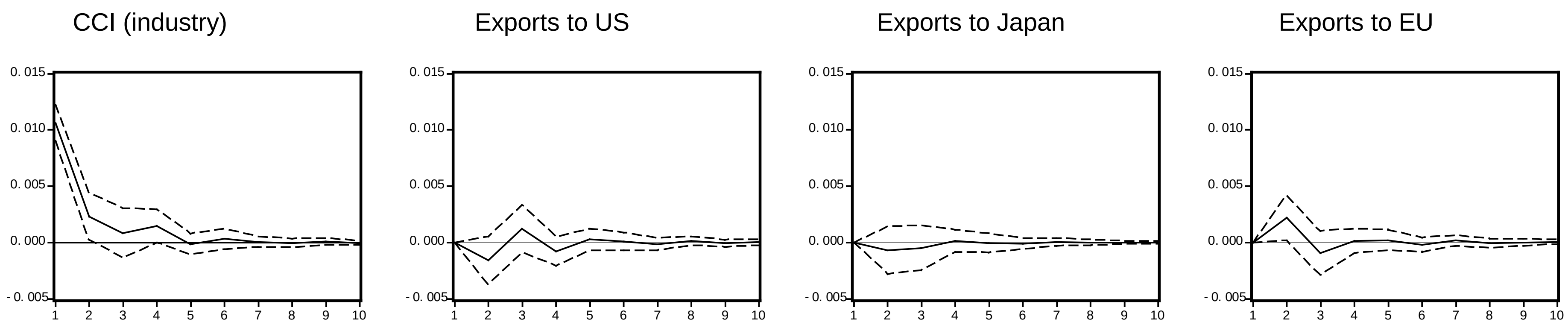


Percent Variance of CCI (Industry) (Postcrisis) due to

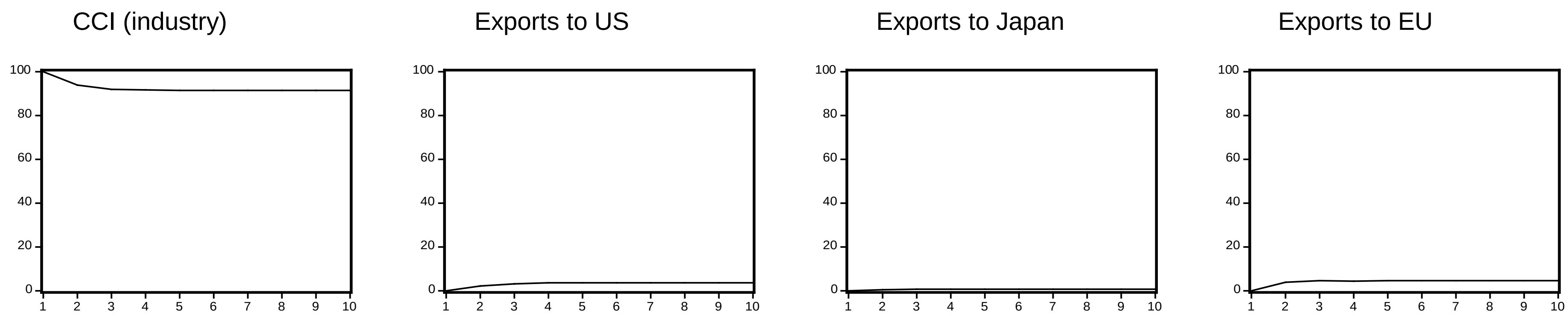


Source: Calculated by the authors.

Figure 10: Impulse Response of CCI (Industry) (One St. Dev. Shock): Total Period

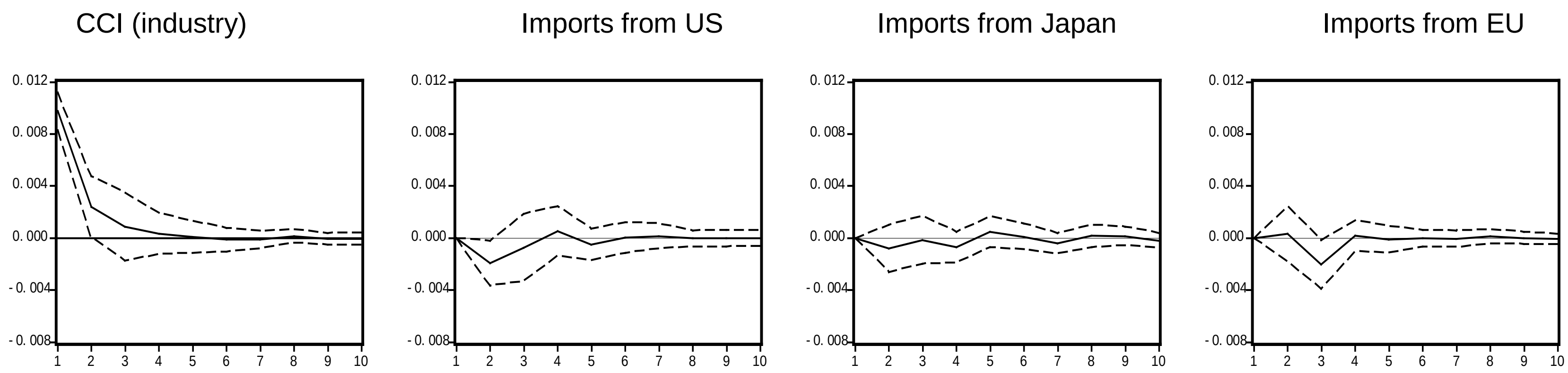


Variance Decomposition
Percent Variance of CCI (Industry) (Total Period) due to

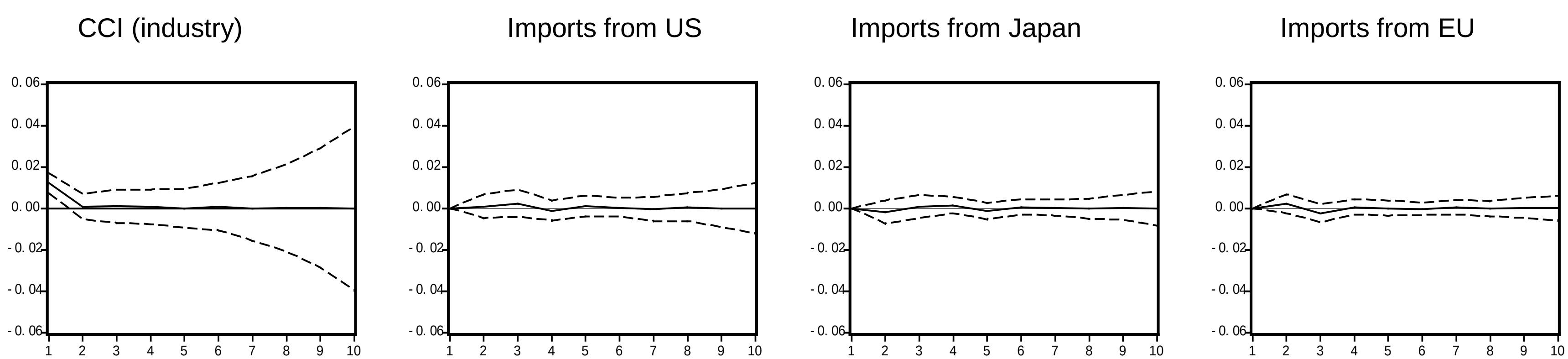


Source: Calculated by the authors.

