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# How Resilient is ASEAN-5 to Trade Shocks? Regional and Global Shocks Compared

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# How Resilient is ASEAN-5 to Trade Shocks? Regional and Global Shocks Compared

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## Abstract

This paper revisits the resilience of the ASEAN region to external shocks amidst the unfolding effects of the US-China trade war. It investigates and compares the effects of regional (ASEAN) and global (US, China) shocks on ASEAN-5 using a structural VAR framework. To identify the propagation of economic shocks and spillovers on ASEAN-5, the changing trade links between the economies considered are used to account for time variations spanning the period 1978Q1 to 2018Q2. Three major results follow from the analyses on trade links and output multiplier effects. First, the response of ASEAN-5 to shocks from the US and China were more pronounced than regional shocks for the period after the Asian financial crisis. Second, the increasing cumulative impact of China's shock on ASEAN was congruous to the growing trade links and trade intensities between ASEAN and China. Third, the US and China were dominant growth drivers for the weaker trade-linked ASEAN partners. Taken together, the results suggest that global shocks matter for the region, and the economic resilience of the region to global shocks depends on indirect effects, apart from the direct trade links.

*Keywords:* trade links; SVAR model; ASEAN-5; China; US.

*JEL Classification:* F41, C32, F62.

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## 1. Introduction

The United States-China trade war that began in January 2018 has raised the stakes for trade and economic growth in Southeast Asia. This is because Southeast Asia is an integral part of production networks, particularly in electronics, in which China, ASEAN's single largest trading partner, occupies a nodal position (Huang, Salike & Zhong, 2017). The Association of the Southeast Asian Nations (ASEAN) is a region is dependent on third markets, such as the United States (US), through its trade with China (Prana, 2018). Through supply chains, ASEAN is affected by the trade wars as the top ten US imports from China facing increased tariffs include segments of the electronics industry, such as telecommunications equipment, computer circuit boards and processing units (Thomas, 2019). As such, de-globalization following from the American-Sino trade war could rupture the triangular trade patterns that prevail between ASEAN, China and the US.

Notwithstanding the above, there are optimistic accounts that trade will bring about some strategic and positive consequences for the region, such as trade diversions from three perspectives: China to ASEAN; US to ASEAN; and ASEAN to other ASEAN member states (AMS). The trade war, apparently, is already causing the shifting of supply chains (Tobin & Power, 2019), namely the relocation of lower value-added activities to countries like Vietnam (Thomas, 2019), and the surge in exports of components from China to ASEAN (Yeo, 2018). Moeller (2018) adds that the repercussions on overall economic growth in Southeast Asia from this trade war will be minimal when compared with the crises episodes, the Asian financial crisis (AFC) in 1997-1998 and the global financial crisis (GFC) in 2008-2009. Others argue, however, that any positive effects from the trade war for the region would be short-term (Anya, 2019), as the war could escalate beyond the US and China.

Against this speculative debate of the unfolding effects of the trade war, the resilience of the ASEAN region to the *direct*<sup>1</sup> and *indirect*<sup>2</sup> shocks from the US-China trade war is called

into question. Moeller (2018) believes that for Southeast Asia, the indirect impact of the trade war will be more relevant and interesting to be analyzed. With the nature of ASEAN's interdependent trade with the two superpowers, the ongoing US-China trade war is an important global shock to be considered when debating the economic resilience of the region. In this regard, the impact on the ASEAN Member States (AMS) may vary due to their different trade dependence on China and the US. Singapore and Malaysia are potentially the most open and most exposed economies within the region, while Myanmar, Lao, Vietnam and Indonesia trade most intensively with China. Alternatively, Vietnam, Malaysia and the Philippines are the most exposed to the US.

This paper therefore investigates and compares the effects of regional (ASEAN) and global (US, China)<sup>3</sup> trade shocks on ASEAN-5 using a structural vector autoregressive (SVAR) framework. This paper identifies the propagation of economic shocks and spillovers on ASEAN-5 using changing trade links between the economies considered to account for time variations spanning the period 1978Q1 to 2018Q2. The period of analysis includes the main economic episodes that have characterized the integration process of ASEAN, which are the AFC and the GFC.

This paper is structured as follows. Section 2 reviews the extant literature on trade interdependencies and its quantification. Section 3 describes the changing patterns of trade (export integration, trade intensity and trade balance) for the ASEAN-5 (five founding members - Singapore, Malaysia, Thailand, Philippines and Indonesia), China and the US in bilateral relationships. Section 4 details the data, methodology and estimation procedures. Section 5 presents the empirical results and discusses the findings, and Section 6 concludes.

