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Working Paper

The People's Republic of China as an Engine of Growth for Developing Asia? Evidence from Vector Autoregression Models

ADB Economics Working Paper Series, No. 175

Provided in Cooperation with:

Asian Development Bank (ADB), Manila

Suggested Citation: Park, Donghyun; Shin, Kwanho (2009) : The People's Republic of China as an Engine of Growth for Developing Asia? Evidence from Vector Autoregression Models, ADB Economics Working Paper Series, No. 175, Asian Development Bank (ADB), Manila, <https://hdl.handle.net/11540/1830>

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ADB Economics Working Paper Series



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No. 175 | October 2009



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Asian Development Bank

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics

©2009 by Asian Development Bank
October 2009
ISSN 1655-5252
Publication Stock No. WPS091085

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Abstract

Developing Asia has traditionally relied on exports to the United States (US) and other industrialized countries for demand and growth. As a result, the collapse of exports to the US and other industrialized countries during the global financial and economic crisis has sharply curtailed gross domestic product (GDP) growth across the region. The emergence of the People's Republic of China (PRC) as a globally influential economic force is fueling hopes that it can supplement the US as an additional source of demand and growth. The central objective of this paper is to use vector autoregression (VAR) models to empirically investigate whether exports to the PRC have a significant and positive effect on the GDP of nine developing Asian countries. The study's results from a three-variable VAR model indicate that PRC's imports have a significant positive effect on the GDP of regional countries. However, the study's results from a four-variable VAR model indicate that the PRC's apparently positive impact reflects the US' demand for Asian goods, rather than independent demand from the PRC. Therefore, overall, the study's evidence suggests that the PRC is not yet an engine of growth for the rest of the region.

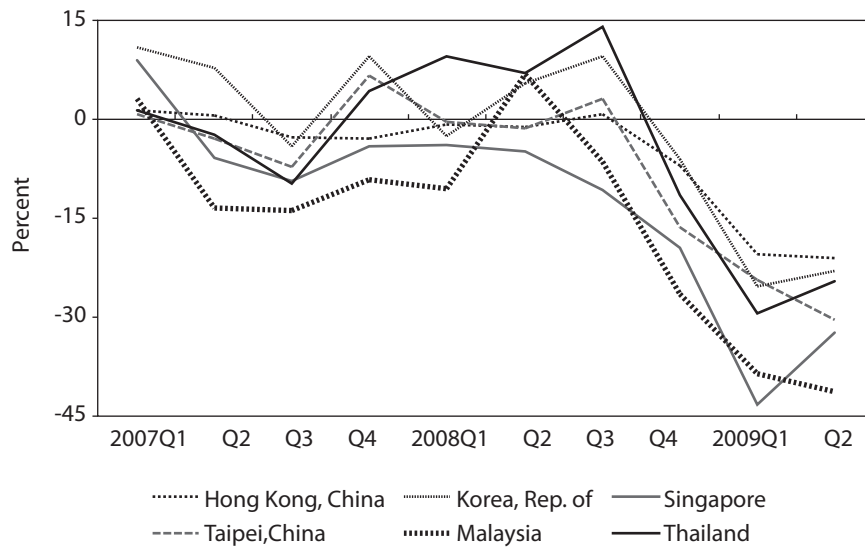
I. Introduction—The Global Financial Crisis and Developing Asia’s Trade Crisis

The global financial crisis and the ensuing global slowdown have severely curtailed the growth of developing Asia’s exports and output.¹ The region’s gross domestic product (GDP) growth decelerated from a 5-year average of 8.3% from 2003 to 2007, 9.5% in 2007 to 6.3% in 2008, and further to a projected 3.9% in 2009. In terms of growth performance, this will be the region’s worst year since the Asian financial crisis of 1997/1998. Unlike their United States (US) and European Union (EU) counterparts, the region’s financial systems suffered only limited damage from the crisis due to lack of exposure to subprime assets and relatively healthy balance sheets of banks. Although there has been some financial disintermediation, the region has suffered at most a credit hiccup rather than the full-blown credit crunch that crippled the real economies of the US and EU. While the slowdown of the real economy was a consequence of financial instability in the industrialized countries, this was not the case in developing Asia.

While the region’s financial systems were largely unscathed during the global crisis, the region’s exports and trade suffered a severe contraction (Figure 1). The negative export shock has, in turn, knocked the wind out of the region’s real economies. Trade has been the main channel through which the global crisis has been transmitted from the G-3 economies (US, Eurozone, and Japan) in general and the US in particular to developing Asia. From the viewpoint of developing Asia, the global crisis of 2008–2009 was primarily a trade crisis rather than a financial crisis. As a result, the hardest hit regional economies have been the most open, trade-dependent economies (Figures 2 and 3). Some initial hopes that the region’s dynamic fast-growing economies had become collectively large enough to withstand adverse shocks originating outside the region have proven to be badly misplaced. Regional growth is expected to bounce back to 6.4% in 2010 and there is a fairly firm consensus that strong fundamentals will enable the region to recover faster than the rest of the world. Nevertheless, the sharp slowdown in 2008–2009 has been a sobering experience for the region’s public and policy makers.

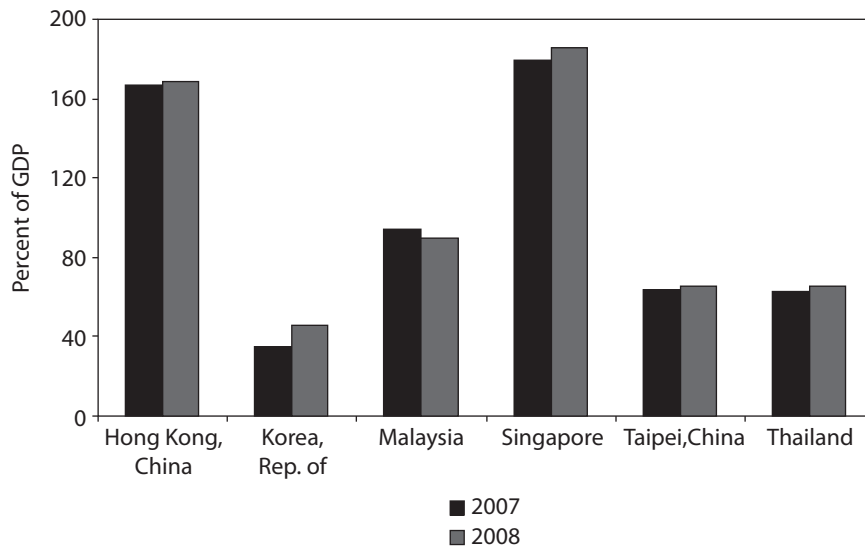
¹ Developing Asia refers to the 45 developing member countries (DMCs) of the Asian Development Bank (ADB). Please refer to www.adb.org for the list of countries.

Figure 1: Quarterly Growth in Exports to the United States, 2007 Q1–2009 Q2, Selected Developing Asian Countries



Source: CEIC Data Company Ltd., downloaded 31 August 2009

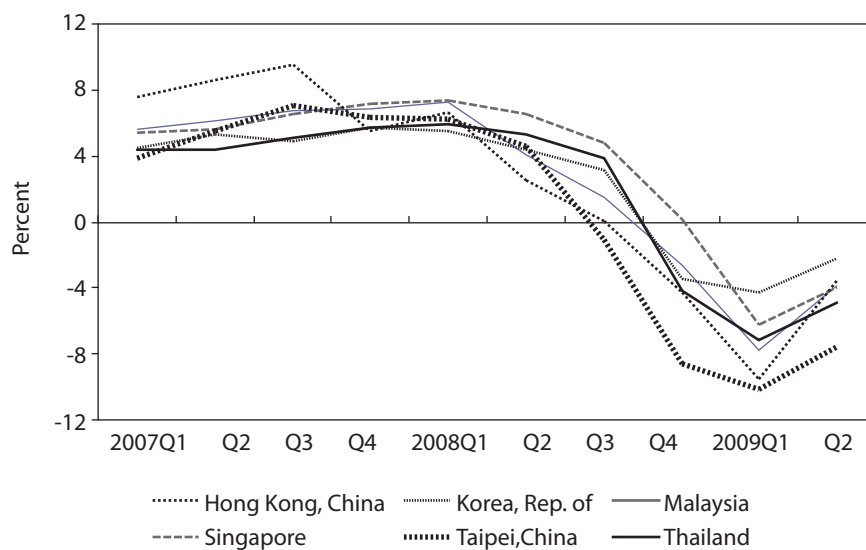
Figure 2: Share of Exports in GDP in 2007 and 2008, Selected Developing Asian Countries



GDP = gross domestic product.

Source: CEIC Data Company Ltd., downloaded 31 August 2009

Figure 3: Quarterly GDP Growth, 2007 Q1–2009 Q2



GDP = gross domestic product.

Source: CEIC Data Company Ltd., downloaded 31 August 2009

What must be frustrating for the Asian public and policy makers alike with respect to the 2008–2009 downturn is that, in stark contrast to the homegrown Asian financial crisis in 1997/1998, the region has paid a steep price for the excesses of distant countries outside the region. When the global crisis erupted, the region was blessed with strong public finances, healthy current account surplus, an ample war chest of foreign exchange reserves, and macroeconomic stability. Unfortunately for the region, such sound fundamentals failed to protect its real economy from the G-3 slowdown. One major lesson from the global crisis is that the old dictum about Asia catching a cold when the US sneezes remains as valid as ever. And, when the US sneezes hard and loud, as it did this time, Asia not only catches a cold but a nasty cold. The fact that developing Asia was apparently a passive victim of the global crisis in the sense that it did not directly contribute to the immediate causes of the crisis—i.e., market failures in the US housing and financial markets—does not reduce the pain of the downturn for the region, especially for its millions of poor and vulnerable residents. For Asia, it is possible to view the slowdown of economic activity in 2008–2009 as a trade crisis, in contrast to the slowdown of 1997/1998, which was a financial crisis.

The excessive dependence on exports to the US exposed by Asia's trade crisis has both short-run and long-run ramifications for developing Asia's economic performance. In the short run, such dependence suggests that a secure, full-fledged recovery may have to wait until the US economy recovers. Thanks to years of fiscal prudence, the region's governments have plenty of fiscal freedom with which to boost domestic demand to offset a sagging external demand. However, realistically, the massive fiscal stimulus packages

implemented by countries around the region can only partly offset the effect of a weaker US economy. In the long run, heavy dependence on the US market suggests that the region's long-run growth will remain hostage to the US economy's long-run performance. If there is a secular decline in the US' demand for Asian exports in the future, for example, developing Asia's growth would suffer noticeably. In fact, the prospective unwinding of one of the key imbalances of the US economy that contributed to the global crisis—its large and persistent current account deficit—implies that a secular decline in the US' imports cannot be ruled out. In fact, the substantial increase in the US' saving rates since the crisis indicates that such an unwinding is already underway, with troubling implications for the region's long-run export and growth prospects.

Given that the root cause of developing Asia's slowdown is the contraction of aggregate demand due to the contraction of external demand, the logical solution to short-run recovery and long-term growth is to find alternative sources of demand. One potential alternative source of demand is intraregional trade. Evidence suggests that trade among developing Asian countries has in fact grown impressively in recent years.² However, much of the growth reflects trade in parts and components as opposed to trade in final goods.³ In particular, the PRC's well-known role as the world's factory means that countries around the region ship parts and components that are assembled in the PRC and exported to the rest of the world.⁴ What this means is that the growth of intra-Asian trade is heavily influenced by growth of demand in the rest of the world. This is especially true for trade among East and Southeast Asian economies, which trade extensively with each other. For example, even though Malaysia's exports to the PRC are superficially large and growing, Malaysia is, in effect, exporting to the US rather than to the PRC. The lack of more substantive intraregional trade based on final goods, along the lines of the EU, is a direct consequence of weak domestic demand in the regional economies. By the same token, the strengthening of domestic economies in developing Asian countries will stimulate more substantive intraregional trade, which is less dependent on demand in the rest of world.