Figure 11: Impulse Response of CCI (Industry) (One St. Dev. Shock): Pre-Crisis

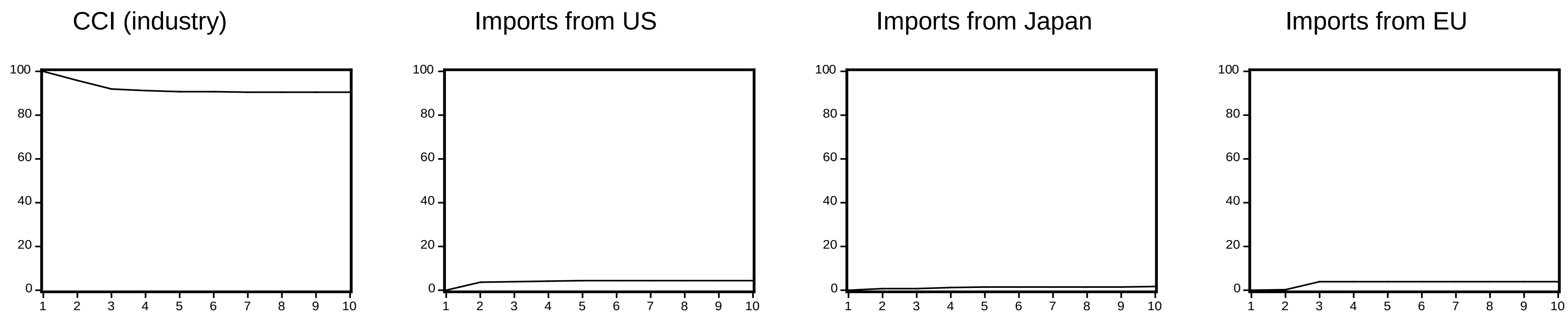


Impulse Response of CCI (Industry) (One St. Dev. Shock): Postcrisis

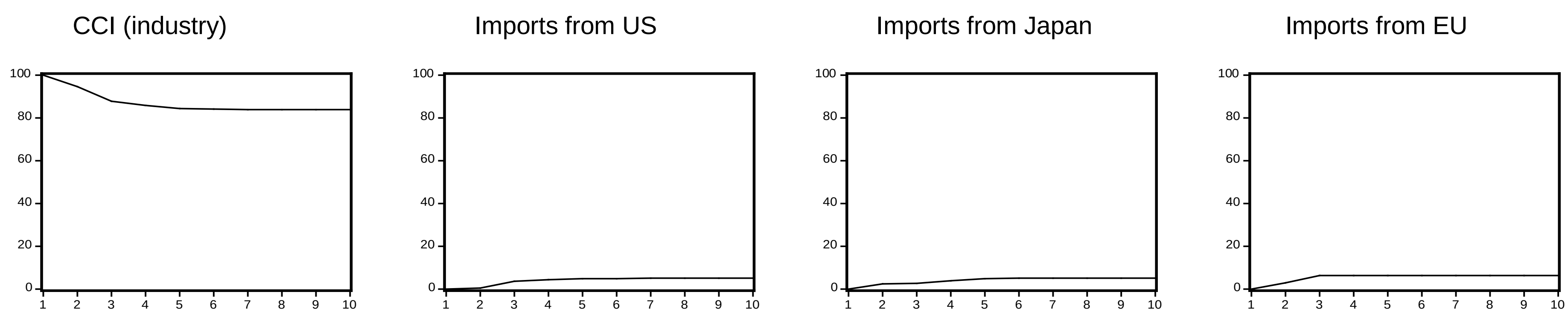


Source: Calculated by the authors.

Figure 12: Variance Decomposition
Percent Variance of CCI (Industry) (Pre-Crisis) due to

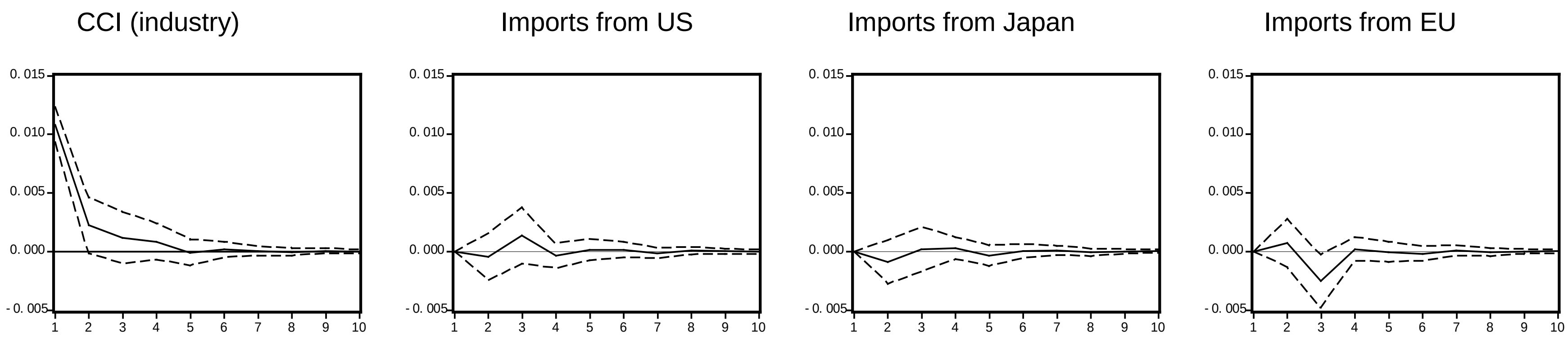


Percent Variance of CCI (Industry) (Postcrisis) due to

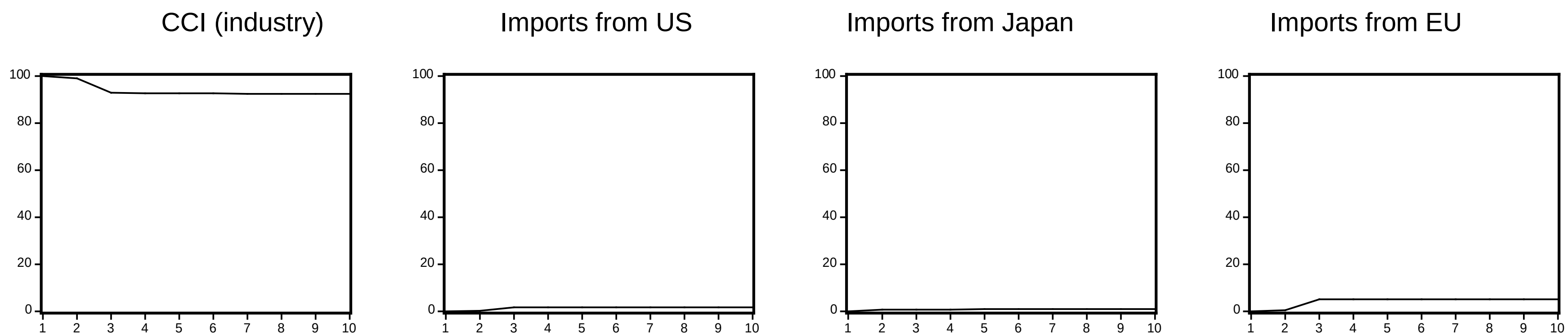


Source: Calculated by the authors.

Figure 13: Impulse Response of CCI (Industry) (One St. Dev. Shock): Total Period

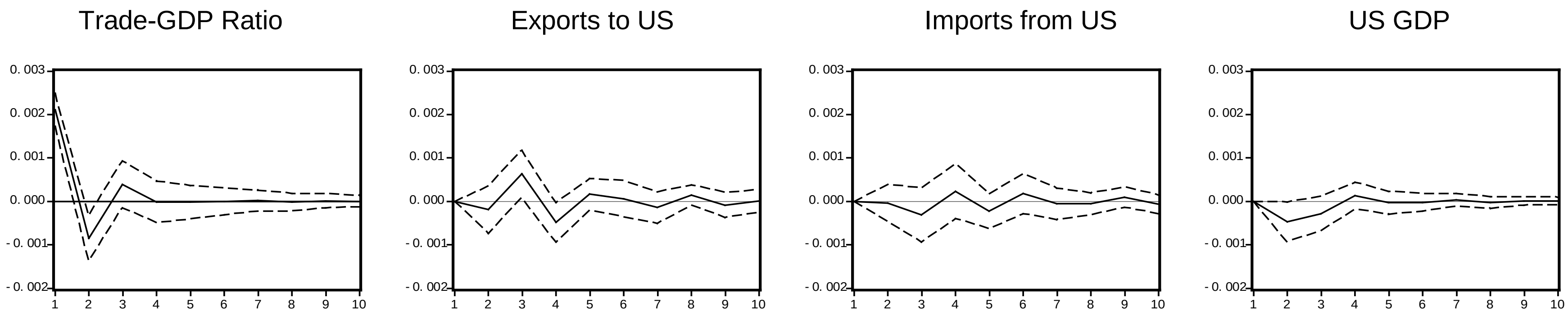


Variance Decomposition
Percent Variance of CCI (Industry) (Postcrisis) due to

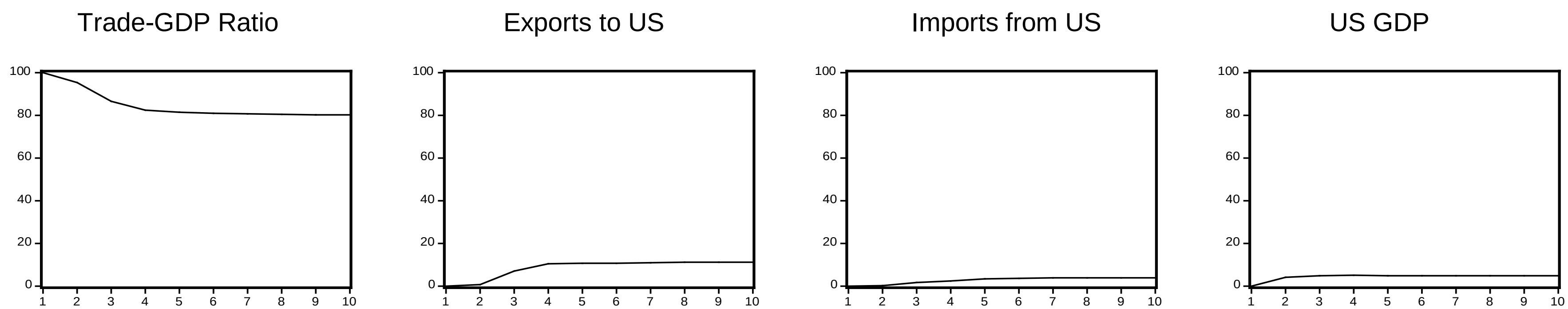


Source: Calculated by the authors.