## **2. Theory and Empirics**

Bilateral trade is an important source for inter-country business cycle linkages (Baxter & Kouparitsas, 2004; Imbs, 2004; Cheewatrakoolpong & Manprasert, 2014). Increasing trade

links may therefore lead to co-movements and increased volatility as they induce large demand-side (contraction, expansion, substitution) effects. In the presence of production networks, the emphasis on common global (external) shocks is understandable, as the effects of the shocks can be transmitted indirectly (Cheewatrakoolpong & Manprasert, 2015; Sato & Shrestha, 2014) through induced changes in domestic production and trade in intermediate goods (parts and components or indirect trade). For example, the current US-China trade war is expected to cause a realignment of global supply chains in the ASEAN region (Tobin & Power, 2019). Arguably, the transmission of shocks to networked economies, in turn, can magnify the global shocks.

The extant literature on trade interdependencies are largely based on formal modelling approaches, while some others are done in an off-model manner. Formal modelling approaches include the computable general equilibrium (CGE) model to create different scenarios of shocks and identify their potential global economic impacts (Bollen & Rojan-Romagosa, 2018; Guo, Lu, Sheng & Yu, 2018), and global input-output tables that examine shock transmissions in terms of intermediate inputs (Sato & Shrestha, 2014). Econometric models, in turn, such as the SVAR and global VAR (GVAR) methods, are used to examine shocks according to impulse response function analyses.

Following from the different methods used, the empirical literature on the trade channel<sup>4</sup> as a transmission mechanism for propagating shocks across countries, however, remains at best mixed (Dungey, Khan & Raghavan, 2018). Several studies find a moderate or weak role for trade interdependence in propagating economic shocks (Canova, 1991; Canova & Dellas, 1993; Masson, 1998; Baig & Goldfajn, 1999; Harrigan, 2000; Blanchard, Das and Faruquee, 2010; Berkmen, Gelos, Rennhack & Walsh, 2012). Alternatively, studies by Dungey and Martin (1998), Ito and Hashimoto (2005), Haidar (2012) and Dungen et al. (2018) identify that trade (both bilateral and competition *via* a third market) had some influence in explaining

the propagation of instabilities and output shocks in the international markets (see also Sato and Shrestha, 2014).

Previous studies on the interdependence of trade (and income) in the context of the ASEAN region also do not provide any robust findings. While Lau (2008) concludes that ASEAN-5 and China are subject to common shocks, Yuning and Junyi (2016) observe that ASEAN-5 has become less integrated with China in terms of the growth rate after the GFC. This is supported by other studies that suggest a stronger regional influence of the US relative to China (Sato, Zhang, & McAleer, 2011; Feldkircher & Korhonen, 2014, Sato & Shrestha, 2014; Dungey and Vehbi, 2015). On the contrary, Abeyasinghe and Lu (2013) and Ong and Sato (2018) find multiplier effects of China on the regional economies. Ong and Sato (2018) show that Asia (including ASEAN-5) is affected by a China shock relative to a US shock, and with the exception for Malaysia and the Philippines, the remaining ASEAN-5 members are also positively affected by a shock from China.

The conflicting findings justify a revisit to the issue of trade interdependence in the context of ASEAN, a group that is regionally networked, yet highly integrated with the global economy. The trade channel is also more relevant for ASEAN, relative to monetary and financial shocks.

### **3. Trade Patterns: ASEAN5, China and the US**

The direct export exposure of ASEAN-5 to the markets of China and the US was 12.99 per cent and 9.62 per cent in 2018, respectively (calculated from ITC, 2019). The AMS, however, recorded varying degrees of integration with the region, China and the US. Figure 1 presents the export shares of ASEAN-5 with China, US and the ASEAN region for the 1978 to 2018 period. Malaysia and Singapore are more integrated with the region than with China and the US. While the export integration of the individual ASEAN-5 with China appeared to have increased post-2000, the export shares with the US were on a downtrend. From an intra-

ASEAN perspective (see Appendix Figure 1), Malaysia and Singapore also recorded the highest export exposure with the individual AMS. In fact, each of the three remaining countries, Thailand, Philippines and Indonesia, displayed relatively higher degrees of integration either with Malaysia or Singapore, than with the other AMS. Conversely, the Philippines seemed to be less integrated with the region.

[Insert Figure 1 here]

Given the growing export links between the AMS and China, the trade intensity index is presented in Figure 2 to determine whether the value of trade between the ASEAN-5 with China and the US is greater or smaller than would be expected based on their importance in world trade. The trade intensity indices (albeit below one) between the AMS and China recorded an upward trend for the 1990 to 2018 period, while trade intensity with the US gradually declined over the same period. Unlike Singapore-US, the trade intensity index was considerably high for the Singapore-China case, expect for a drastic drop from 14.72 to 1.08 between 2017 and 2018. While Indonesia's trade intensity with China (US) was larger (smaller) than expected for the entire period of review, the trade intensity indices for Malaysia, Thailand and the Philippines exceeded one only in the post 2000 period. Alternatively, trade intensity between the Philippines and the US was constantly greater than expected.