The central objective of this paper is to empirically investigate whether trade with the PRC can serve as an engine of recovery and growth for developing Asia. The paper's empirical analysis is largely limited to the economies of East and Southeast Asia, which have reached a fairly high degree of economic integration with each other, primarily through the trade channel. However, many of the paper's results have implications for other parts of developing Asia as well. For example, South Asia stands to reap sizable benefits from India's growth as integration progresses in the future. The paper's empirical analysis is motivated by two stylized facts. First, as noted earlier, intraregional trade has grown rapidly among East and Southeast Asian economies even though much of this trade is based on demand for final goods from outside the region. Second, the single

² See, for example, Kwan (2001), Drysdale and Garnaut (1997), and Frankel and Wei (1997).

³ See, for example, Brown and Linden (2005), Brown et al. (2004), and Sturgeon (2003).

⁴ Please refer to Athukorala and Yamashita (2009, 2008) and Pula and Peltonen (2008).

greatest shock to the world economy in the last 4 decades has been the stunning rise of the PRC as an economic force of global significance. In view of this trend, the PRC has increasingly come to be seen as potential engine of recovery in the short run and growth in the long run by other countries in the region.

The two stylized facts jointly imply that, in the short term, growing demand from a booming PRC can substantially offset the adverse impact of the US downturn on the region's exports. If this were the case, exports to the PRC can boost the region's aggregate demand and growth in the short run in the face of a weakened US demand. The long-term corollary is that exports to the PRC and trade with the PRC can provide the region with an additional long-term source of demand and growth. In this paper, the authors use the vector autoregression (VAR) model to assess the PRC-as-engine hypothesis. More specifically, the authors investigate whether exports to the PRC have a positive and significant effect on GDP in other developing Asian countries. If there is a significant positive effect, this would bode well for the region's hopes of leveraging on a fast-rising PRC for recovery in the short run and growth in the long run.

II. Growth of Intra-Asian Trade and the Rise of the PRC as a Potential Engine of Growth

As seen in the previous section, at a broader level, this paper was motivated by the short-run and long-run ramifications of the US downturn for developing Asia. In the short run, the region's heavy dependence on the US market suggests that the speed and scope of the region's recovery will be determined to a large extent by the speed and scope of the US economy's recovery. Going forward, even beyond the current global recession, such dependence implies that the US business cycle will be a disproportionately significant short-run macroeconomic volatility in developing Asia, especially when the US economy suffers a severe negative shock. In the long run, the trade crisis of 2008–2009 brings to the fore the issue of whether an export-led growth strategy that implicitly relies on an infinite global demand for the region's manufacturing products is viable. Looking ahead, the troubling prospect confronting developing Asia is a prolonged period of substantially slower growth brought about by a permanent slowdown in global demand for Asian exports. In particular, the prospective unwinding of the US' current account deficit has unfavorable implications for Asian exports and growth. In short, this paper was motivated by the widespread concerns and fears within the region precipitated by the collapse of exports and trade in the aftermath of the global financial crisis, and the pronounced impact of that collapse on the region's short-run growth and prospects.

At a narrower level, however, this paper is motivated by hopes and optimism surrounding the possibility that the PRC may emerge as a major new source of demand and growth to supplement the US, which still faces an uncertain recovery from the global crisis. The

rapid growth of intra-Asian trade and the phenomenal rise of the PRC as an economic force are fueling such hopes and optimism. It is true that much of the extensive intra-Asian trade reflects trade in parts and components predicated on demand for final goods from the US and elsewhere. Nevertheless, its rapid quantitative growth in recent years nevertheless gives some grounds for optimism that trade in final goods will play a bigger role in intra-Asian trade and that intra-Asian trade will thus become a source of demand and growth. The remarkable emergence of the PRC as a globally significant economic and trading power is giving further hope to those who look to greater intra-regional trade for growth. More specifically, the underlying idea is that a fast-growing PRC's growing appetite for imported final goods from the rest of the region will compensate for weaker demand in the US and other industrialized countries. The remarkable resilience of the PRC during the global crisis—its GDP growth is projected to be 8.2% in 2009 (ADB 2009)—lends further credibility to the PRC-as-an-engine-of-growth hypothesis.

There are elements of both competition and partnership in the economic relationship between the PRC and the rest of the region. Countries around the region have viewed the PRC as a serious competitive threat to their manufacturing exports to the US and other markets outside the region. Furthermore, the PRC and the rest of the region compete for foreign direct investment (FDI) from industrialized countries. While the PRC-as-a-competitive-threat hypothesis reflects legitimate deep-seated concerns and fears of other Asian countries, which also rely on exporting manufactured goods to the outside world, the PRC-as-an-engine-of-recovery-and-growth is gaining greater ground, as those same countries look for ways to revive their economies amid continuing uncertainty about the trajectory of the US recovery. If the dominant view of the PRC by other regional countries before the current global crisis was that of a competitive threat in export markets, at home, there is a growing tendency to view the PRC as a promising market that can absorb a large and growing share of the region's exports. The PRC's visibly growing affluence and purchasing power, as evident in the rapid expansion of its middle class, is also giving rise to hopes that the PRC will play a bigger role as a consumer and hence as a source of independent demand for final goods.

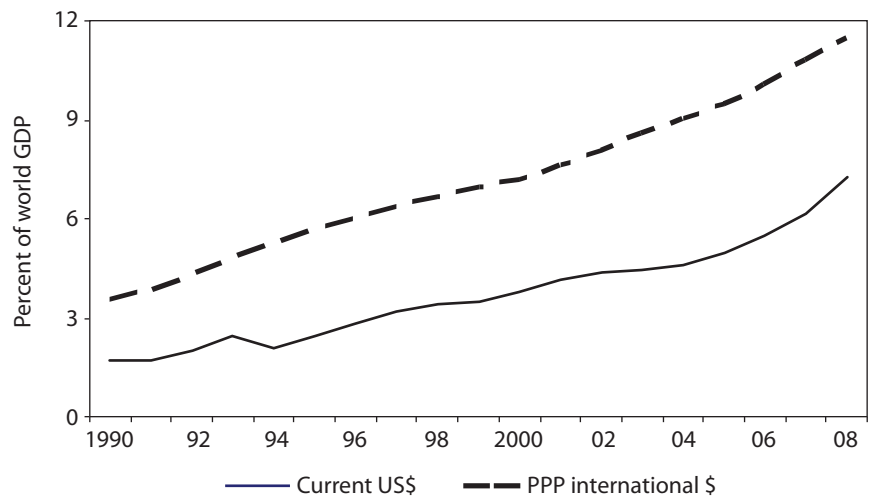
The evidence provides loud and clear confirmation of the conventional wisdom that intra-regional trade has grown rapidly among East and Southeast Asian countries, with a corresponding decline in the relative importance of trade with countries outside the region. More specifically, for countries in these two subregions, the share of intraregional trade has increased from 31.7% in 1990 to 42.0% in 2008. (Figure 4) Similarly, the evidence also gives an abundance of support for the PRC's growing relative importance in the world economy. From 1990 to 2008, the share of the PRC's GDP in world GDP rose sharply from 1.7% to 7.3% (Figure 5). Given the central role of trade and openness in the relentless expansion of the PRC's economy, its trade has also experienced a similarly rapid growth during the same period. Much of the growth in intra-Asian trade reflects growing trade between fast-growing PRC and the rest of the region. The PRC is becoming an increasingly important export market for each of the major economies in East and Southeast Asia (Figure 6).

Figure 4: Share of Intraregional Trade, East and Southeast Asia



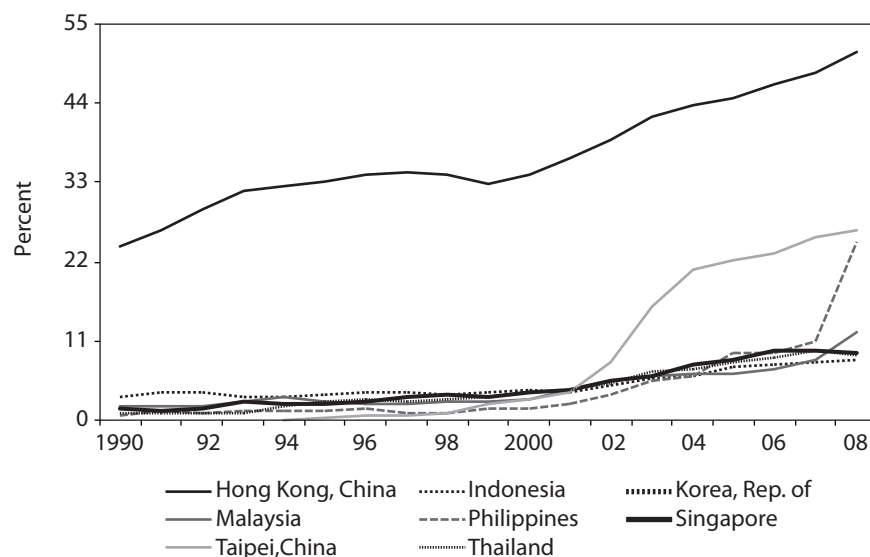
Source: Park and Shin (2009).

Figure 5: Share of People's Republic of China in World GDP



GDP = gross domestic product; PPP = purchasing power parity.
Source: Park and Shin (2009).

Figure 6: Exports to the People's Republic of China as Share of Total Exports, Selected East and Southeast Asian Economies



Source: Park and Shin (2009).

III. Evidence from VAR Regressions: Impact of the PRC's Demand for Imports on the GDP of Asian Countries

In the final analysis, the PRC-as-an-engine-of-recovery-and-growth hypothesis is a hypothesis about the PRC's GDP exerting an independent and positive effect on the GDP of other countries in East and Southeast Asia. It is worth noting that the reason for largely limiting our analysis to those two subregions is that the general level of regional economic integration and in particular integration with the PRC is more advanced in East and Southeast Asia than in other parts of developing Asia. The transmission mechanism from the PRC's GDP to GDP in the rest of the region involves the trade channel, i.e., from the PRC's GDP to the PRC's imports to East and Southeast Asia's exports to East and Southeast Asia's GDP growth, and the tangible end result should be a positive relationship between the PRC's imports from and output levels in the rest of the region. What interest the authors are (i) the relative magnitude of the impact of the PRC's imports on the GDP of its neighbors, and (ii) the evolution of this magnitude over time. In particular, an impact that is not visibly smaller than the impact of the US' imports would support the emergence of a second engine of growth in the region. Furthermore, an impact that grows over time, especially relative to the US impact, would also support a twin-engine growth paradigm.

In this section, authors use the VAR model to identify the US' and the PRC's import demand shocks, which are export demand shocks from the viewpoint of East and Southeast Asia. The authors' VAR model is based on that of Haltmaier et al. (2007), who analyze macroeconomic data from the second quarter of 1993 to the fourth quarter of 2006 to assess the impact of the PRC's and the US' demand on GDP growth in Indonesia; Korea; Malaysia; Philippines; Singapore; Taipei,China; and Thailand. Their two major findings are that (i) external shocks have played a major role in the domestic output fluctuations of their sample of developing Asian economies, and (ii) the PRC's demand shocks have been as important as the US' demand shocks in explaining the domestic growth fluctuations of Korea; Singapore; Taipei,China; and Thailand, but have not played a significant part in explaining the growth of Indonesia, Malaysia, and Philippines. Interestingly, most of their major findings remain valid even when Haltmaier et al. (2007) extend their VAR model to account for the possibility that the PRC's demand for Asian exports is a derived demand based on the US' demand for final goods.

A. Evidence from Three-Variable VAR Model

Through the VAR model, authors try to assess the relative contributions of shocks to the US' import demand and shocks to the PRC's import demand to GDP in nine regional countries during the first quarter of 1990 to the fourth quarter of 2008. Our sample of nine countries consists of the four newly industrialized economies (Korea; Hong Kong, China; Taipei,China; and Singapore), the ASEAN-4 (Indonesia, Malaysia, Philippines, and Thailand), plus India. India is included in the sample in light of its large and growing economic weight. A high PRC contribution would support the PRC-as-an-engine hypothesis and a growing contribution would suggest that the PRC is becoming more of an engine over time. During the sample period, as seen in Section II, the PRC has experienced exceptionally rapid growth, and trade with the PRC has become relatively more important for the rest of the region. Specifically, the authors estimate a three-variable structural VAR for each country in our sample. The VAR includes the following three variables: domestic real GDP, US' real imports from the country, and the PRC's real imports from the country. US' real imports from a given emerging Asian economy are computed by using the US' overall import price index to deflate nominal imports in US dollars. Due to the absence of an appropriate import price deflator for the PRC, authors use the producer price index as a proxy to deflate PRC's nominal imports.