Figure 14: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Pre-crisis

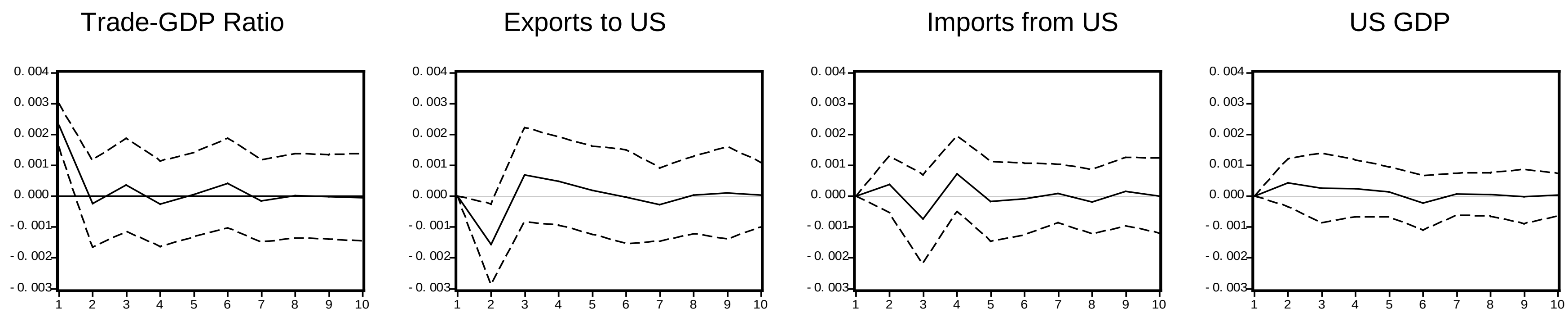


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

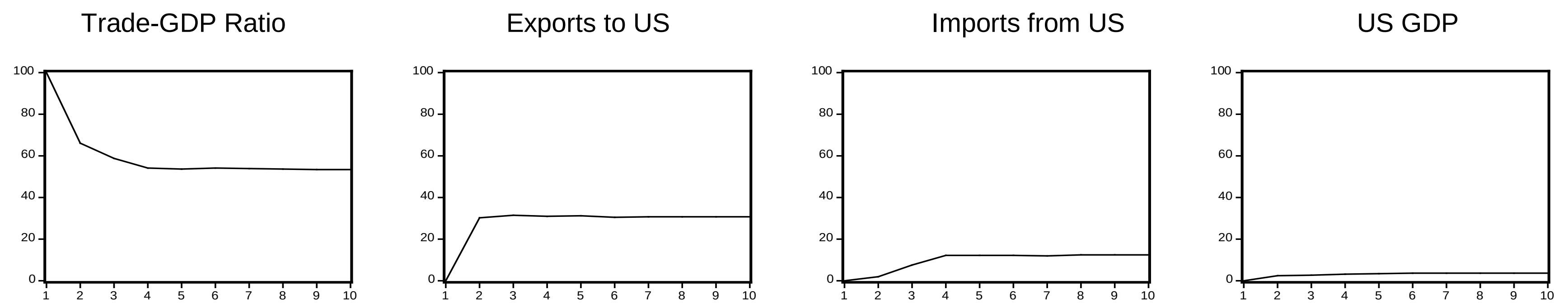


Source: Calculated by the authors.

Figure 15: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Postcrisis

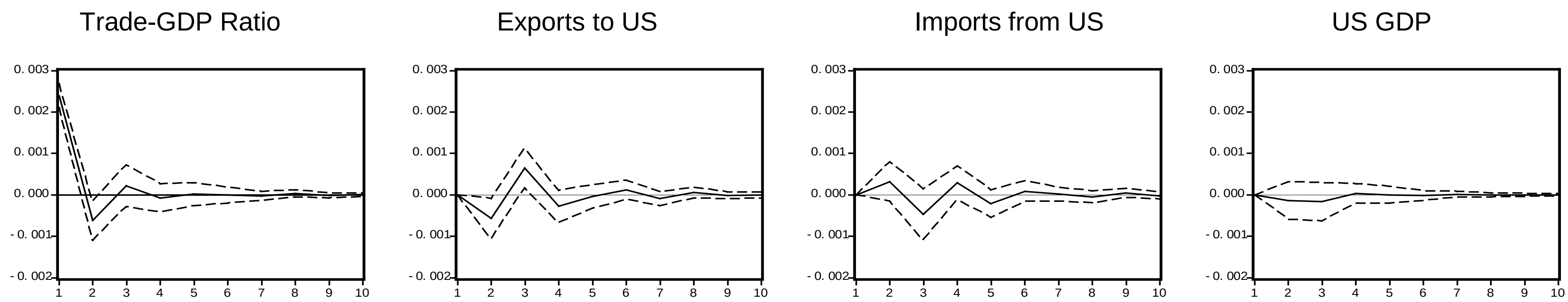


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Postcrisis) due to

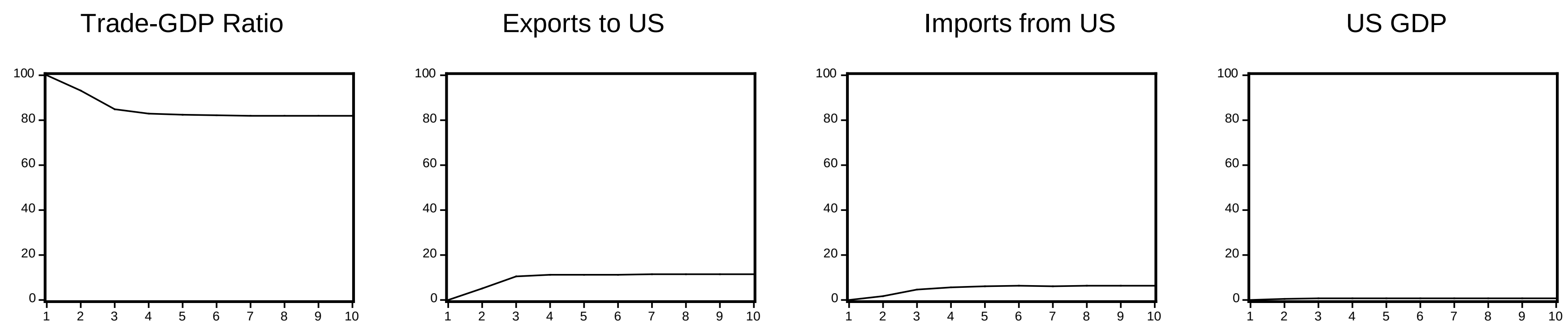


Source: Calculated by the authors.