[Insert Figure 2 here]

Against the backdrop of increasing export integration and more evidence of larger than expected trade flows with China relative to the US, the deepening integration of trade activities between ASEAN-5 and China progressed with a widening of trade deficits since 2012 (Figure 3). Conversely, ASEAN-5 recorded trade surpluses with the US for the entire 1992 to 2018 period. The trade balances imply the importance of China as an import source for ASEAN-5, while the US, mainly as an export destination.

[Insert Figure 3 here]

#### 4. Data and Methodology

The database contains gross domestic product (GDP) growth and export share series<sup>5</sup> of ASEAN-5, China and the US, spanning the period 1978Q1 to 2018Q2<sup>6</sup>. The study uses quarterly<sup>7</sup> GDP and bilateral export shares for each country to measure output and trade linkages, respectively. Quarterly GDP data, expressed in national currencies are obtained from International Financial Statistics, while quarterly exports data, reported in current US dollars, are extracted from the Direction of Trade Statistics (DOTS), International Monetary Fund (IMF). GDP data for individual countries are transformed to US million dollars using official exchange rates.

Output growth rates are first differences of log real GDP, where the X-12 procedure is applied when seasonal adjustment is required. The unit root tests of GDP growth series support the conclusion that the GDP growth series are stationary. To measure bilateral-trade flows, a trade-matrix ( $W$ )<sup>8</sup> is constructed with 12-quarter moving average export data, which results in a smooth varying  $W$  matrix, reducing noise in the data (see also Abeysinghe & Forbes, 2005).

To examine the interdependence between each of the ASEAN economies with China the US and other ASEAN economies, we estimate a SVAR<sup>9</sup> model employing quarterly data on GDP and export shares.

A SVAR model representation is:

$$A_0 Y_t = C + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (1)$$

where  $Y$  is a  $(4 \times 1)$  vector of variables, the  $A_i (i = 0, 1, 2, \dots, p)$  are  $(4 \times 4)$  matrices of coefficients with  $A_0$  normalised across the main diagonal.  $C$  is the  $(4 \times 1)$  vector of constants while  $\varepsilon_t$  is a  $(4 \times 1)$  multivariate white noise error process with zero mean and a diagonal covariance matrix,  $\Sigma_\varepsilon$  containing the variances of the structural disturbances. The  $Y_t$  in (1) is represented as

$$Y_t = [Y_{US,t}, Y_{CH,t}, Y_{AS,t}, Y_{it}]$$



with  $Y_{US,t} = w_{iUS,t}y_{US,t}$ ;  $Y_{CH,t} = w_{iCH,t}y_{CH,t}$ ;  $Y_{AS,t} = \sum_{j=1}^4 w_{ij}y_{j,t}$

where  $Y_{it}$  is the GDP growth rate for each of the ASEAN country in our sample, while  $y_{CH,t}$ ,  $y_{US,t}$  and  $y_{j,t}$  are growth rates for China, US and ASEAN respectively.  $w_{iCH,t}$  and  $w_{iUS,t}$  are the export shares, i.e. exports from ASEAN  $i$  to China and the US respectively divided by total exports of ASEAN  $i$  while  $w_{ij}$  is the export share from ASEAN  $i$  to ASEAN  $j$  economies over total exports to ASEAN  $i$ . All these exports shares are changing over time. Since the US is the largest economy,  $Y_{US,t}$  is ordered first with the expectation that it has a flow-on effect on  $Y_{CH,t}$ ,  $Y_{AS,t}$  and  $Y_{it}$ .  $Y_{CH,t}$  is ordered second and it interacts with  $Y_{US,t}$  in the lags. The smaller ASEAN economies are ordered last and assumed to be contemporaneously affected by the two larger economies.

The SVAR framework enables us to capture both direct and indirect interdependencies *via* trade links between the two larger economies and the regional economies, observed through changing trade weights over time on each of the ASEAN economies. This approach allows for the analysis of the impact of output shocks originating from China, the US and the ASEAN region with different configurations of international trade links and illustrates how the propagation of shocks changes over time due to the transforming trade structure.

The SVAR in (1) can be represented as:

$$A(L)Y_t = \varepsilon_t \quad (2)$$

where  $A(L)$  is a matrix polynomial in lag operator  $L$  and  $A(L) = A_0 - A_1L - \dots - A_pL^p$  and  $\varepsilon_t = [\varepsilon_{US,t}, \varepsilon_{CH,t}, \varepsilon_{AS,t}, \varepsilon_{i,t}]'$ . The disturbances,  $\varepsilon_t$ , have economic meaning and therefore the effects of shocks originating from China ( $\varepsilon_{CH,t}$ ), the US ( $\varepsilon_{US,t}$ ) and the ASEAN ( $\varepsilon_{AS,t}$ ) on each of the economies are captured effectively by the impulse response functions given in (3):

$$Y_t = A(L)^{-1}\varepsilon_t \quad (3)$$

The impulse responses enable us to disentangle the impacts of a shock in one economy on another, highlighting the prevailing bilateral cross-border interdependencies. We compute impulse responses to illustrate how a shock to an individual country has a direct and indirect influence on other countries in the sample through trade-links and output-multiplier effects.