To identify the US' and the PRC's demand shocks, authors use a Cholesky decomposition based on the following causal ordering: the US' real imports, the PRC's real imports, and domestic output. According to the Cholesky decomposition, a variable is contemporaneously affected by those variables coming before it in the ordering. However, a variable contemporaneously influences but is not contemporaneously influenced by the variables coming after it in the ordering. This ordering is consistent with economic intuition since East and Southeast Asian economies are usually considered small open economies. As such, they do not have a material influence over the US' GDP, the PRC's

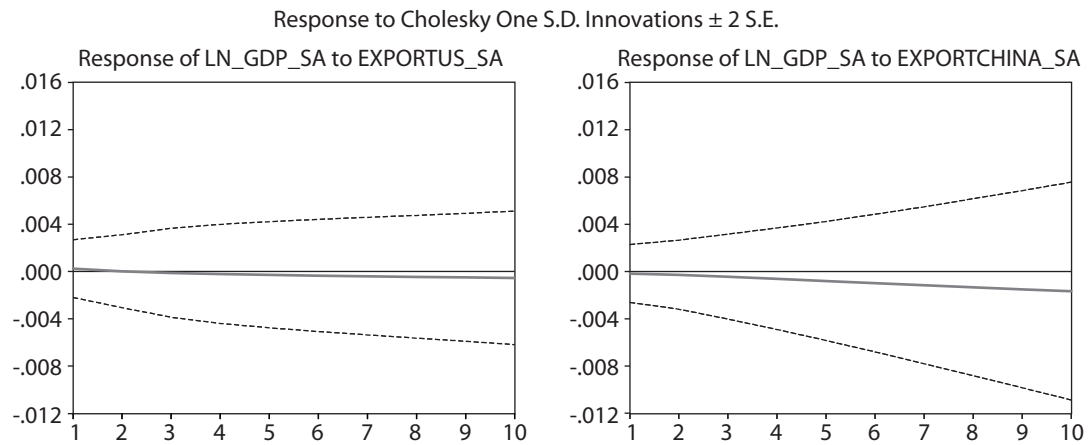
GDP, and the world prices of the goods they export. Therefore, since these exogenous variables are the primary determinants of the US' and the PRC's demands for their exports, the demands of the two economies are also exogenous from the viewpoint of the paper's 10 sample countries. In light of the small open economy assumption, authors also make the system block recursive such that not even the lagged values of domestic output levels of the 10 economies feed back into the US' and the PRC's demands.

After making the appropriate choice of length based on statistical criteria, authors estimate the reduced form VAR and then retrieve the structural VAR using the identification assumptions. For each country, authors compute the dynamic responses of domestic GDP to positive shocks to the US' and the PRC's imports. These impulse responses are then cumulated to give the effects on the level of domestic output over time. Figure 7 shows the responses of the level of domestic output to a one standard-deviation shock to the US' and the PRC's imports in the nine countries in the paper's sample.

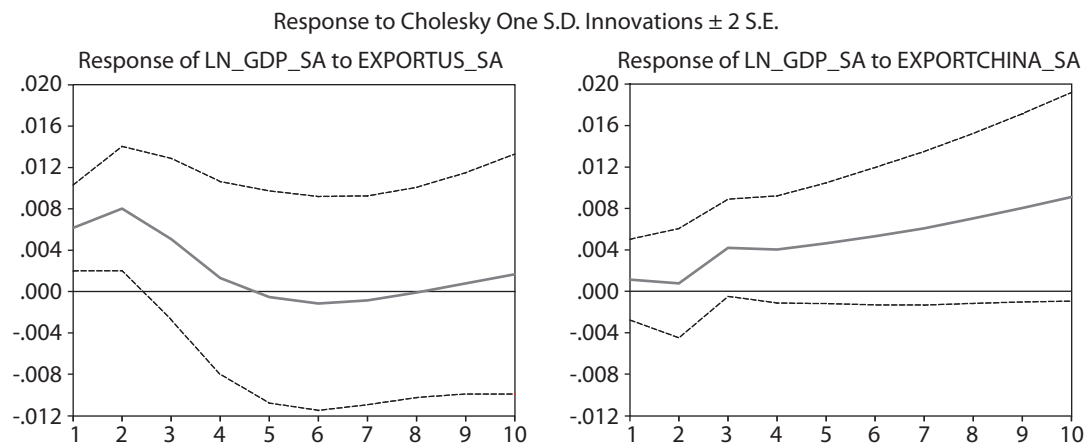
To control for the impact of the Asian financial crisis of 1997/1998, which represented a highly significant structural break in the region's economies, the authors exclude the crisis sub-period of third quarter of 1997 to second quarter of 1998 from the analysis and subdivide the remaining period into the pre-crisis sub-period and the post-crisis sub-period. Authors do so to see if there have been any significant structural changes in the impulse responses since the Asian crisis. The top figure shows the impulse response in the pre-crisis sub-period, the middle figure shows the impulse response in the post-crisis period, and the bottom figure shows the impulse response in the entire sample period exclusive of the Asian crisis sub-period.

Figure 7: Impulse Responses based on the Estimated VAR (Three Variables)