Figure 16: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Total Period

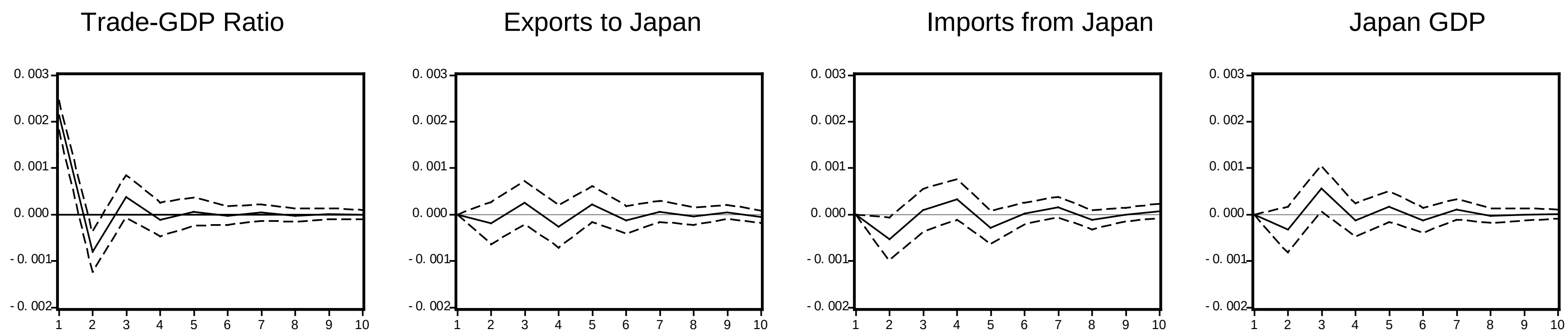


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Total Period) due to

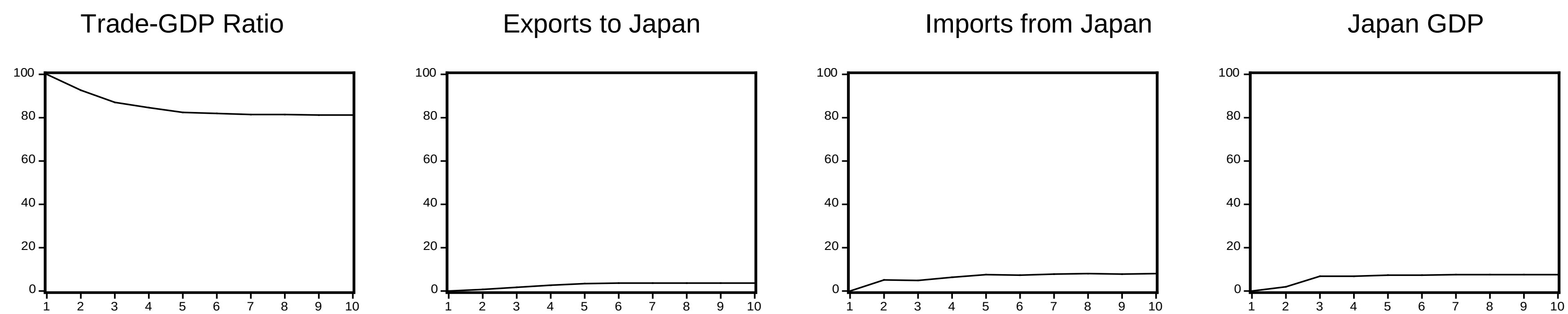


Source: Calculated by the authors.

Figure 17: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Pre-Crisis

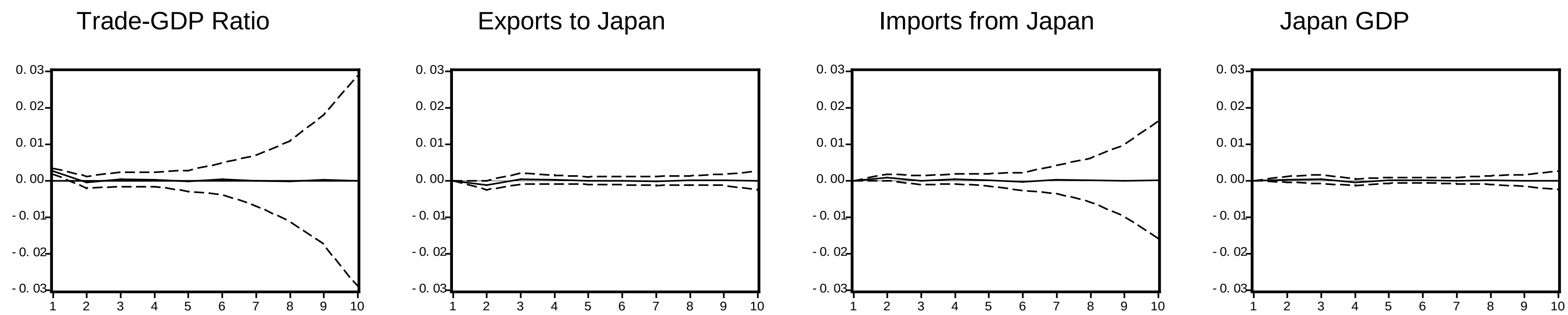


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

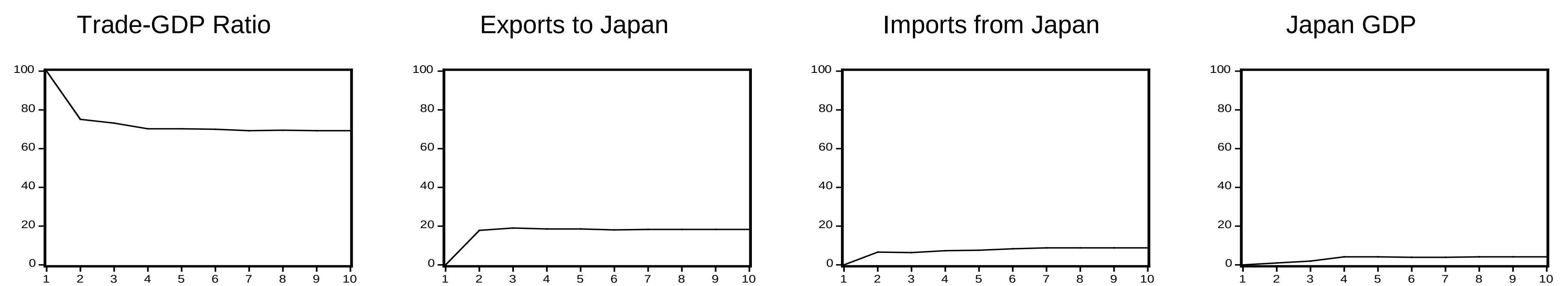


Source: Calculated by the authors.

Figure 18: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Postcrisis

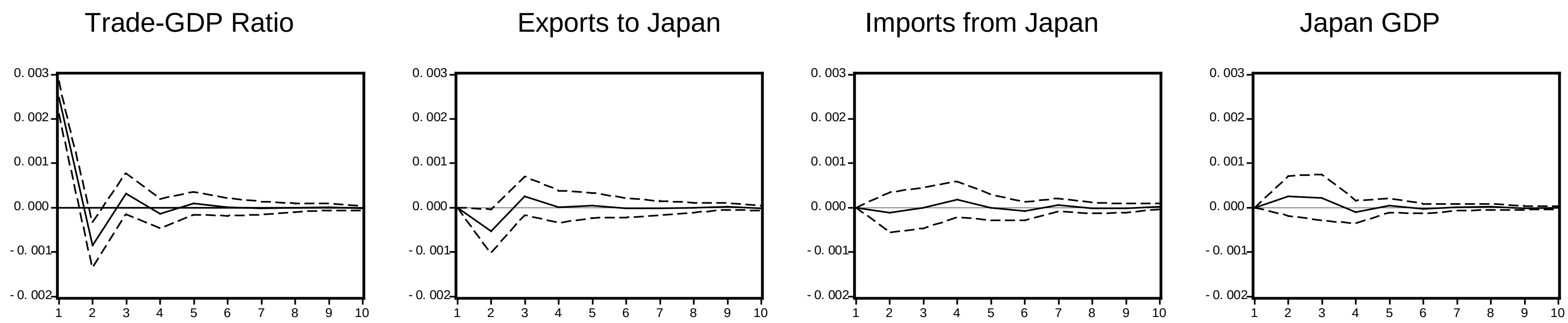


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Postcrisis) due to

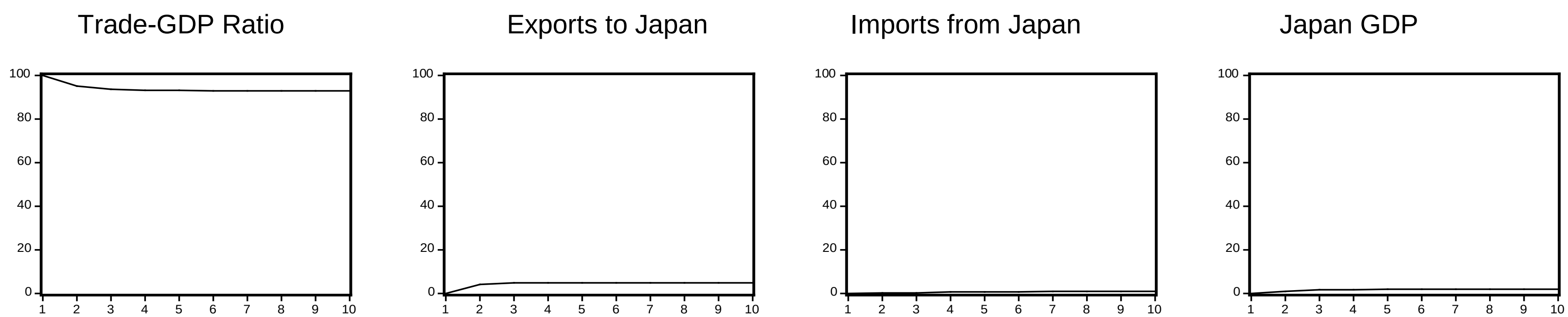


Source: Calculated by the authors.