## **5. Results and Discussion**

In this section we present the impulse responses for the ASEAN-5 economies to demonstrate the dynamic nature of transmission mechanism of a country-specific shock. This is followed by estimates of the output multipliers to assess the direct and indirect effects of the regional and global shocks. Since the overall period of study, 1978Q1 to 2018Q2, includes the post liberalization period in ASEAN-5 economies, and the AFC and the GFC, the timeframe of the analysis is further divided into three sub-periods to account for the pre- and post-crises, as reported in Table 1. We selected these sub-periods to examine the possible changes in international transmission mechanism with changes in the cross-border trade links among countries over time.

[Insert Table 1 here]

Figure 4 presents the impulse responses of each ASEAN-5 economies to a one-unit growth shock originating in the US, China and the ASEAN region respectively for the four sample periods described in Table 1. Figure 4 shows that in the full sample period, the responses of each of the ASEAN-5 economies to one-unit shock from the ASEAN region are larger than those from the US or China, and they generally peak around the second quarter and taper off smoothly after 7<sup>th</sup> quarter. The responses of Singapore, Malaysia and Thailand (the three most open economies) to shocks originating from the US and China appear to have similar intensities. The similar reactions of Singapore, Malaysia and Thailand to the global shocks plausibly reflect the similar levels of trade overlap or intra-industry trade (IIT)<sup>10</sup> between these three AMS with China, at 29.32 per cent, 21.83 per cent and 25.08 per cent, respectively. The

IIT for the Philippines-China (11.24 per cent) and Indonesia-China (8.30 per cent) are much lower (calculated from UN Comtrade, 2019).

[Insert Figure 4 here]

However, when we breakdown the sample into the pre- and post-AFC periods, different patterns emerge, which justify the sub-period analyses to capture the bilateral trade relationships that have evolved and matured (see also Figure 1). In the pre-AFC period, the shock originating from the ASEAN region had a larger and significant effects on these economies, while shocks from the US and China produced relatively smaller effects. This implies, in the pre-AFC crisis period, the regional economic conditions were more important for these economies and they were less affected by conditions in the US or China. Alternatively, in the post-AFC period, particularly before the GFC period, the shock originating from the US had a more dominant impact on Singapore, Malaysia and Thailand, while the shocks from China and the region (except for Malaysia) generated somewhat similar effects across all the economies. Extending the period beyond the GFC, it was observed while the pattern of responses did not change that much, there was a slight decline in the intensity of the responses, partly due to the slowdown in global economic activity.

Overall, the effects from both the US and China increased in the post-AFC period, implying the region's growing connectivity with the world's two largest economies. This is not surprising as China's integration into the regional production networks only took off after its entry to the World Trade Organization in 2001 (Huang, Salike & Zhong, 2017).

Table 2 reports the normalized output multipliers and the export shares matrix output multipliers for 1997, 2008 and 2018 for the respective shocks from ASEAN, the US and China to each of the AMS. The output multiplier is estimated as the cumulative impulse responses to external shocks after four quarters, showing the accumulated impact of a one-unit expansion in the GDP of external economies on the output growth of the ASEAN-5 economies. The

normalized output multipliers are then estimated by dividing the four-quarter cumulative impulse responses by its own effect. The responses of the AMS, with different trade-structures (see Section 3), are analyzed to capture the time varying nature of trade patterns. The influence of regional growth drivers was dominant in the ASEAN economies. From Table 2, we can clearly see that the propagation patterns had changed over the period. For instance, although the US economy still dominated in triggering growth in ASEAN economies, the average impact was declining, while the cumulative average impact of China's shock was rising (see also Abeysinghe and Lu, 2003). For example, Thailand's cumulative response to a one-unit expansion in the US had declined from 0.176 in 1997 to 0.169 in 2018, while the responses to China had increased from 0.042 to 0.146. Though the evidence contradicts with previous findings of smaller output shocks from China relative to the US (Dungey & Vehbi, 2011; Sato et al., 2011; Utlaut & Van Roye, 2010; Genberg, 2005; Abeysinghe & Forbes, 2005), it is congruous with the changing trade patterns between ASEAN and China; growing export exposure and rising trade intensities (see Figures 1 and 2; Dungey & Vehbi, 2015).

[Insert Table 2 here]

We further find that the multiplier effects portray a different picture of the transmission of shocks than that provided by the bilateral trade flows, measured as export shares. The results indicate that the impact of shocks to a major trading partner of a country could be less influential than shocks in countries with lower trade links. For instance, in 2018, in the cases of Malaysia, Thailand and Indonesia, the US remained the dominant growth driver compared to China, whilst the three ASEAN economies respective export shares to China were in fact larger than to the US. Similarly, in 2008, the US remained the dominant growth driver compared to China for Singapore, though the latter's export shares to China were considerably higher. This demonstrates the significance of indirect multipliers when analyzing the importance of growth drivers, along with the direct trade patterns.