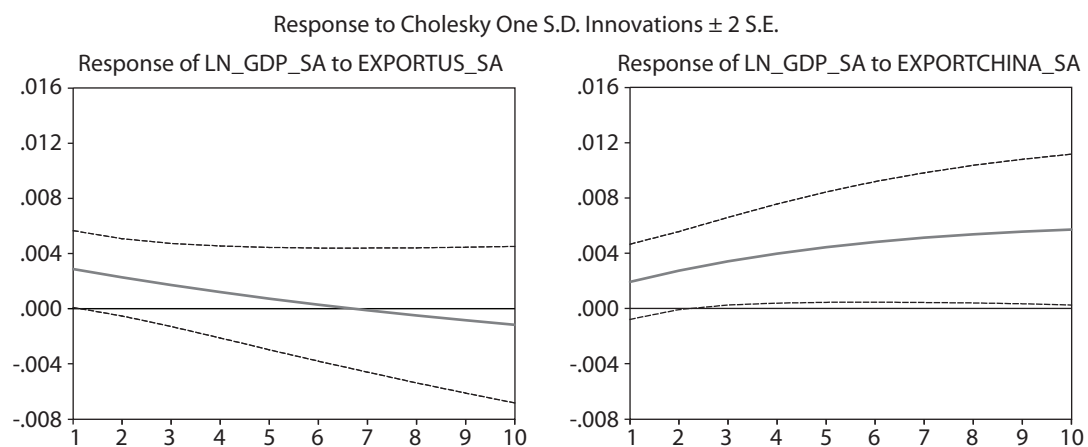
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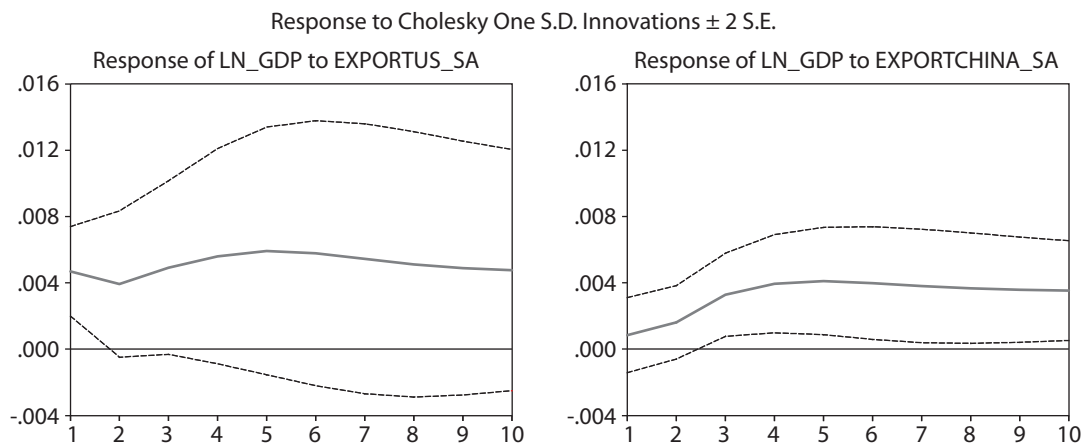
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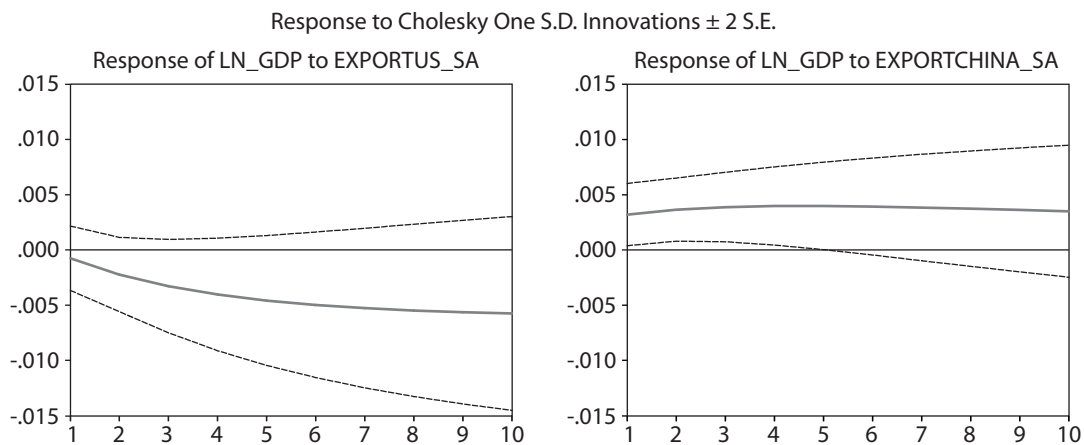
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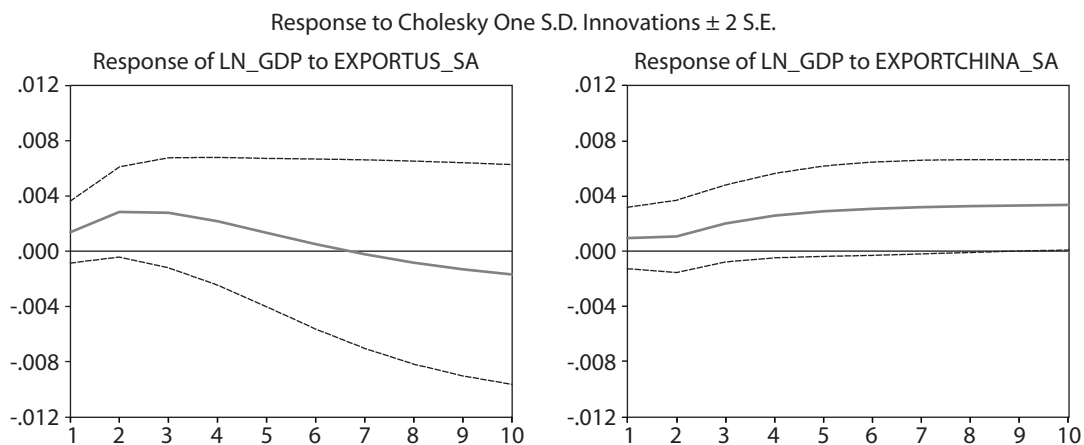
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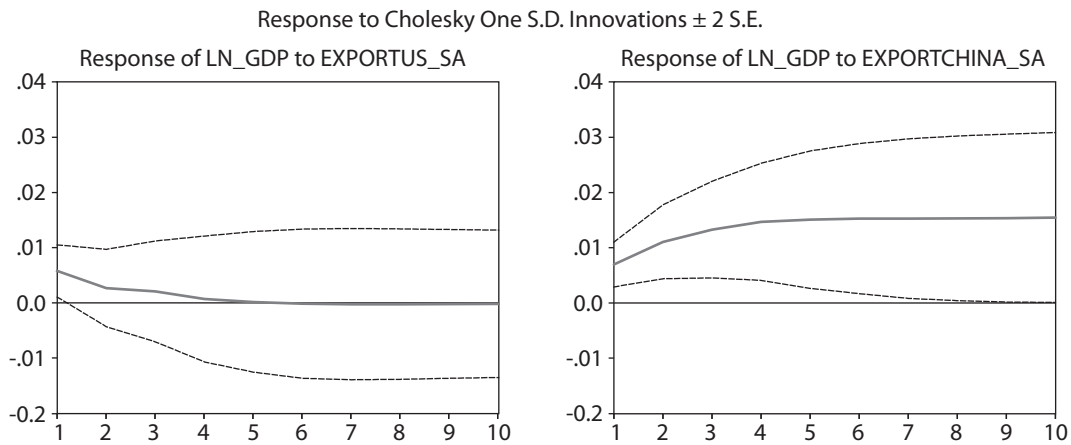
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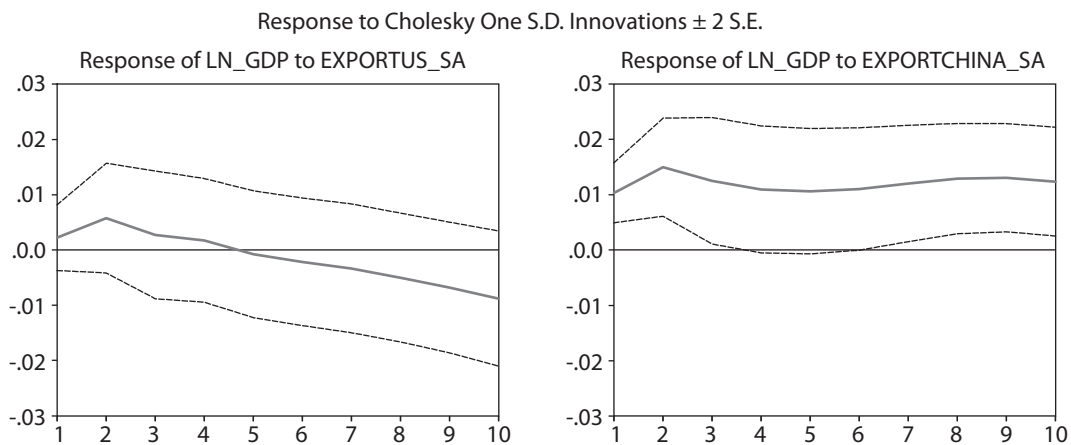
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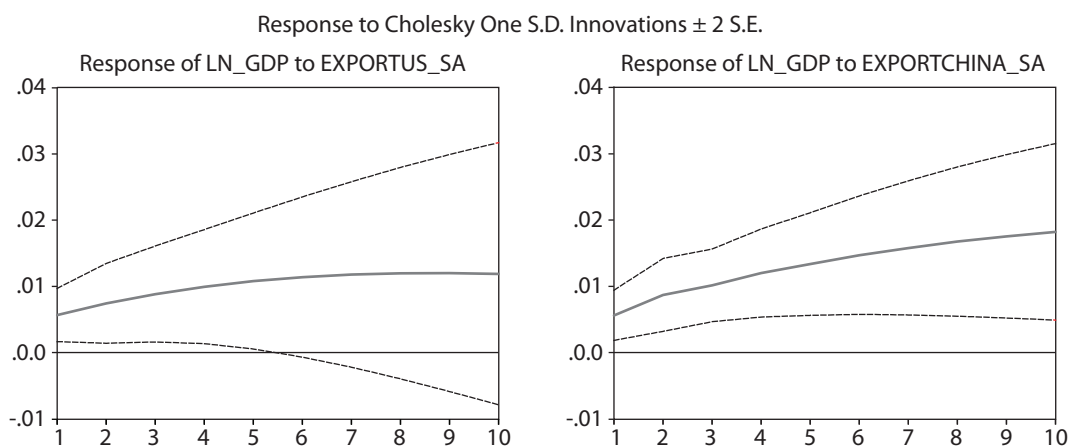
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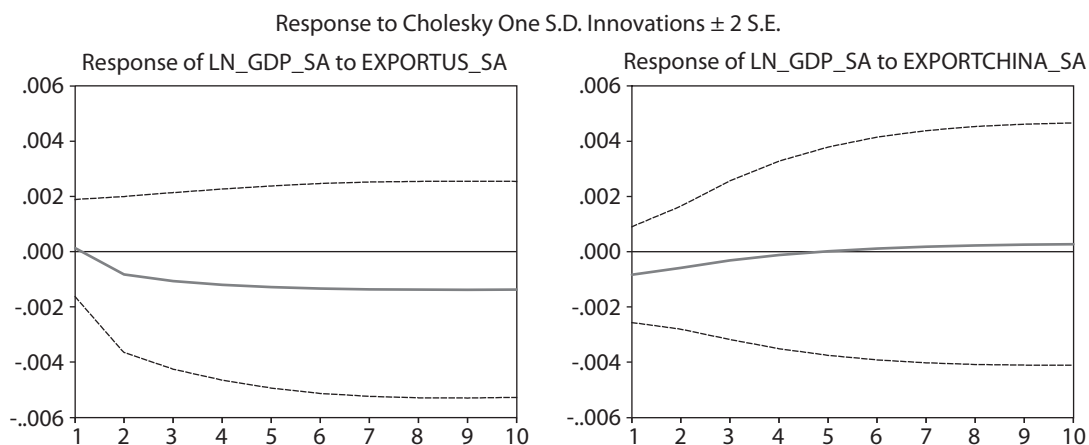
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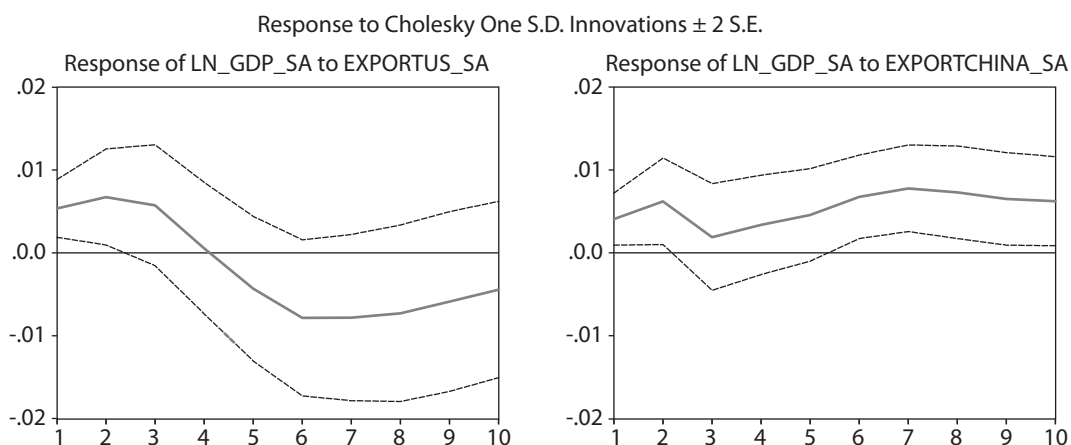
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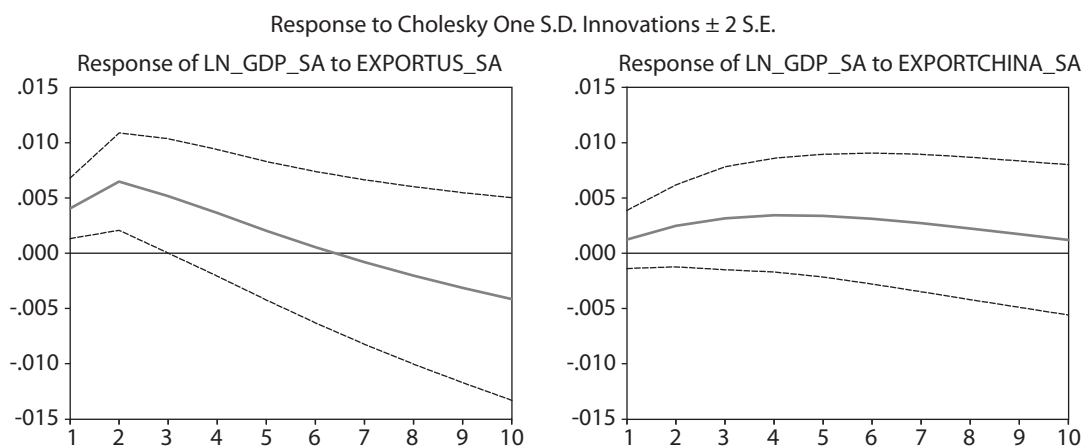
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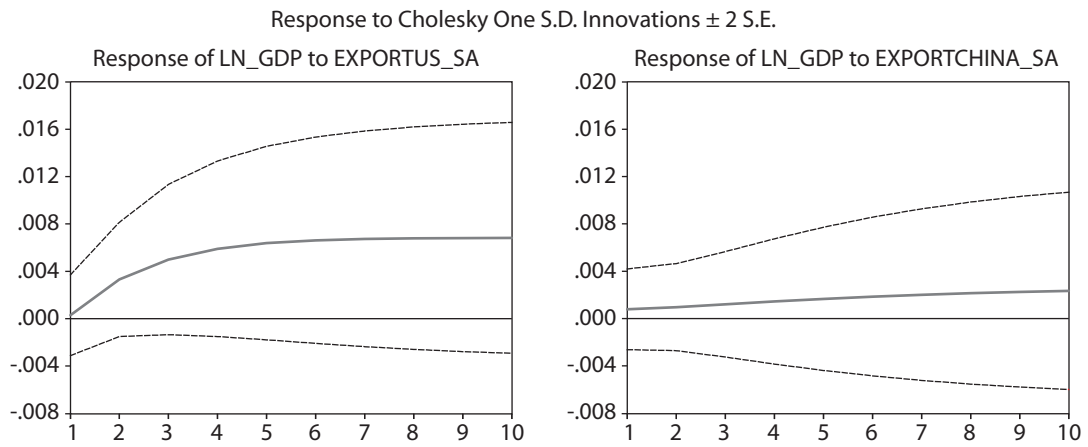
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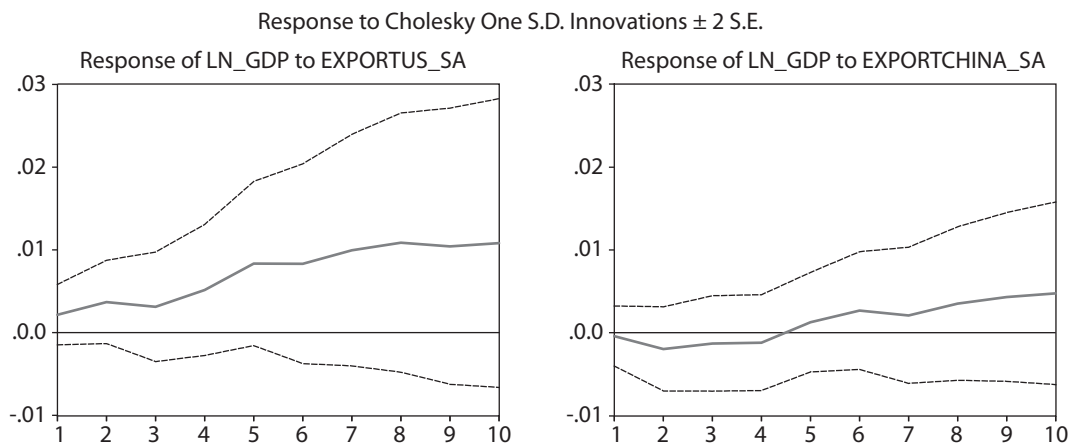
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<India, 1999Q1–2008Q2>