Figure 19: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Total Period

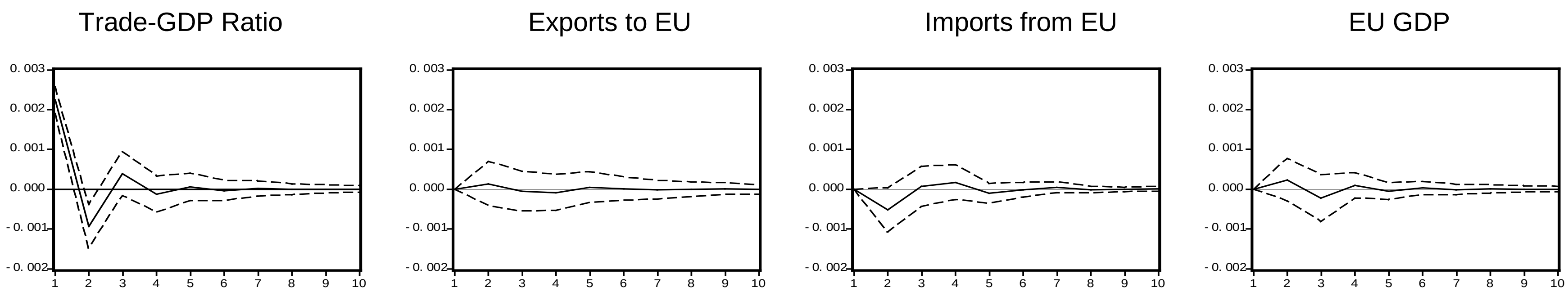


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Total Period) due to

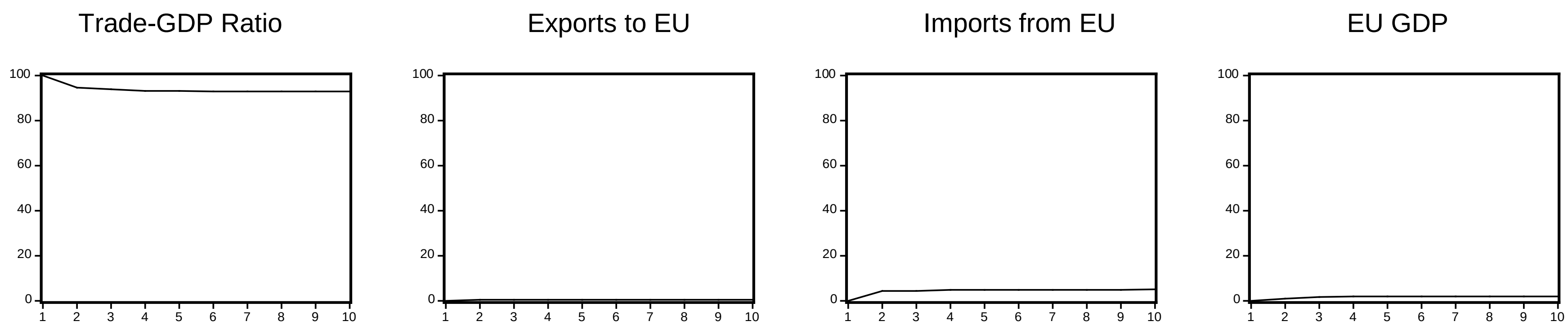


Source: Calculated by the authors.

Figure 20: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Pre-crisis

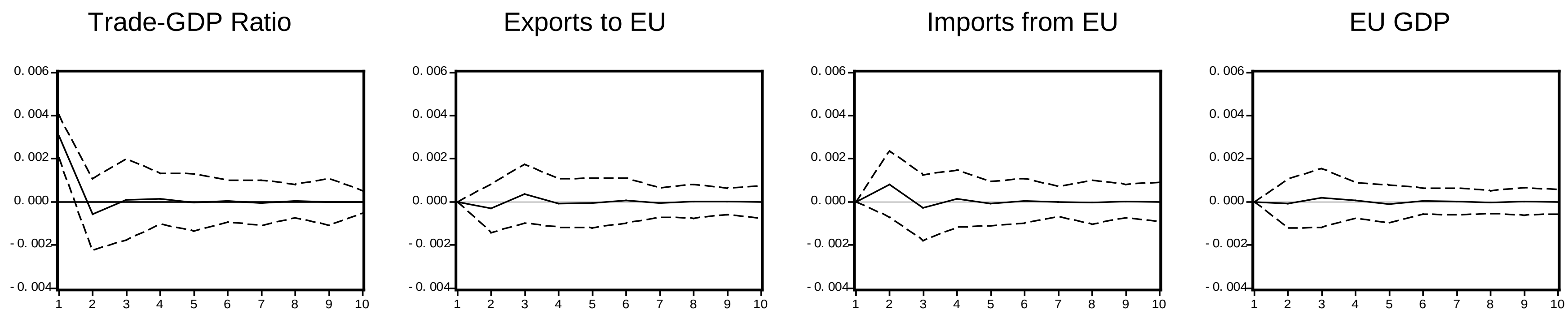


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Pre-Crisis) due to

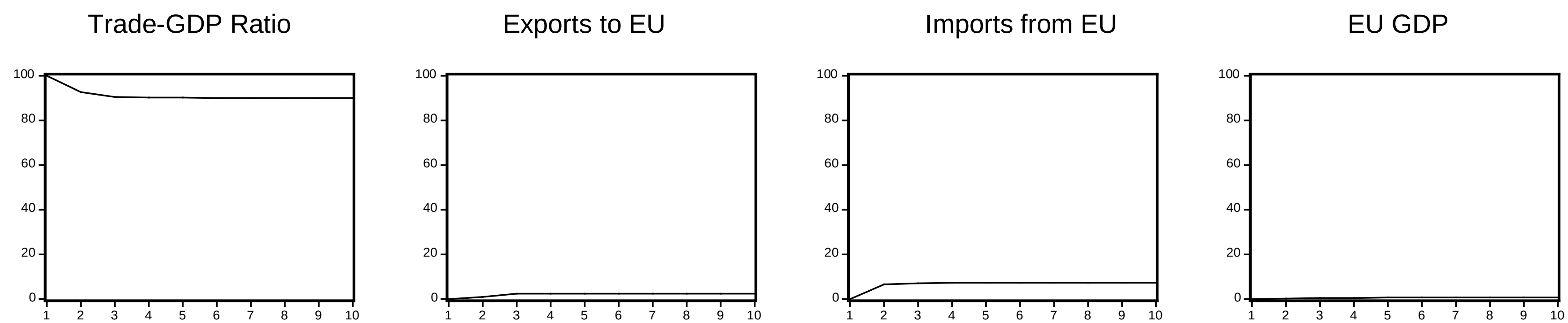


Source: Calculated by the authors.