The reactions of the ASEAN-5 based on the impulse response and the output multipliers imply that the trade channel is indeed important for the region. The asymmetric reactions are observed in accordance with the following: origin of the shocks (US, China and ASEAN region); sample period of analyses (pre- and post AFC); and nature of the transmission mechanism (direct and indirect). The relative importance of the shocks (regional and global) and the asymmetric responses have important policy implications.

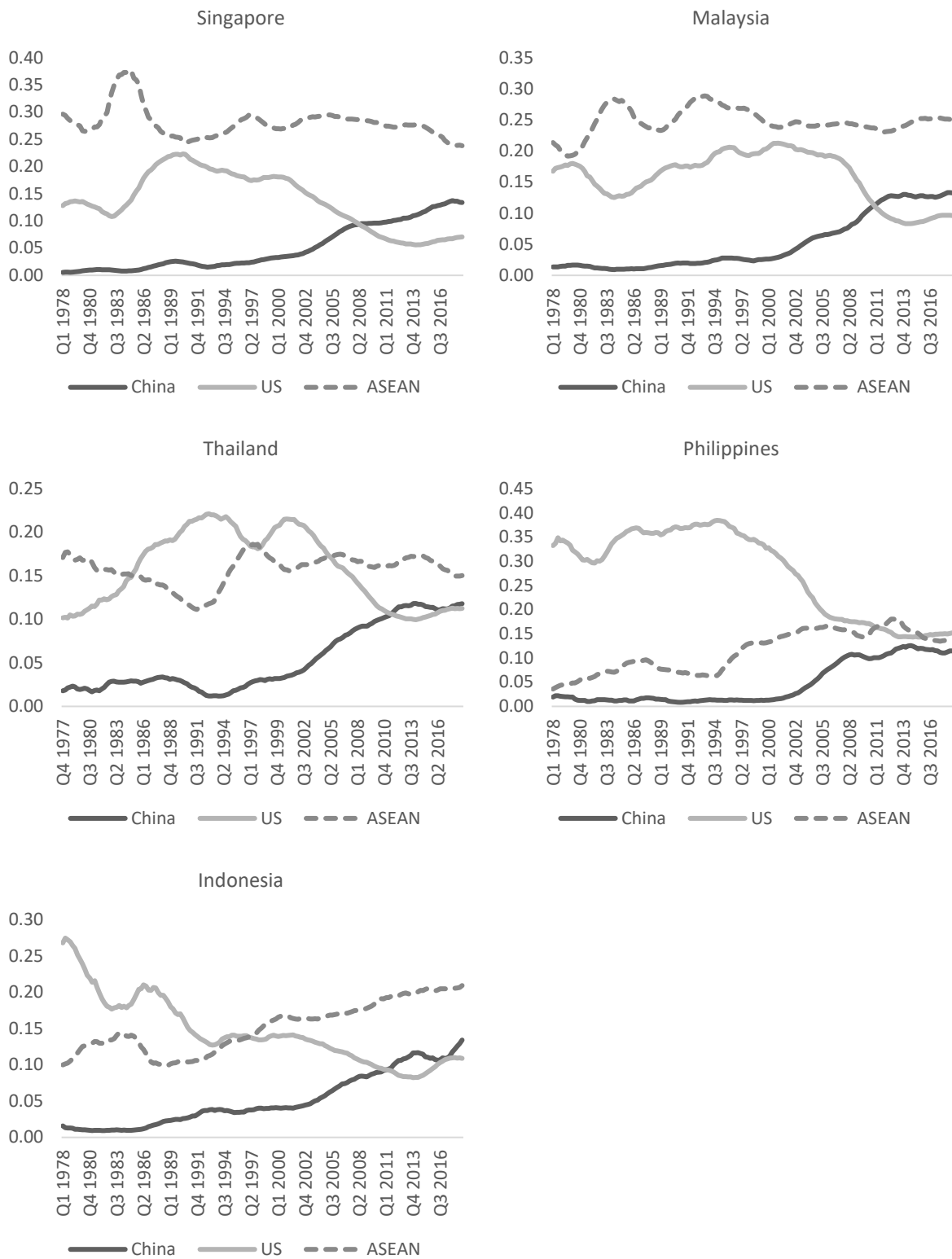
## **6. Concluding Remarks**

It is widely recognized that countries engaged in production networks are highly vulnerable to common external shocks. This paper therefore focuses on the changing trade interdependencies between the ASEAN, China and US (two important trading partners of ASEAN) and empirically analyzes the cross-border transmission of regional and global shocks to the ASEAN-5 economies. Of interest are the ASEAN-5 effects of the global shocks originating in the US and China due to the ongoing US-China trade wars.