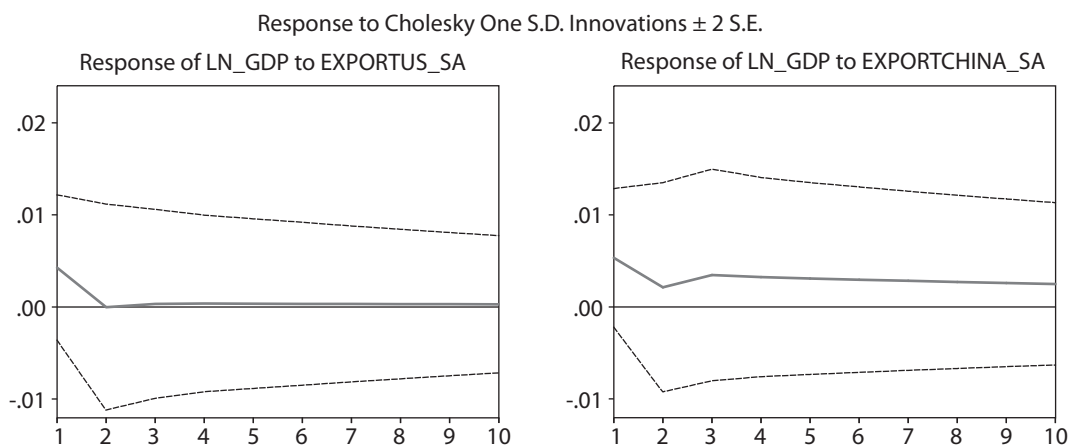
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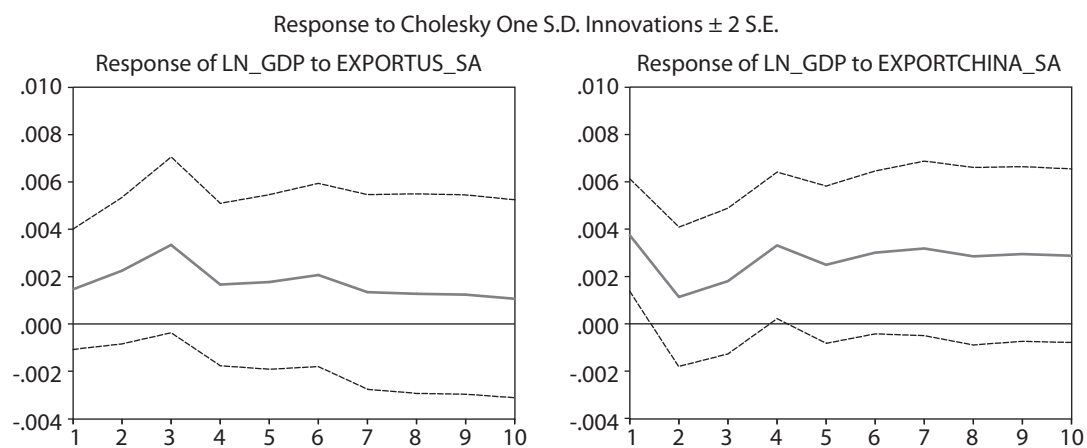
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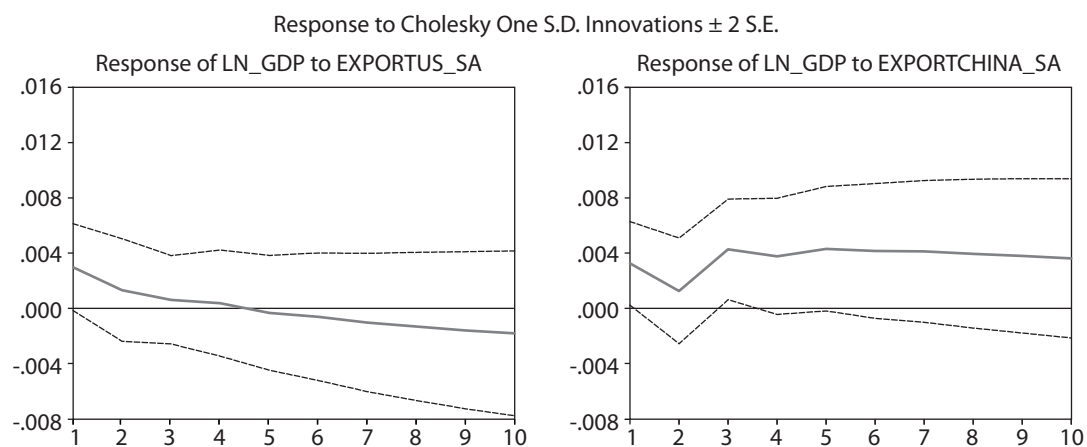
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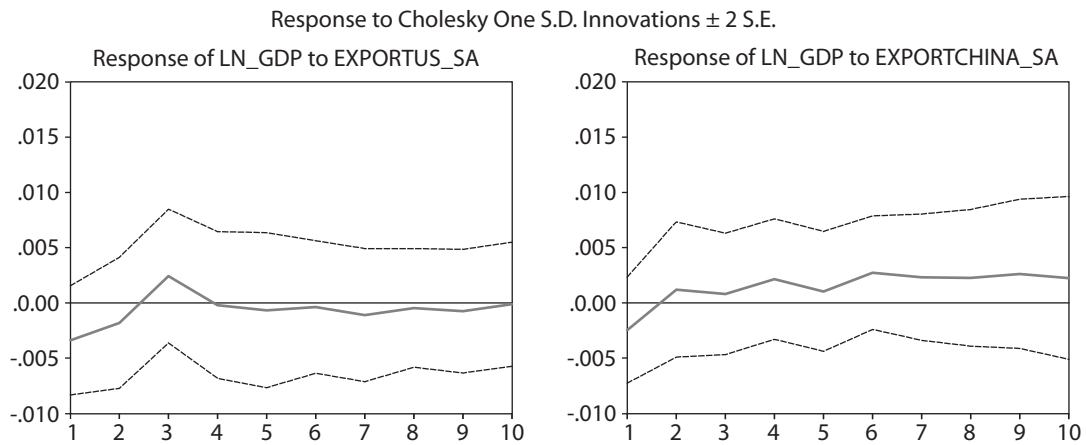
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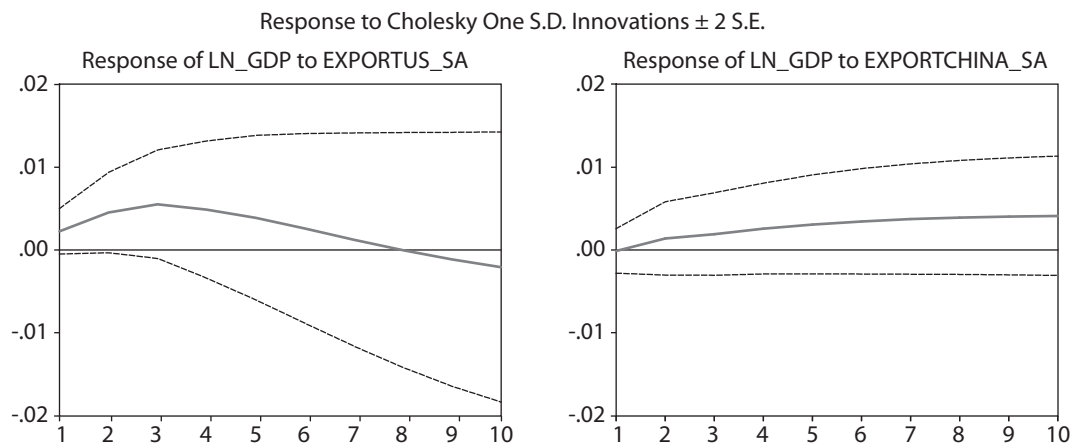
Continued.

Figure 7: Continued.

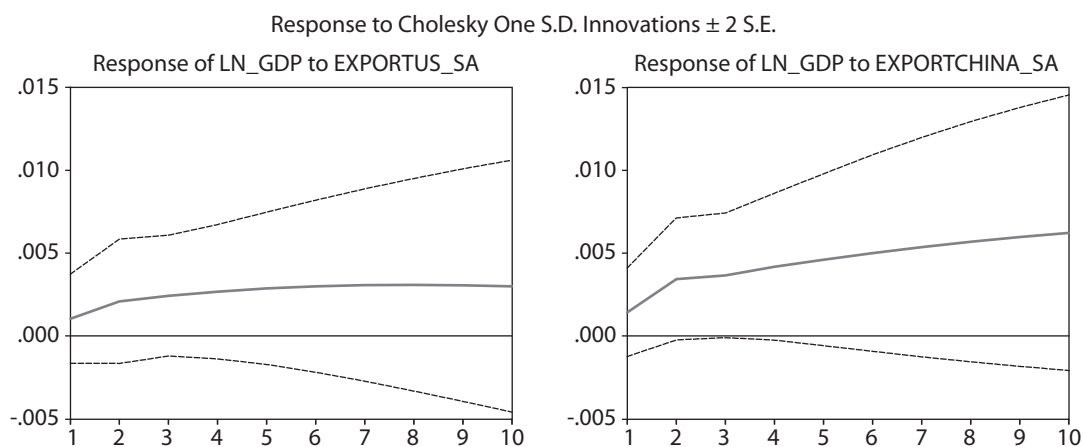
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<Malaysia, 1999Q1–2008Q2>



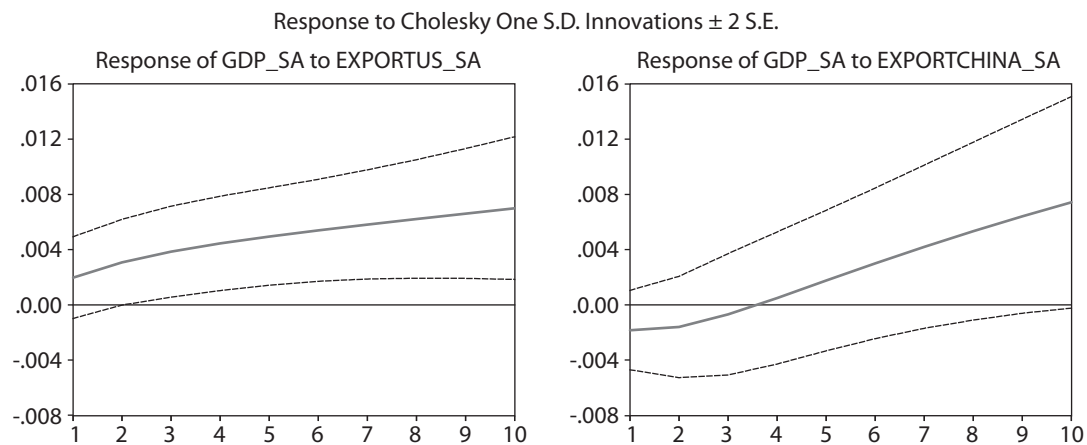
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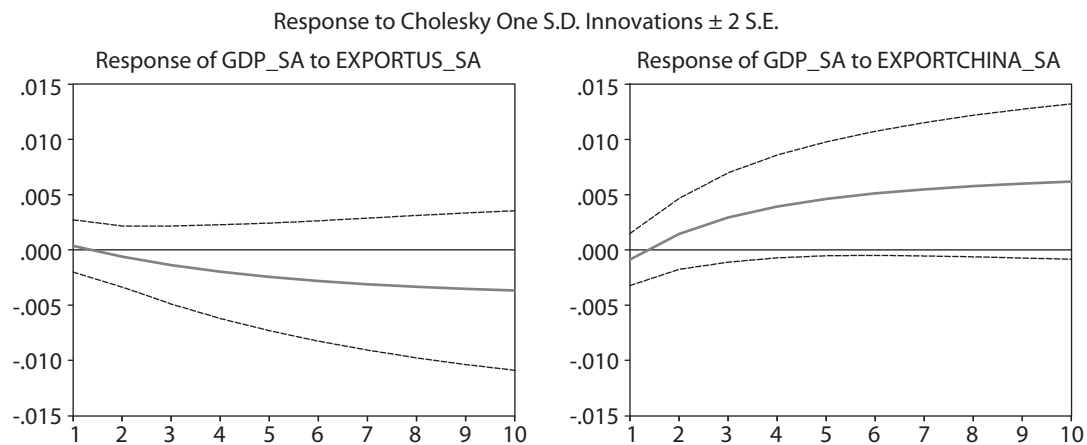
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Figure 7: Continued.