Figure 21: Impulse Response of India's Trade-GDP Ratio (One St. Dev. Shock): Postcrisis

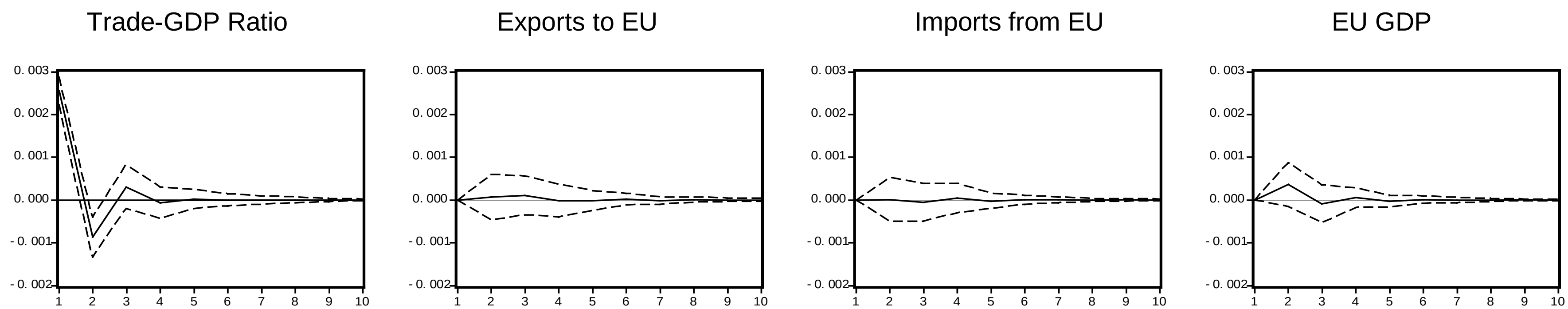


Variance Decomposition
Percent Variance of Trade-GDP Ratio (Postcrisis) due to

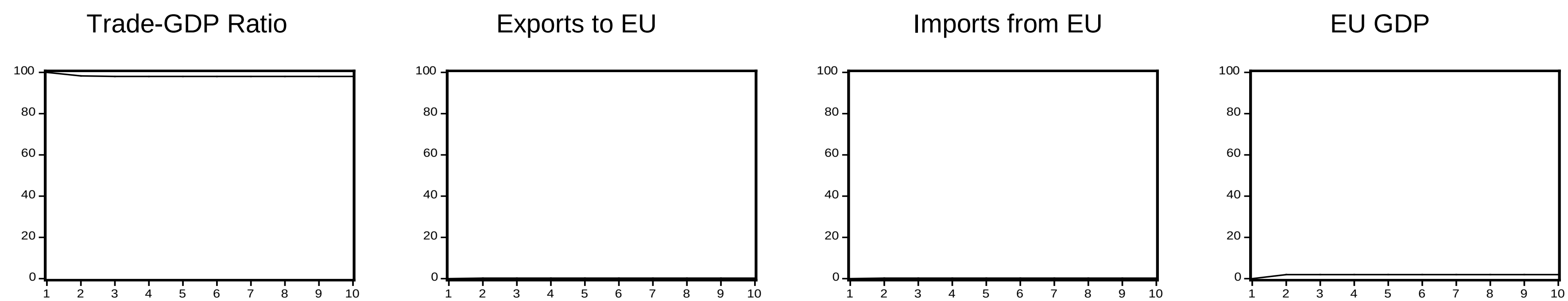


Source: Calculated by the authors.

Figure 22: 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



Source: Calculated by the authors.

Fifth, India's trade openness (trade-GDP ratio) has responded mildly to the shock of exports to US. Figures 14 to 22 present the effect of exports, imports, and GDP of each country on the variation of trade openness (trade-GDP ratio) of India during the pre-crisis, postcrisis, and total periods. It is observed from Figure 14 that the trade-GDP ratio of India has responded mildly to the one standard deviation shock of exports to the US. However, imports from the US and the US GDP have very little effect on the variation of trade openness (trade-GDP ratio) of India. Figure 15 shows that during the postcrisis period the variance of exports to the US, imports from the US, and US GDP together have explained about 40% of the variation of the trade-GDP ratio of India. Figure 16 gives the response of the trade-GDP ratio of India on these variables during the total period. Here, the results are similar to those of the pre-crisis period. The effect of variation of exports to Japan, imports from Japan, and Japan GDP on the variation of India's trade-GDP ratio during the pre-crisis, postcrisis, and total periods are given in Figures 17, 18, and 19. It is observed that during the postcrisis period about 30% of the variation of trade-GDP ratio of India is explained by the variation of exports to Japan, while the figure was less than 20% during the pre-crisis period. On the other hand, if we consider the entire period (Figure 19) the variation in exports, imports, and GDP explain very little of the variation of trade-GDP ratio of India. Figures 20, 21, and 22 show the effect of the variation of exports to, imports from, and GDP of the EU on the variation of the trade-GDP ratio of India for the two subperiods and for the entire period. The variation of these variables has little or no effect on the trade-GDP ratio of India in both the pre- and the postcrisis periods as well as for the total period as a whole.

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

8. CONCLUSIONS AND POLICY IMPLICATIONS

Variations in CCI scores in India's exports suggest shifting of products across periods is very frequent. Expansions of existing products or creation of new products from 2007 to 2009 in Indian exports have been noticed in readymade garments; leather and leather products; jute and jute 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 since July 2008 in readymade garments; gems and jewelry; drugs, pharmaceuticals, and fine chemicals; food and beverages; transport equipment; and marine products, whereas the other exports witnessed either zero or negative change. The estimated CCI scores indicate compositional change has always been less than 5% in the industrial sector in India. The positive compositional change has been witnessed in products such as food products; beverages, tobacco, and related products; jute and other vegetable fiber textiles; rubber, petroleum, plastic, and coal products; leather and fur products; and machinery and equipment. There has not been much compositional change in manufacturing post-July 2008 that matches India's exports, except in food and beverages.

The CCI scores also indicate that exports of manufacturing goods underwent more sweeping changes in product composition than those in production of manufacturing goods. Given the advantage of depreciating currency, this is not surprising, because incentives are relatively higher in trade, other things being equal, than in manufacturing, particularly in the short run. More sweeping changes are taking place in the export sector than in manufacturing. The monthly aggregate CCI for manufacturing also confirms this. Therefore, the export sector generates major compulsion for adjustment and restructuring. The bigger the export sector, the 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 reorganizing the production structure, 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 competing imports to the export sector), new products 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 the 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 the estimated coefficients are not statistically significant. However, there is a positive tendency toward co-movement of compositional changes in exports and industry. Although the impact might be mild, falling exports are likely to affect the compositional change in the industrial sector negatively. Therefore, there is no strong indication to confirm that India's industrial sector has been harshly affected by the ongoing global crisis, but its mild effect cannot be refuted. This also suggests that if the crisis continues, industrial restructuring would be needed to support the economy. While compositional change in industry in India has been stimulated by India's exports to the EU and Japan, its estimated parameter has been negative in the case of the US. This may be because the US is India's principal export market and it is severely affected by the global crisis; because there are some other reasons (e.g., distance) which the models fail to capture; or because larger distance makes it more expensive to export, so the fall in demand impact has become stronger. Compared to exports to the US, India's exports to Japan and the EU have been less affected. There is no strong indication that Indian industry has been severely harmed by the fall in demand in crisis-affected advanced economies like the US, the EU, and Japan, other things being constant. The estimated models also show that price rise has diminished industrial composition in India.

Since there may be lags between changes in composition in exports and industry, we have therefore used the 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 exports to the US, Japan, and the EU during the crisis period. During the pre-crisis period CCI (industry) did not respond significantly to shocks in exports to the US, Japan, and the EU. However, during the crisis period CCI (industry) has responded significantly to exports to the US, Japan, and the EU. But the response of CCI (industry) to exports to Japan and the EU are lower, compared to exports to the US, 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% of the variation in CCI (industry) depends on its own variation, while in the crisis period about 20% of the variation in CCI (industry) depends on the exports to the EU, Japan, and the US. Thus, the effect of shocks of India's exports to advanced economies during the crisis period has been transmitted to Indian industry.

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

Finally, India's trade openness (trade-GDP ratio) has responded mildly to the shock of exports to US. However, imports from the US and the US GDP have very little effect on

India's variation of trade openness (trade-GDP ratio). India's trade with the US, coupled with US GDP, significantly contributes to the variability of India's trade openness in the crisis period, accounting for 40% of the variation of the trade-GDP ratio of India, whereas India's trade with of the EU and Japan and their GDPs have either no effect or insignificant effect on India's trade openness.