While the sub-period analyses indicate that the regionally networked ASEAN-5 is no longer resilient to the shocks originating from the US and China, particularly after the AFC, the results cast doubt on the expectations that ASEAN economies with greater export links with the global players should be more susceptible to their shocks. On the contrary, the US and China are each found to be influential drivers of growth for the weaker trade-linked ASEAN partners. Meaning which, though some AMS may have low direct trade dependency with the US and/or China, they may indeed have high export exposure to the latter two countries if indirect linkages are included. This suggests that the indirect transmission mechanism cannot be ignored when examining the exposure and resilience of the small and open ASEAN economies to global (and regional) shocks. Direct links alone may therefore fail to accurately capture the total trade exposure of ASEAN, and its resilience to external shocks beyond the region.

The main message is that while economic uncertainties continue to surround the US-China trade wars, the trade frictions on a global basis could ultimately have deeper and more enduring indirect implications for ASEAN. In short, trade linkages are an important transmission channel, and the sample choice matters as trade integration deepens and becomes more complex over time. It may therefore be useful to investigate the sectoral indirect effects of cross-border transmission of trade shocks to provide specific input for resilience-building policies, so that ASEAN can better navigate such global trade shocks. Another valuable extension to this research would be to use trade measures (beyond export shares/ concentration) that include indirect trade linkages with the crisis originating country.

**Figure 1: Export Shares with China, US and ASEAN-5, 1978Q1-2018Q4**

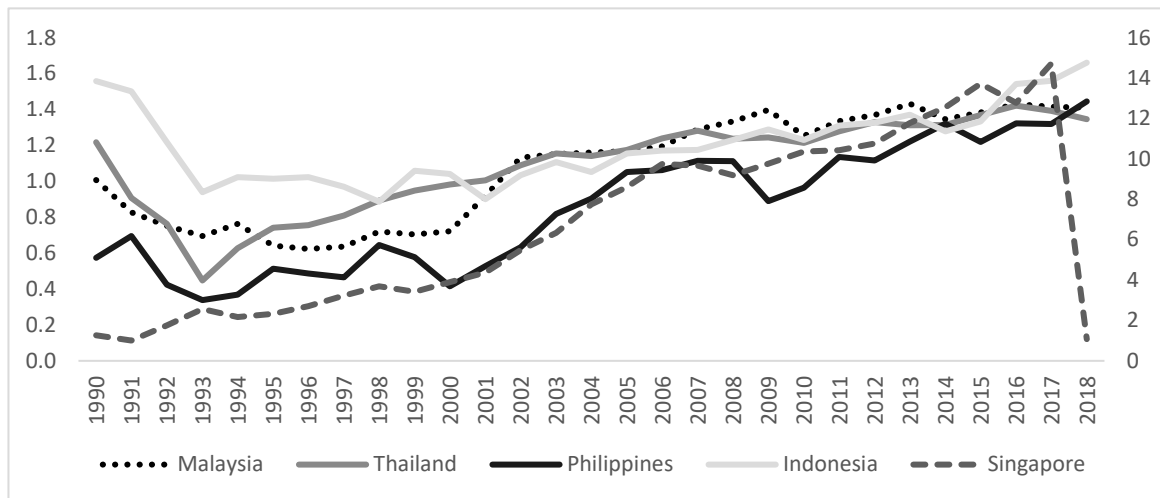


Notes: Export share refers to exports going to the partner (China/ US/ ASEAN-5) to total exports of the reporter (individual AMS). A higher export share indicates a higher degree of integration between countries.

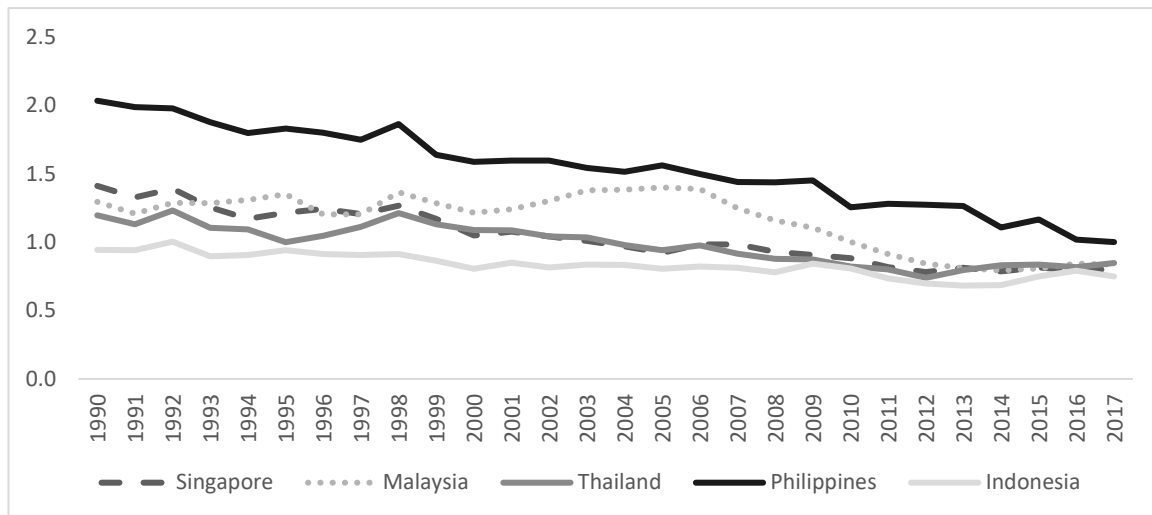
Source: IMF (2019)