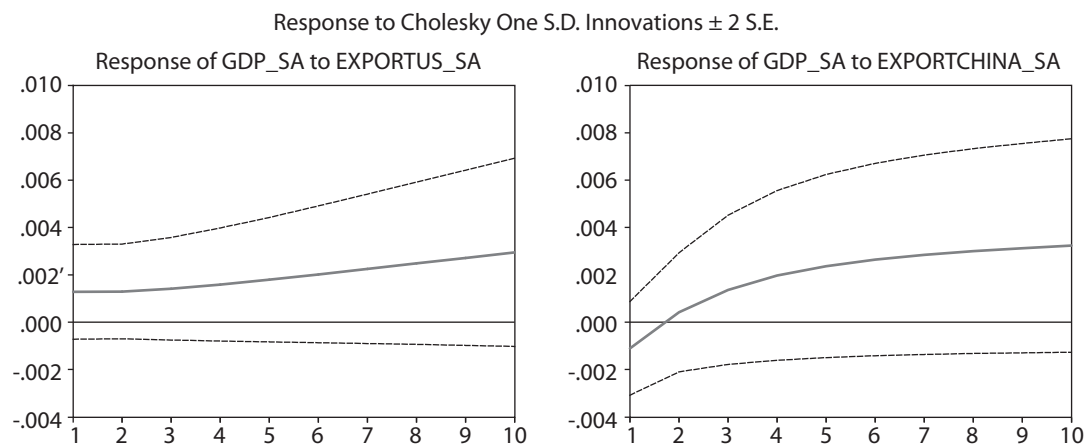
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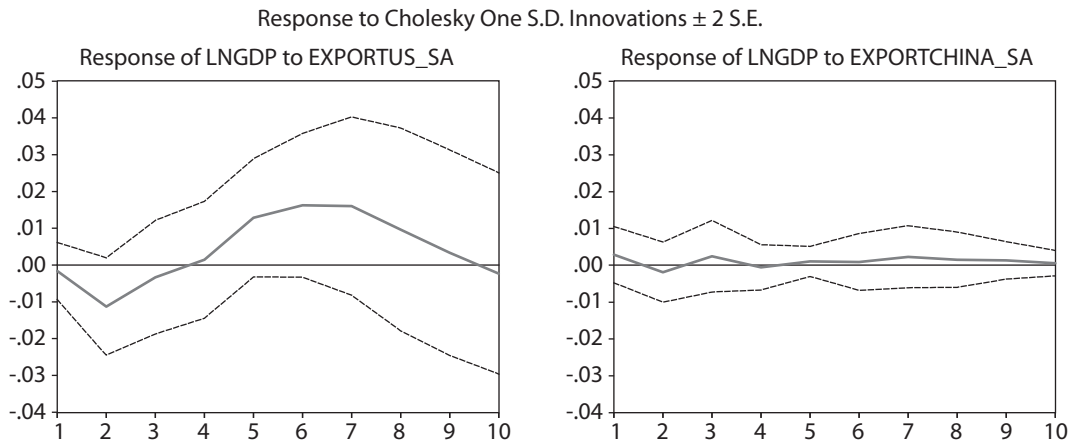
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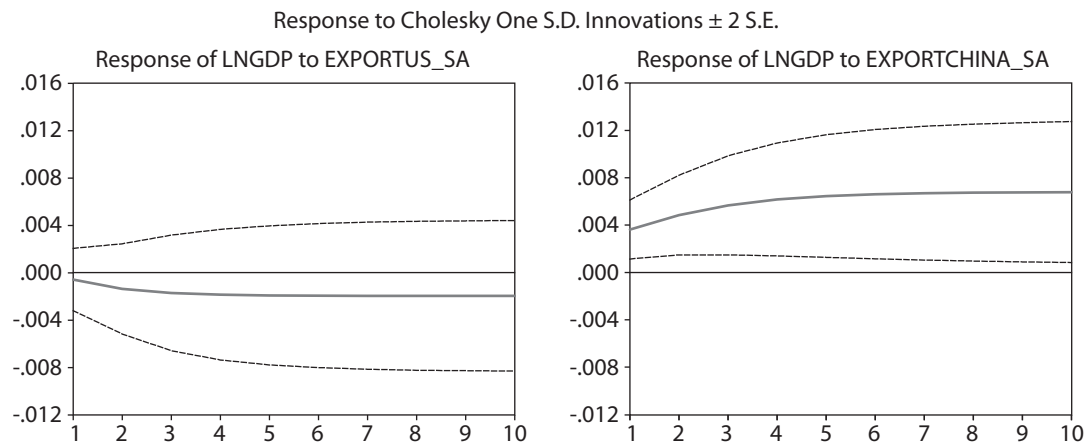
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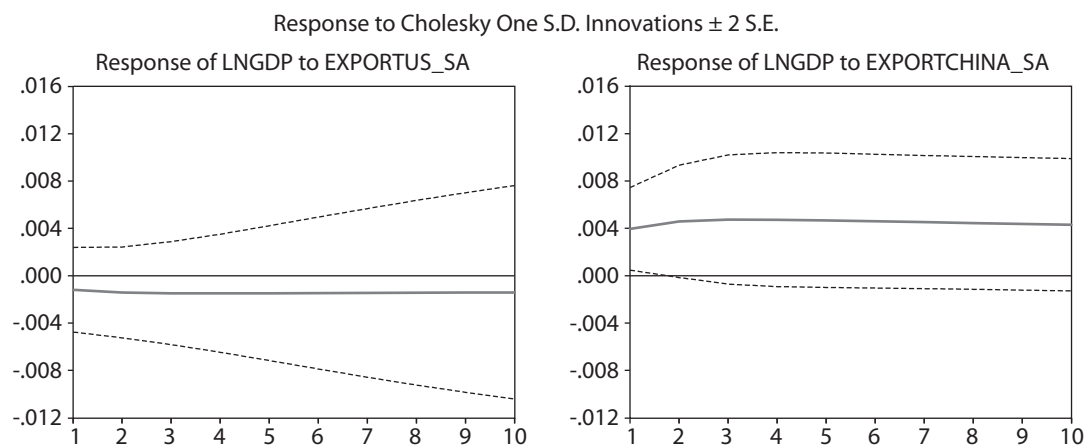
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<Thailand, 1999Q1–2008Q2>



<Thailand, 1990Q1–1997Q2 and 1999Q1–2008Q2>



While the impulse responses are interesting and informative, what is of greater significance for this paper's purposes is the relative importance of the US' versus the PRC's demand shocks in accounting for the domestic GDP fluctuations in the nine sample countries. This depends not only on the size of the impulse responses in the face of a given size shock (Figure 7) but also the frequency and average size of shocks hitting the economy. Variance decompositions, which measure the percentage of the forecast error variance of domestic output at various forecast horizons that is attributable to each shock, indicate the relative importance of the US' demand shock versus that of the PRC's. Table 1 reports the results of the variance decompositions for the nine countries in the paper's sample based on the estimated three-variable VAR model.

Table 1: Variance Decompositions based on the Estimated VAR (Three variables)

Period (quarters)	Hong Kong, China								
	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	0.1 (4.215)	0.1 (4.075)	99.8 (6.402)	20.6 (12.036)	0.7 (3.078)	78.7 (11.867)	6.1 (4.931)	2.7 (4.171)	91.2 (6.055)
2	0.1 (4.75)	0.1 (4.155)	99.8 (6.664)	31.0 (14.814)	0.6 (4.276)	68.5 (14.449)	5.1 (4.602)	4.3 (5.1)	90.5 (6.163)
3	0.1 (5.626)	0.2 (4.832)	99.7 (7.645)	29.5 (15.463)	4.5 (5.71)	66.0 (16.057)	4.3 (4.351)	6.1 (6.279)	89.6 (6.64)
10	0.3 (9.531)	2.2 (13.126)	97.6 (16.498)	14.6 (15.162)	34.6 (18.759)	50.8 (19.537)	1.8 (4.105)	17.2 (14.741)	81.0 (14.753)
Period (quarters)	Korea, Rep. of								
	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	44.4 (15.572)	1.4 (4.717)	54.2 (15.277)	0.7 (4.154)	12.6 (9.708)	86.7 (9.697)	2.5 (4.251)	1.2 (3.494)	96.3 (5.691)
2	45.7 (17.135)	4.0 (5.555)	50.3 (16.022)	3.4 (5.942)	14.5 (9.915)	82.0 (9.581)	6.2 (6.295)	1.2 (3.691)	92.5 (7.707)
3	47.9 (19.034)	10.9 (8.577)	41.2 (16.184)	6.7 (7.941)	15.7 (10.284)	77.6 (9.999)	7.3 (7.296)	2.5 (4.96)	90.2 (9.219)
10	53.8 (24.182)	23.5 (17.636)	22.7 (15.239)	22.4 (17.71)	15.5 (15.518)	62.0 (15.472)	4.2 (9.551)	10.5 (10.896)	85.3 (13.712)

Continued.

Table 1: Continued.

Singapore									
Period (quarters)	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	19.2 (12.337)	28.0 (13.308)	52.8 (13.264)	1.4 (4.173)	31.4 (11.514)	67.2 (11.333)	11.3 (7.495)	11.1 (6.355)	77.5 (7.809)
2	11.9 (10.276)	50.4 (16.959)	37.7 (13.284)	4.7 (8.245)	40.8 (13.362)	54.5 (12.634)	13.8 (9.002)	17.0 (8.287)	69.1 (9.598)
3	7.8 (9.279)	60.8 (17.838)	31.4 (13.596)	3.8 (8.698)	40.5 (14.773)	55.7 (14.4)	16.4 (10.433)	20.9 (9.248)	62.7 (11.163)
10	1.8 (13.709)	78.5 (20.737)	19.7 (15.564)	8.4 (12.607)	57.4 (16.286)	34.2 (14.155)	23.7 (17.074)	42.2 (17.119)	34.0 (17.845)

Taipei,China									
Period (quarters)	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	0.1 (8.118)	5.3 (11.293)	94.6 (13.432)	22.0 (10.605)	12.7 (8.314)	65.3 (11.284)	14.9 (9.289)	1.4 (4.052)	83.7 (9.605)
2	2.7 (10.631)	4.0 (10.397)	93.4 (13.406)	23.3 (13.408)	17.3 (10.844)	59.4 (12.947)	21.8 (12.468)	2.8 (5.24)	75.4 (12.542)
3	4.7 (14.869)	2.9 (11.823)	92.4 (16.988)	23.1 (14.515)	12.7 (9.909)	64.2 (14.011)	20.4 (12.971)	4.2 (6.546)	75.4 (13.278)
10	12.0 (23.241)	1.2 (19.394)	86.9 (28.951)	30.6 (15.501)	28.4 (12.201)	41.1 (17.212)	11.5 (10.552)	5.7 (10.667)	82.8 (14.185)

India						
Period (quarters)	1999Q1–2008Q2			1996Q1–2008Q4		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	0.1 (2.662)	0.5 (3.617)	99.4 (4.466)	3.5 (6.308)	0.1 (2.61)	96.3 (6.817)
2	5.1 (6.913)	0.7 (3.481)	94.2 (8.001)	7.7 (9.355)	1.7 (6.61)	90.6 (11.01)
3	10.9 (12.184)	0.9 (3.796)	88.2 (12.767)	8.8 (11.273)	1.8 (8.01)	89.4 (12.766)
10	28.1 (23.96)	2.5 (13.39)	69.4 (23.913)	49.3 (22.487)	5.7 (10.786)	45.0 (23.048)

Continued.

Table 1: Continued.