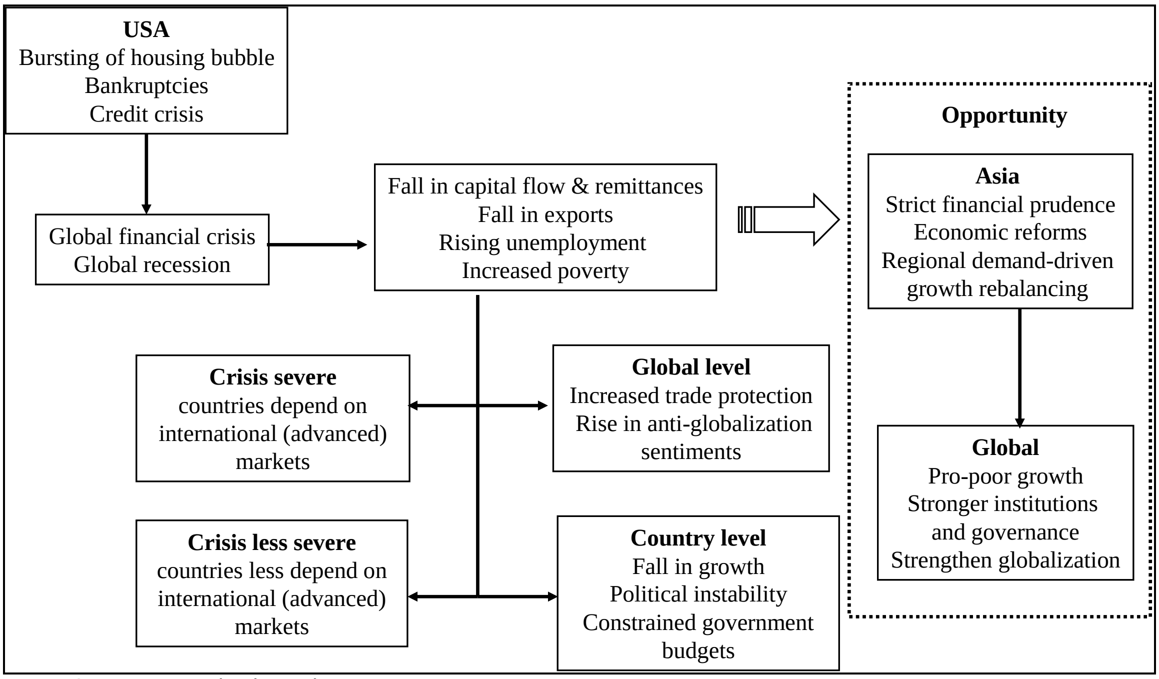
This study suggests that Indian industry has not been significantly harmed by the ongoing global financial and economic crisis. Although India continues to enjoy large domestic demand, the compositional change (positive) in manufacturing would decrease if the crisis continues, resulting in a slowdown in growth and a rise in economic stagnation. This would also cause huge social problems in India, particularly in those export sectors which are laborintensive. Therefore, there is a need for industrial restructuring to strengthen India's vast manufacturing sector and growing trade sector, and also for the greater cause of social protection and for building an effective safety net. Presumably, other South Asian countries have to follow suit.

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

In the face of sliding world demand, efforts to raise productivity and competitiveness help countries protect export market shares. Obviously there is need of further trade liberalization in Asia, which will stimulate the trade within the region. Thus, a structural shift in export-led production of Asian economies away from the advanced economies to the emerging and regional markets in the medium to long run is inevitable (Adams and Park 2009). Turning crisis into opportunities, Asia (including India) should continue with reforms for strengthening regional demand and subsequently the global demand. As noted in Figure 23, strict financial prudence coupled with regional demand–driven growth rebalancing are suggested measures for growth recovery in the medium to long run. This might also give opportunities to expand trade and investment in unexplored and potentially strong markets in Asia and beyond. Bhagwati commented: "The export slowdown is a temporary phenomenon and the readjustments in the global economy would spur exports."[11] This reminds us about the need for export orientation. Asia will continue to exhibit the highest growth, and hence the regional and international demand will inevitably rise, and strengthen globalization.

[11] Refer, Financial Express (2009).

Figure 23: Turning Crisis into Opportunities



Source: Drawn by the authors.

Trade policy is no longer just a question of lowering barriers. What is important now is to help small and medium-sized firms get a foothold in regional and global supply chains which are still growing, or at least not declining (ITC 2009). The scope for increasing the competitiveness of the South Asian economies is large and includes policies to improve the availability of infrastructure, lower the transaction cost of private investment through better governance, and reduce restrictions on trade and investment (World Bank 2010).

Many Asian economies, including India, are highly export dependent. Excessive dependence on external demand makes Asia more vulnerable to external shocks. The global economic crisis's impact on India—a country less dependent on merchandise exports for growth—is far less dramatic. However, it is not India's less damaging performance in exports 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 when trade has been limited by lack of external demand. India has to unfold another set of reforms to enhance their global and regional integration and to strengthen the globalization process. More importantly, export promotion and industrial restructuring need special attention in the postcrisis period. At the same time, this would require in the first instance a sharp shift in other developing countries (read, People's Republic of 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 and unemployment.

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APPENDIX 1

(a) US Imports from India (July 2007 = 100)

	FB	CM	MF	C&P	MG	MTE	MMA	CT
Jul-07	100	100	100	100	100	100	100	100
Aug-07	158.07	106.71	96.75	128.57	123.58	123.17	117.96	111.41
Sep-07	85.11	102.53	1.17	91.23	94.98	82.1	91.24	101.23
Oct-07	92.77	112.51	10025.51	140.38	115.51	115.85	126.91	108.36
Nov-07	91.71	112.87	244.89	90.41	79.77	90.49	91.07	100.53
Dec-07	90.32	82.41	36.93	130.47	78.5	102.33	79.89	97.76
Jan-08	106.44	110.51	57.07	144.83	139.62	94.84	111.68	87.67
Feb-08	78.7	121.97	99.66	63.7	97.43	113.43	100.04	147.33
Mar-08	121.74	130.55	108.08	97.56	105.09	103.09	113.12	89.94
Apr-08	107.89	76.66	1.1	108.27	94.16	103.53	92.84	86.18
May-08	125.9	98	279.57	83.68	110.72	120.55	86.06	101.14
Jun-08	75.46	90.18	80.58	115.62	79.08	74.4	93.34	126.97
Jul-08	116.76	176.76	99.65	88.24	123.36	107.18	101.39	77.28
Aug-08	136.78	67.72	62.91	111.74	103.12	118.25	103.5	115.76
Sep-08	85.04	87.26	8663.36	89.33	118.15	88.4	112.23	106.22
Oct-08	93.32	139.96	2.22	128.72	88.67	126.57	112.74	93.09
Nov-08	80.13	63.63	1031.81	81.01	66.53	85.32	83.8	152.36
Dec-08	103.48	141.16	201.81	113.77	105.59	81.44	83.39	61.72
Jan-09	97.16	96.87	69.36	85.04	89.98	110.95	117.51	95.74
Feb-09	75.06	95.12	7.63	89.84	89.85	78.2	91.63	90.03
Mar-09	139.89	85.15	94.8	123.47	112.05	99.43	111.28	106.05
Apr-09	100.15	94.95	20.84	100.36	94.33	126.1	94.68	101.87
May-09	95.48	79.53	4987.17	94.01	94.39	76.0	90.17	91.4
Jun-09	90.36	81.84	248.12	97.18	100.88	93.95	91.99	108.31

Notes: FB – Food and Beverages; CM – Crude Materials, Inedible, Except Fuels; MF – Mineral Fuels, Lubricants, Related Material; C&P – Chemicals and Related Products; MG – Manufactured Goods; MTE – Machinery and Transport Equipment; MMA – Miscellaneous Manufactured Articles; CT – Commodities and Transactions. Commodity groups follow SITC codes.

Source: Calculated based on US Census Bureau data available at CEIC Database, http://www.ceicdata.com (accessed on 7 August 2009).