**Figure 2: Trade Intensities for ASEAN-5-China and ASEAN-5-US, 1990-2018**

ASEAN-5 and China



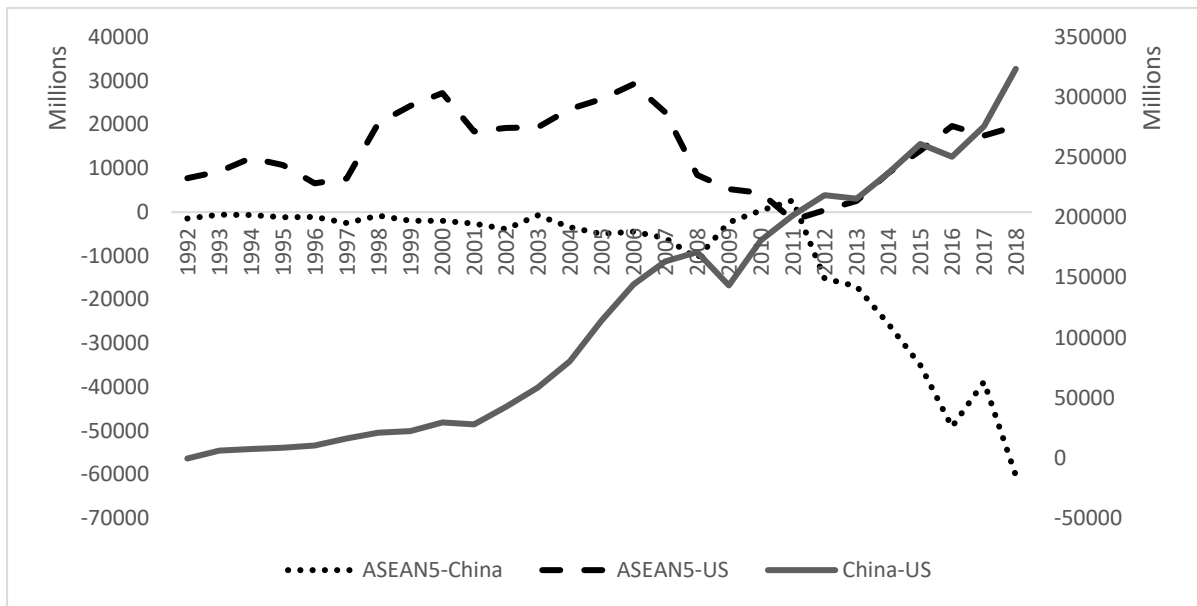
ASEAN-5 and US



Notes: The right axis refers to trade intensity for Singapore-China. The reporters are the individual AMS, and the partners are China and the US. The 2018 data is not available for the ASEAN-5-US. Trade intensity index is the ratio of trade share of a country to the share of world trade with China (partner). An index of more than one indicates that trade flow between countries is larger than expected given their importance in world trade. Source: ADB (2019) and ITC (2019).