Indonesia									
Period (quarters)	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks	Exports to US shock	Exports to the PRC shock	Other shocks
1	6.7 (13.398)	10.4 (13.128)	83.0 (16.784)	3.4 (7.241)	22.3 (9.565)	74.2 (12.018)	6.4 (5.882)	7.6 (6.516)	86.0 (8.159)
2	3.3 (10.843)	5.9 (11.124)	90.8 (14.937)	9.6 (10.602)	20.4 (9.421)	70.0 (13.143)	5.6 (5.637)	6.5 (6.112)	87.9 (7.584)
3	2.3 (11.039)	5.6 (12.343)	92.2 (15.847)	19.1 (13.404)	19.3 (10.687)	61.7 (13.589)	4.1 (4.406)	11.3 (8.768)	84.6 (9.109)
10	0.9 (13.769)	4.9 (14.031)	94.2 (18.651)	13.0 (15.856)	30.0 (17.213)	57.0 (18.19)	2.6 (8.56)	18.2 (16.063)	79.1 (17.075)

Malaysia									
Period (quarters)	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks
1	6.8 (10.372)	3.6 (7.645)	89.6 (11.91)	6.9 (8.309)	0.0 (2.871)	93.1 (8.614)	0.9 (2.635)	1.7 (4.082)	97.4 (4.29)
2	6.7 (10.406)	3.4 (8.29)	89.9 (12.177)	11.8 (10.25)	0.9 (4.055)	87.3 (11.148)	2.2 (3.514)	5.7 (6.246)	92.1 (6.769)
3	8.7 (10.371)	3.4 (9.14)	87.9 (12.276)	14.5 (11.676)	1.4 (4.834)	84.1 (12.734)	3.2 (4.257)	7.7 (7.491)	89.1 (8.539)
10	5.2 (15.61)	9.7 (17.52)	85.0 (19.806)	7.8 (19.829)	6.8 (11.433)	85.4 (19.845)	7.1 (10.612)	22.0 (19.504)	70.9 (21.347)

Philippines									
Period (quarters)	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks
1	5.9 (9.475)	5.2 (7.397)	88.9 (12.377)	0.2 (5.261)	1.5 (6.564)	98.3 (7.887)	2.4 (3.658)	1.8 (3.961)	95.8 (5.372)
2	10.5 (11.334)	4.7 (7.362)	84.7 (14.239)	0.5 (4.921)	2.8 (6.756)	96.7 (7.579)	2.5 (3.871)	1.1 (3.186)	96.4 (4.939)
3	15.4 (13.229)	3.6 (7.253)	81.0 (15.664)	1.6 (6.766)	7.5 (10.083)	90.9 (10.62)	2.8 (4.209)	1.7 (4.051)	95.6 (5.566)
10	36.7 (18.797)	22.2 (18.373)	41.1 (20.871)	10.0 (17.189)	31.5 (22.924)	58.5 (24.118)	6.2 (8.416)	8.3 (10.471)	85.5 (11.879)

Continued.

Table 1: *Continued.*

Period (quarters)	Thailand								
	1990Q1–1997Q2			1999Q1–2008Q2			1990Q1–1997Q2 & 1999Q1–2008Q2		
	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks	Exports to US shock	Exports to PRC shock	Other shocks
1	1.1 (8.029)	3.3 (8.807)	95.6 (11.268)	0.5 (3.19)	19.8 (11.106)	79.7 (10.967)	0.8 (4.021)	8.8 (7.932)	90.3 (8.666)
2	32.7 (21.701)	3.0 (8.611)	64.4 (19.474)	1.7 (4.806)	26.5 (13.499)	71.8 (12.775)	1.0 (4.377)	10.5 (9.117)	88.5 (9.984)
3	29.5 (21.471)	3.6 (11.191)	66.9 (19.099)	2.5 (7.063)	31.9 (15.802)	65.6 (14.834)	1.1 (4.694)	11.4 (10.216)	87.5 (11.143)
10	70.2 (22.426)	2.1 (11.196)	27.7 (18.803)	4.0 (13.511)	46.2 (20.728)	49.9 (19.572)	1.3 (7.598)	13.1 (12.331)	85.6 (14.034)

() = negative; PRC = People's Republic of China; US = United States.

Source: Author's calculations.

To simplify the discussion, the authors will focus on the results at the time horizon of 10 quarters, when the joint impact of the US' and the PRC's demand shocks tends to be the biggest. While the authors' analysis yields a number of results, the most interesting and significant one is that the PRC's demand has become a more important source of GDP fluctuations in several of the paper's sample countries. This is the case in five out of nine sample countries, namely: Hong Kong, China; Indonesia; Taipei, China; Philippines; and Thailand. In and of itself, this would lend support to the PRC-as-an-engine hypothesis. Another somewhat predictable finding is that the role of the PRC's demand as a source of GDP fluctuations differs a lot across the sample economies, e.g., the PRC does not matter at all for India but matters a whole lot for Singapore.

The following discusses the relative importance of the US' versus the PRC's demand shock in each of the nine economies. For Hong Kong, China, the PRC is more important than the US overall and, furthermore, the relative importance of Hong Kong, China increased in the post-crisis period. For Korea, the US' demand was the dominant source of GDP fluctuations in the pre-crisis period but the PRC's demand played a much bigger role in the post-crisis period. The experience of Taipei, China closely mirrors the Korean experience, with the PRC's demand becoming almost as influential as the US' demand in the post-crisis period. The PRC's demand was the dominant source of Singapore's GDP fluctuation in both periods whereas the US' demand was similarly dominant for India. In the Philippines and Thailand, the US' demand dominated in the pre-crisis period but the PRC's demand dominated in the post-crisis period. Indonesia also witnessed a sharp increase in the relative importance of the PRC's demand in the post-crisis period. Finally, overall the PRC matters more than the US as a source of fluctuations in Malaysia but neither the US' nor the PRC's demand account for more than a small share of the forecast error variance of domestic output in either of the two periods. To sum up, the

broader picture that emerges is that of a PRC that already plays a big role in the GDP movements of countries in the region, not noticeably smaller than the role of the US. Furthermore, the role of the PRC has strengthened appreciably since the Asian crisis.

B. Evidence from Four-Variable VAR Model

While such results bode well for the PRC-as-an-engine hypothesis, there is a serious risk that they overestimate the extent to which the PRC serves as an independent source of demand and growth for the region. This pertains to the basic structure of intra-Asian trade alluded to earlier, i.e., the exports of parts and components from other Asian countries to the PRC for assembly and exports of the assembled final goods to US and other destinations outside the region, e.g., suppose consumers in a booming US economy purchase more PRC-made personal computers. This increase in the US' demand will be transmitted to other Asian countries in the form of stronger demand from the PRC for semiconductors and other personal computer parts. That is, the structure of intra-Asian trade suggests that the PRC's demand for imports from its neighbors is a derived demand that is based on final demand in the US and elsewhere. What is driving the PRC's demand for imports from, say, Malaysia is not the PRC's own demand but the US' demand for final goods from Asia. The large and growing role of the PRC's demand as a source of GDP fluctuations in the rest of the region may thus simply reflect the large and growing role of the PRC as an assembler of parts and components. Therefore, a more accurate assessment of the PRC's demand on GDP in the sample countries requires control for the PRC's exports to the US. It is conceptually useful to think of much of the PRC's exports as reexports of goods from those countries to the US.

To control for the reexports of goods from the sample countries to the US, the authors expand their three-variable VAR model to a four-variable VAR model. The additional variable is the US' real imports from the PRC, which contains large inputs of intermediate goods from the rest of the region. In the context of the causal ordering of the expanded VAR model, this variable was placed immediately after the US' imports from the sample country and immediately before the PRC's imports from the same country. If the US' real imports from the PRC—i.e., PRC's real exports to the US—displace, say, Korea's real exports to the PRC as a significant source of GDP fluctuations, this can be viewed as evidence supportive of the derived demand hypothesis. If, on the other hand, Korea's real exports to the PRC remain significant even after controlling for the PRC's real exports to the US, it is much more appropriate to interpret the authors' findings from the four-variable VAR model as evidence supportive of the PRC-as-an-engine hypothesis. Table 2 reports the results of the variance decompositions based on the estimated four-variable VAR model.

Table 2. Variance Decompositions based on the Estimated VAR (Four variables)

Period (quarters)	Hong Kong, China											
	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC's shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC's shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	0.1 (4.441)	2.3 (7.115)	0.3 (4.738)	97.3 (9.69)	11.7 (10.009)	7.5 (8.333)	1.2 (4.172)	79.7 (10.263)	5.9 (5.213)	0.3 (2.424)	2.6 (4.365)	91.2 (7.282)
2	0.1 (4.087)	2.2 (7.339)	0.4 (4.914)	97.4 (9.648)	9.8 (9.289)	5.0 (6.307)	1.3 (5.532)	83.8 (11.046)	4.3 (4.488)	0.4 (2.18)	4.0 (5.075)	91.3 (7.301)
3	0.0 (5.415)	2.1 (8.041)	0.5 (5.661)	97.3 (11.034)	8.3 (9.193)	4.0 (5.037)	2.2 (7.503)	85.6 (12.351)	3.3 (3.829)	1.6 (3.01)	5.5 (5.848)	89.7 (7.763)
10.0	0.3 (12.969)	2.7 (14.289)	2.4 (9.216)	94.6 (19.492)	4.2 (16.59)	32.9 (18.168)	3.3 (8.386)	59.6 (19.151)	5.9 (7.12)	20.5 (12.951)	14.6 (11.446)	59.0 (17.297)

Period (quarters)	Korea, Rep. of											
	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	30.8 (16.414)	27.8 (13.517)	2.2 (4.79)	39.1 (12.191)	1.4 (6.314)	17.9 (11.101)	10.7 (8.643)	69.9 (12.141)	1.0 (2.902)	4.0 (4.747)	0.0 (2.287)	95.0 (6.074)
2	26.1 (16.755)	38.1 (15.749)	2.1 (3.93)	33.7 (13.752)	1.0 (5.202)	20.5 (11.357)	7.5 (7.881)	71.0 (13.09)	2.4 (4.567)	3.3 (4.416)	0.0 (2.256)	94.4 (6.357)
3	28.3 (19.02)	44.3 (16.955)	1.2 (3.49)	26.2 (12.754)	0.7 (6.037)	27.3 (13.397)	6.2 (6.585)	65.8 (14.489)	2.5 (5.458)	4.8 (6.207)	0.0 (2.301)	92.7 (8.234)
10.0	24.3 (23.34)	55.2 (22.469)	6.5 (11.592)	14.0 (11.892)	3.2 (11.792)	48.6 (17.532)	21.7 (17.53)	26.5 (12.983)	1.6 (11.079)	41.8 (19.544)	0.1 (3.614)	56.5 (18.497)

Continued.

Table 2: *Continued.*

Period (quarters)	Singapore											
	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	2.5 (6.171)	0.9 (5.367)	21.1 (11.093)	75.5 (11.751)	6.5 (8.968)	7.9 (8.439)	13.1 (9.785)	72.6 (11.656)	7.0 (5.434)	0.2 (1.703)	10.1 (6.636)	82.7 (8.093)
2	1.4 (5.104)	5.9 (7.798)	25.5 (13.081)	67.1 (13.91)	13.8 (12.68)	5.5 (7.613)	7.7 (8.48)	73.0 (13.313)	7.8 (6.931)	1.7 (2.829)	11.1 (7.078)	79.5 (9.011)
3	2.6 (6.371)	11.6 (10.416)	25.5 (13.775)	60.4 (15.398)	20.4 (14.789)	4.3 (5.432)	6.1 (7.33)	69.2 (14.74)	8.5 (8.212)	6.3 (5.91)	10.7 (7.137)	74.6 (9.913)
10.0	11.7 (13.303)	42.6 (21.944)	15.4 (13.734)	30.4 (17.28)	16.6 (14.426)	43.1 (13.668)	11.5 (12.962)	28.8 (12.395)	5.1 (9.404)	57.4 (19.791)	5.1 (8.901)	32.5 (15.38)

Period (quarters)	Taipei,China											
	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	1.4 (11.669)	17.6 (14.285)	34.6 (15.853)	46.5 (14.614)	11.5 (8.633)	0.2 (3.039)	3.5 (6.717)	84.8 (11.137)	14.3 (7.797)	0.0 (2.133)	0.8 (3.33)	84.8 (8.339)
2	7.5 (15.831)	12.3 (14.592)	35.5 (14.918)	44.7 (14.017)	13.9 (11.456)	3.9 (5.682)	7.4 (8.774)	74.9 (13.4)	22.0 (11.299)	1.0 (3.084)	2.0 (4.602)	75.0 (11.72)
3	22.3 (20.698)	8.8 (15.476)	27.0 (13.757)	41.9 (13.521)	10.8 (10.416)	9.6 (7.88)	5.8 (8.587)	73.8 (13.582)	22.2 (12.4)	2.3 (4.51)	2.7 (5.942)	72.7 (13.359)
10.0	19.9 (20.725)	12.2 (18.965)	20.9 (13.413)	47.0 (13.802)	31.5 (18.705)	12.8 (10.636)	5.3 (7.144)	50.4 (16.225)	14.1 (10.901)	15.2 (16.675)	5.7 (10.508)	65.1 (21.707)

Continued.