(b) US Imports from Pakistan (July 2007 = 100)

	FB	CM	C&P	MG	MTE	MMA	CT	EMAA
Jul-07	100	100	100	100	100	100	100	100
Aug-07	148.64	116.24	166.67	98.6	76	111.25	259.41	115.41
Sep-07	75.21	70.83	660	88.3	73.97	93.89	32.01	56.35
Oct-07	104.41	118.51	13.33	112.89	415.14	99.91	92.41	97.69
Nov-07	111.98	95.73	354.55	84.2	25.5	88.24	95.73	136.09
Dec-07	109	101.03	1178.21	98.8	106.31	86.6	98.51	103.04
Jan-08	82.94	109.74	329.71	104.61	72.61	97.53	87.57	78.48
Feb-08	110.24	77.66	51.42	86.64	111.69	94.9	190.05	92.47
Mar-08	141.61	166.82	71.63	119.43	102.09	120.07	98.81	214.53
Apr-08	113.48	71.83	225.72	96.32	142.9	96.33	66.88	77.78
May-08	97.97	146.11	68.08	116.56	60.76	112.78	117.63	70.73
Jun-08	92.2	88.6	111.43	85.86	109.27	99.2	96.32	171.92
Jul-08	155.77	83.58	152.59	100.68	98.77	102.79	86.49	62.75
Aug-08	101.1	133.38	120.47	114.57	104.06	115.71	173.38	145.21
Sep-08	52.26	67.91	31.74	84.72	95.35	86.85	52.33	60.06
Oct-08	121.28	156.58	397.4	125.81	153.86	113.7	138.48	161.26
Nov-08	79.44	60.42	18.05	80.82	49.03	77.45	117.92	65.58
Dec-08	133.42	113.75	261.88	102.23	372.23	103.55	129.31	166.83
Jan-09	83.28	88.93	39.57	86.25	35.84	82.78	62.37	60.53
Feb-09	95.15	95.3	85.52	102.59	98.9	100.84	177.01	66.18
Mar-09	117.19	115.08	96.05	92.21	111.87	99.05	37.19	81.48
Apr-09	78.92	79.82	264.61	100.73	69.59	96.38	146.16	223.64
May-09	128.21	91.09	114.76	113.35	108.94	117.7	167.01	47.97
Jun-09	71.9	90.07	69.87	106.9	120.34	108.37	52.92	133.9

Source: Calculated based on US Census Bureau data available at CEIC Database, http://www.ceicdata.com (accessed on 7 August 2009).

(c) US Imports from Sri Lanka (July 2007 = 100)

	FB	CM	C&P	MG	MTE	MMA	CT	OMADP	TSRRE	EMAA
Jul-07	100	100	100	100	100	100	100	100	100	100
Aug-07	123.9	89.98	91.53	144.34	134.99	107.02	123.98	109.52	40.46	95.77
Sep-07	105.54	108.56	111.38	89.07	112.64	94.78	89.91	75.65	167.92	97.86
Oct-07	80.63	113.75	75.51	95.37	103.33	84.32	141.87	98.08	39.33	118.34
Nov-07	77.37	70.71	104.24	88.06	96.25	92.86	43.17	147.66	205.71	77
Dec-07	113.06	150.26	90.62	83.26	94.73	115.72	157.51	75.4	56.94	98.72
Jan-08	99.32	98.72	134.34	144.63	113.44	112.15	109.65	132.28	500	87.54
Feb-08	77.4	89.92	85.61	99.77	86.19	91.75	48.55	39.79	69.27	100
Mar-08	153.85	196.41	146.59	100.84	99.36	107.08	176.69	274.67	90.14	87.8
Apr-08	87.58	55.84	66.33	78.32	114.85	79.33	133.91	107.28	45.31	140.63
May-08	74.94	97.88	127.93	127.98	92.49	88.45	114.75	116.06	93.1	94.76
Jun-08	125.7	60.47	86.13	66.36	97.48	128.75	54.17	90.84	11.11	77.09
Jul-08	112.8	135.74	137.75	138.41	105.69	110.15	99	75.97	1466.67	203.28
Aug-08	95.96	137.49	86.58	74.07	92.38	93.33	214.62	168.64	28.41	61.9
Sep-08	77.64	73.42	108.81	112.67	106.86	102.33	40.83	97.49	160	113.84
Oct-08	136.79	137.2	106.58	86.24	76.78	99.66	146.69	61.00	0	78.83
Nov-08	97.96	53.28	67.39	88.02	59.8	86.85	79.42	65.92	0	103.63
Dec-08	54.49	128.97	156.65	138.97	97.22	106.97	141.06	69.23	4.76	60.77
Jan-09	127.38	64.56	91.51	88.18	96.55	104.23	191.46	159.88	2050	122.19
Feb-09	116.53	77.96	104.56	102.49	61.38	89.36	61.12	64.09	163.41	97.17
Mar-09	100.79	114.66	53.18	80.72	117.55	109.53	241.85	100.6	107.46	141.75
Apr-09	98.75	120.66	207.16	131.28	101.68	91.39	33.85	71.26	55.56	47.77
May-09	91.43	83.35	73.29	51.69	103.8	67.31	119.67	181.51	75	148.75
Jun-09	86.84	93.53	75.92	92.84	85.29	116.55	42.48	109.26	66.67	71.81

Source: Calculated based on US Census Bureau data available at CEIC Database, http://www.ceicdata.com (accessed on 7 August 2009).

APPENDIX 2: 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 Database
Foreign direct investment	CEIC Database
Dun 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 3: 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*	0.7522*	-0.2616*	0.3132*	0.5710*	0.4861*	1

*Significant at 5% level.

Source: Calculated by the authors.

APPENDIX 4: 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, and EXEU represent exports to the US, Japan, and the European Union, whereas IMUSA, IMJAPAN, and IMEU represent imports from the US, Japan, and the European Union. Prefix D indicates difference, whereas Suffix (-1) indicates one-period lag and (-2) indicates two-period lag.

(a) Exports to the 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 first 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
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

Source: Calculated by the authors.

(b) Exports 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 first 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

Source: Calculated by the authors.

(c) Exports to the 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 first 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

Source: Calculated by the authors.

(d) Imports from the 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 first 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

Source: Calculated by the authors.

(e) Imports 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	1.946527	Prob(F-statistic)		0.000003

(ii) ADF equation on first 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

Source: Calculated by the authors.

(e) Imports from the EU

(i) ADF equation on level

ADF Test Statistic	-2.407161	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(IMEU)				
Method: Least Squares				
Sample(adjusted): 2000:04 2009:08				
Included observations: 113 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMEU(-1)	-0.138198	0.057411	-2.407161	0.0178
D(IMEU[-1])	-0.295387	0.098537	-2.997721	0.0034
D(IMEU[-2])	-0.116865	0.095314	-1.226096	0.2228
Constant	26312770	58677443	0.448431	0.6547
TREND(2000:01)	5192573.	2100996.	2.471481	0.0150
R-squared	0.175210	Mean dependent var		27244956
Adjusted R-squared	0.144662	S.D. dependent var		3.23E+08
S.E. of regression	2.99E+08	Akaike info criterion		41.91320
Sum squared resid	9.66E+18	Schwarz criterion		42.03389
Log likelihood	-2363.096	F-statistic		5.735586
Durbin-Watson stat	1.952469	Prob(F-statistic)		0.000318

(ii) ADF equation on first difference

ADF Test Statistic	-5.942895	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(IMEU,2)				
Method: Least Squares				
Sample(adjusted): 2000:05 2009:08				
Included observations: 112 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IMEU[-1])	-1.295366	0.217969	-5.942895	0.0000
D(IMEU[-1],2)	-0.054692	0.167117	-0.327269	0.7441
D(IMEU[-2],2)	-0.156982	0.098172	-1.599055	0.1128
Constant	5324484.	60392425	0.088165	0.9299
TREND(2000:01)	538757.4	891841.9	0.604095	0.5471
R-squared	0.678682	Mean dependent var		1214196.
Adjusted R-squared	0.666670	S.D. dependent var		5.28E+08
S.E. of regression	3.05E+08	Akaike info criterion		41.95112
Sum squared resid	9.93E+18	Schwarz criterion		42.07249
Log likelihood	-2344.263	F-statistic		56.50075
Durbin-Watson stat	1.953588	Prob(F-statistic)		0.000000

Source: Calculated by the authors.

(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 first 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

Source: Calculated by the authors.

(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 first 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

Source: Calculated by the authors.

(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 first 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(EUGD([-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

#We have omitted time trend due to its statistical insignificance

Source: Calculated by the authors.

(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

Source: Calculated by the authors.

(ii) ADF equation on first 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

Source: Calculated by the authors.

APPENDIX 5: VAR RESULTS

(a) EXUSA represents exports to the US, EXJAPAN represents exports to Japan, and EXEU represents exports to the European Union. CCII represents index of changes in industrial composition in India. Prefix D indicates difference; Suffix (-1) indicates one-period lag and (-2) indicates 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		

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		

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		

Source: Calculated by the authors.

(b) IMUSA represents imports from the US, IMJAPAN represents imports from Japan, and IMEU represents imports from the European Union. CCII represents index of changes in industrial composition in India. Prefix D indicates difference; Suffix (-1) indicates one-period lag and (-2) indicates 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		

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		

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		

Source: Calculated by the authors.

(c) TRADEGDP indicates Trade-GDP ratio of India. USAGDP indicates GDP of the US, JAPGDP indicates GDP of Japan, and EUGDP indicates GDP of the European Union.

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		

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		

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		

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		

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		

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		

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		

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		

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		

Source: Calculated by the authors.