Table 1: Continued.

India												
Period (quarters)	1999Q1–2008Q2				1996Q1–2008Q4							
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks				
1	0.7 (5.625)	0.0 (4.104)	0.1 (3.805)	99.2 (7.686)	10.5 (8.647)	0.1 (3.433)	0.2 (2.655)	89.3 (9.258)				
2	1.1 (6.295)	0.5 (4.893)	0.1 (3.969)	98.3 (8.475)	10.7 (8.968)	4.1 (7.037)	8.1 (8.424)	77.1 (12.377)				
3	2.8 (8.901)	1.8 (6.514)	0.1 (4.687)	95.2 (10.953)	11.1 (10.58)	6.6 (10.134)	8.5 (9.057)	73.8 (13.218)				
10	13.6 (16.22)	38.0 (20.709)	1.4 (9.)	46.9 (22.131)	45.0 (19.766)	32.2 (14.603)	7.2 (8.915)	15.5 (7.722)				

Indonesia												
Period (quarters)	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	0.2 (9.451)	2.5 (7.608)	21.1 (13.518)	76.2 (16.771)	5.9 (7.768)	7.2 (8.215)	7.6 (6.565)	79.4 (12.352)	6.4 (6.34)	5.6 (6.103)	5.6 (5.945)	82.4 (9.425)
2	6.7 (15.14)	20.4 (16.339)	14.5 (14.293)	58.3 (16.77)	15.4 (13.341)	12.7 (10.336)	5.8 (6.477)	66.1 (13.69)	5.6 (6.347)	4.4 (6.477)	4.6 (6.059)	85.3 (9.953)
3	15.2 (16.545)	21.2 (16.33)	15.2 (14.575)	48.4 (15.304)	17.4 (13.44)	10.5 (9.9)	4.7 (6.23)	67.4 (13.399)	4.1 (5.955)	4.2 (7.139)	8.2 (7.83)	83.4 (11.285)
10.0	15.2 (20.492)	19.9 (15.728)	18.0 (17.093)	46.9 (16.53)	17.2 (15.428)	36.1 (17.345)	5.9 (10.864)	40.8 (14.712)	5.6 (10.209)	2.1 (8.756)	9.0 (11.594)	83.3 (17.161)

Continued.

Table 2: Continued.

Malaysia												
Period (quarters)	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	0.0 (5.882)	0.6 (4.723)	7.8 (9.025)	91.6 (10.483)	0.2 (3.048)	0.0 (4.452)	4.1 (6.38)	95.7 (7.645)	0.7 (2.126)	0.5 (2.714)	2.0 (3.694)	96.8 (4.751)
2	0.9 (7.974)	1.8 (6.368)	20.7 (11.782)	76.6 (14.254)	0.8 (3.94)	0.5 (5.607)	11.0 (9.955)	87.7 (10.976)	1.7 (3.226)	0.3 (2.393)	5.0 (5.268)	93.0 (5.954)
3	4.4 (9.544)	1.3 (6.885)	23.7 (13.045)	70.6 (15.272)	2.5 (6.09)	5.9 (9.126)	9.0 (9.542)	82.6 (12.557)	2.5 (4.201)	0.5 (2.722)	5.7 (6.194)	91.3 (7.171)
10.0	34.7 (22.157)	4.2 (17.179)	22.4 (15.54)	38.7 (19.417)	18.9 (14.702)	47.8 (16.273)	9.3 (11.732)	24.0 (13.134)	7.0 (10.221)	10.2 (13.409)	5.1 (13.431)	77.6 (17.769)

Philippines												
Period (quarters)	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	14.5 (12.073)	0.9 (4.74)	0.0 (4.288)	84.6 (11.784)	0.2 (3.315)	0.4 (3.889)	1.5 (4.768)	97.9 (7.337)	0.9 (3.119)	0.3 (2.393)	2.7 (3.368)	96.1 (4.832)
2	18.9 (13.964)	0.5 (4.729)	0.6 (6.009)	80.1 (13.507)	3.5 (6.591)	13.6 (9.488)	8.6 (6.764)	74.4 (12.008)	0.6 (2.909)	0.3 (1.851)	1.7 (3.236)	97.3 (4.852)
3	22.4 (16.182)	0.5 (6.179)	2.0 (7.709)	75.1 (15.688)	2.2 (5.949)	25.6 (12.093)	6.1 (7.272)	66.1 (12.29)	0.5 (2.832)	1.2 (2.321)	1.2 (3.631)	97.1 (5.705)
10.0	24.7 (20.343)	28.3 (18.8)	7.3 (9.678)	39.7 (18.989)	20.7 (16.613)	33.1 (18.442)	18.3 (12.218)	28.0 (16.141)	1.3 (4.544)	22.9 (11.904)	2.1 (7.49)	73.6 (14.254)

Continued.

Table 2: *Continued.*

Period (quarters)	Thailand											
	1990Q1–1997Q2				1999Q1–2008Q2				1990Q1–1997Q2 & 1999Q1–2008Q2			
	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks	Exports to US shock	PRC's exports to US	Exports to PRC shock	Other shocks
1	4.4 (10.878)	17.3 (15.562)	3.2 (8.485)	75.1 (17.066)	7.3 (8.125)	0.5 (3.676)	12.0 (9.701)	80.3 (11.328)	4.7 (6.241)	0.4 (2.769)	11.5 (7.866)	83.5 (9.282)
2	16.3 (19.736)	13.6 (13.139)	2.8 (8.523)	67.3 (17.9)	12.4 (11.459)	4.8 (5.754)	12.7 (11.184)	70.1 (12.491)	10.6 (8.594)	1.8 (3.422)	13.4 (9.499)	74.2 (11.926)
3	13.7 (18.653)	13.8 (11.685)	7.1 (10.)	65.4 (17.526)	14.2 (13.602)	10.7 (9.077)	15.4 (13.041)	59.7 (13.54)	16.1 (10.688)	3.5 (4.2)	14.6 (10.729)	65.8 (13.947)
10.0	46.2 (22.314)	33.4 (19.016)	2.1 (7.565)	18.3 (12.54)	6.4 (16.688)	58.5 (23.042)	15.6 (14.622)	19.5 (11.756)	33.2 (17.223)	13.0 (9.425)	16.6 (13.131)	37.1 (17.364)

() = negative; PRC = People's Republic of China; US = United States.
Source: Author's calculations.

The clear overall pattern that emerges is that the PRC's real exports to the US emerge as a new significant source of GDP fluctuations, mostly at the expense of the sample country's real exports to the PRC. That is, once authors control for the possibility that the PRC's demand for Asian exports is primarily a derived demand, Asian exports to the PRC lose much of their significance. The results are most pronounced for the more developed countries—i.e., the four newly industrialized economies—but broadly similar results also hold for Indonesia, Philippines, and Thailand. Interestingly and tellingly, even in Singapore, where real exports to the PRC was found to be the dominant source of fluctuations in the three-variable model, the same variable loses much of its explanatory power in the four-variable model. The only three countries where real exports to the PRC remain significant even after controlling for derived demand are Korea, Philippines, and Thailand. All in all, the results of the four-variable VAR model are more favorable for the derived demand hypothesis than the PRC-as-an-engine hypothesis.

IV. Concluding Observations

From the perspective of developing Asia, the Asian financial crisis of 1997/1998 was a financial crisis that first broke out in the financial markets before later spreading to and wreaking havoc on the real economy. In striking contrast, as far as developing Asia is concerned, the global financial crisis of 2008–2009 was primarily a trade crisis even though its origins were financial. Trade rather than financial contagion was the primary channel that transmitted the global crisis from the US and EU to the region. Another major difference between the two crises is that the Asian crisis was partly homegrown and due to the region's own weaknesses while the global crisis was largely an exogenous shock caused by market failures in the US' housing and financial markets. Even though the region's financial systems did not suffer the devastation visited upon their counterparts in the US and EU, the real economies nevertheless experienced a sharp deceleration as a result of the collapse in their exports to the US and EU. While outward-looking openness has been an indispensable ingredient of developing Asia's success, both crises have served to alert the region's public and policy makers to the harsh reality that globalization entails not only benefits but also costs.

The Asian financial crisis exposed the risks of exposure to volatile short-term foreign capital. The loss of investor confidence triggered a sudden and abrupt withdrawal of capital inflows, and spread from Thailand to other countries like wildfire. In a fundamental sense, the Asian crisis explains why developing Asia's economies were hit so hard by the global crisis even though economic slowdown was brought on by capital flows in one case and trade in the other. Before the Asian crisis, developing Asia as a whole ran a current account deficit but since then the region has run large and persistent surpluses. This reversal of the current account position was motivated partly by the region's desire to build up an ample war chest of foreign exchange reserves for precautionary self-

insurance purposes. The reversal implied a higher level of dependence on exports to the industrialized countries, in particular the US, as a source of demand and growth. The region's desire to protect itself from one type of risk from openness and globalization, i.e., financial instability due to volatile capital flows, inadvertently magnified its exposure to another type of risk, i.e., excessive dependence on exports. The sharp deceleration of the region's exports and growth in 2008–2009 reflects the realization of the latter risk of excessive dependence on exports.

Finding new sources of demand has become an urgent priority for export-dependent developing Asia in light of the collapse of the region's exports to the US and other industrialized countries. In the short run, governments throughout the region have bolstered demand by serving as the consumer of last resort through sizable fiscal stimulus packages. In the long run, one potential source of demand is a stronger domestic demand that will enable the region's economies to consume more of what they produce, a strategic option discussed in the *Asian Development Outlook 2009*. Two stylized facts—(i) the quantitative growth of intraregional trade among East and Southeast Asian countries, and (ii) the rise of the PRC as a globally significant economic power—suggest another source of demand for the region. In view of the size and growth of the PRC's economy and its growing appetite for imports, regional countries are increasingly viewing the PRC as a potentially huge market that can supplement the US as an additional growth engine. Although much of the large and growing trade between the PRC and its neighbors are trade in parts and components geared toward assembly and export to the US, the PRC's fast-rising income level is generating hopes that it will become an independent source of demand for the region.

The central objective of this paper has been to empirically assess the validity of the PRC-as-an-engine-of-growth hypothesis. That is, authors examine the issue of whether and to what extent the dynamic PRC economy is becoming a growth center for the whole region. To do so, authors use VAR models to investigate the impact of the PRC's imports—i.e., exports to the PRC—on the GDP of Hong Kong, China; India; Indonesia; Korea; Malaysia; Singapore; Taipei, China; Thailand; and Viet Nam. The overall balance of evidence from the authors' three-variable VAR model, which does not take into account the fact that the PRC's demand for Asian goods is a demand for parts and components derived from the US' demand for final goods, indicates that exports to the PRC have a large and growing positive effect on the GDP of regional economies. However, when we extend the VAR model to a four-variable VAR model to incorporate derived demand, much of the PRC's positive impact disappears. Therefore, our overall evidence is more supportive of the derived demand hypothesis than the PRC-as-an-engine hypothesis.

This suggests that the PRC's apparently positive effect on the GDP of its neighbors largely reflects the effect of demand from the US. For example, when the US demands more final goods from developing Asia, Malaysia exports more parts and components to the PRC, which then assembles them into final goods for export to the US. Such

intraregional trade is beneficial for the region in that it allows for greater specialization and division of labor, which boosts efficiency and helps the region as a whole keep its global comparative advantage as the manufacturing center of the world. While beneficial, such intraregional trade does not augur well for the PRC's capacity to become a growth engine for the region since it is not based on independent demand from the PRC. Nevertheless, the PRC's remarkable resilience and continued rapid growth during the global crisis, coupled with the ongoing unwinding of the US current account deficit, suggests that the PRC may become more of a growth engine in the future.

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About the Paper

Donghyun Park and Kwanho Shin use vector autoregression models to assess the impact of exports to the People's Republic of China (PRC) on the gross domestic product of nine Asian countries. They find a positive effect but this effect reflects the role of the PRC as an assembler of parts and components imported from other Asian countries for export to the United States. This suggests that PRC's imports do not yet have an independent positive effect on the gross domestic product of other Asian countries.

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Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org/economics
ISSN 1655-5252
Publication Stock No. WPS091085



Printed in the Philippines