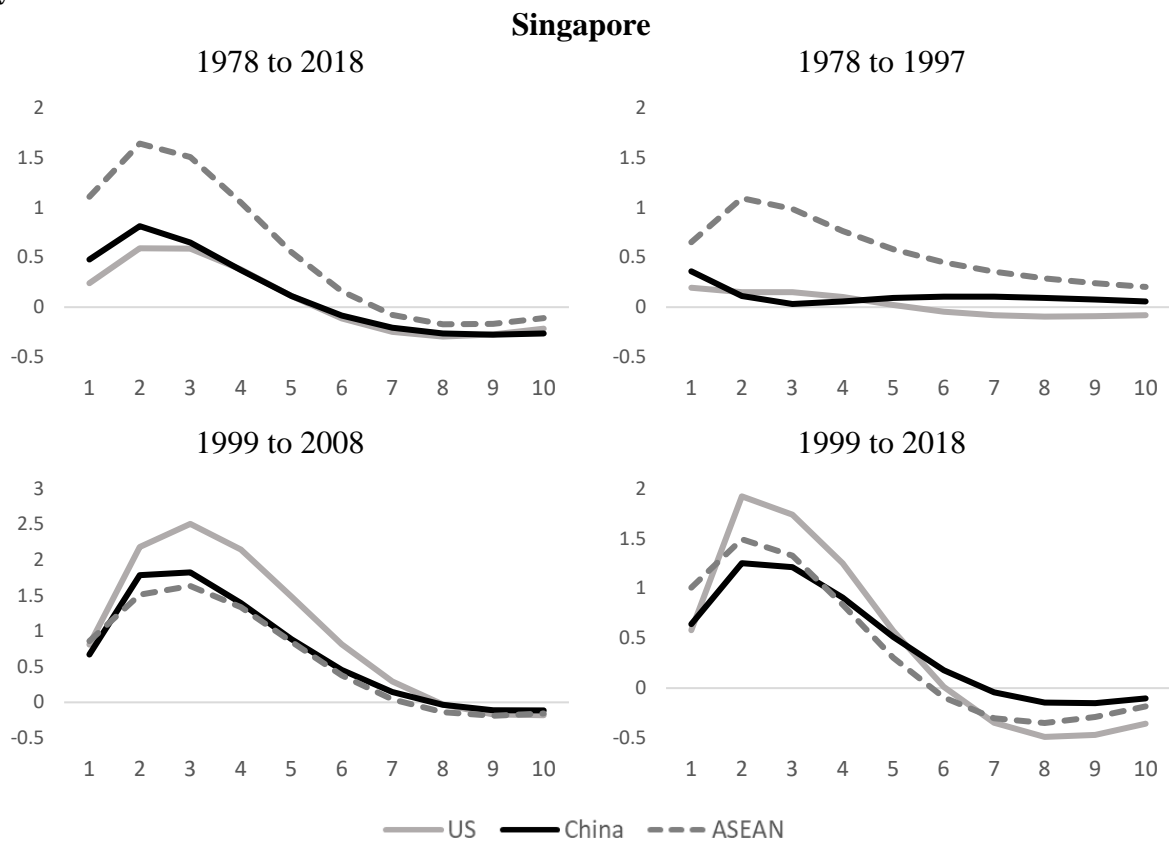


**Figure 3: ASEAN-5 - Trade Balances with China and the US, 1992-2018 (USD million)**

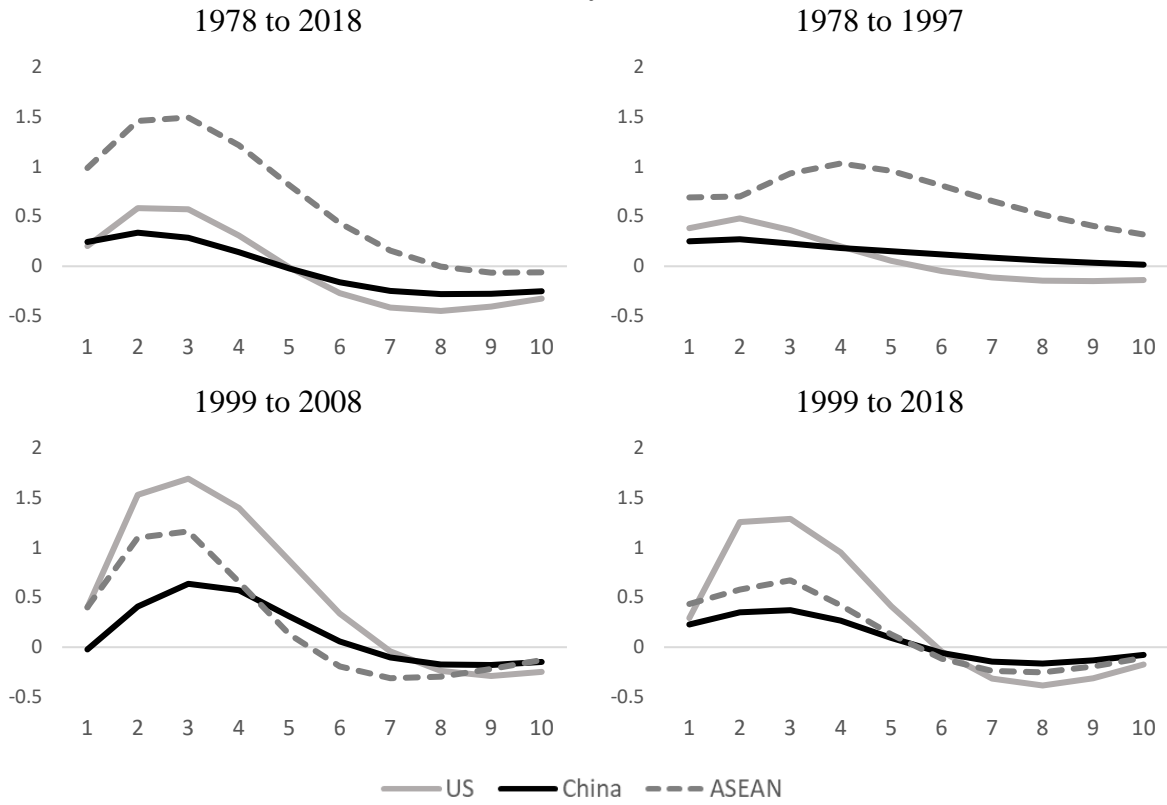


Notes: The right axis refers to China-US trade balances.  
Source: UN (2019) and ITC (2019).

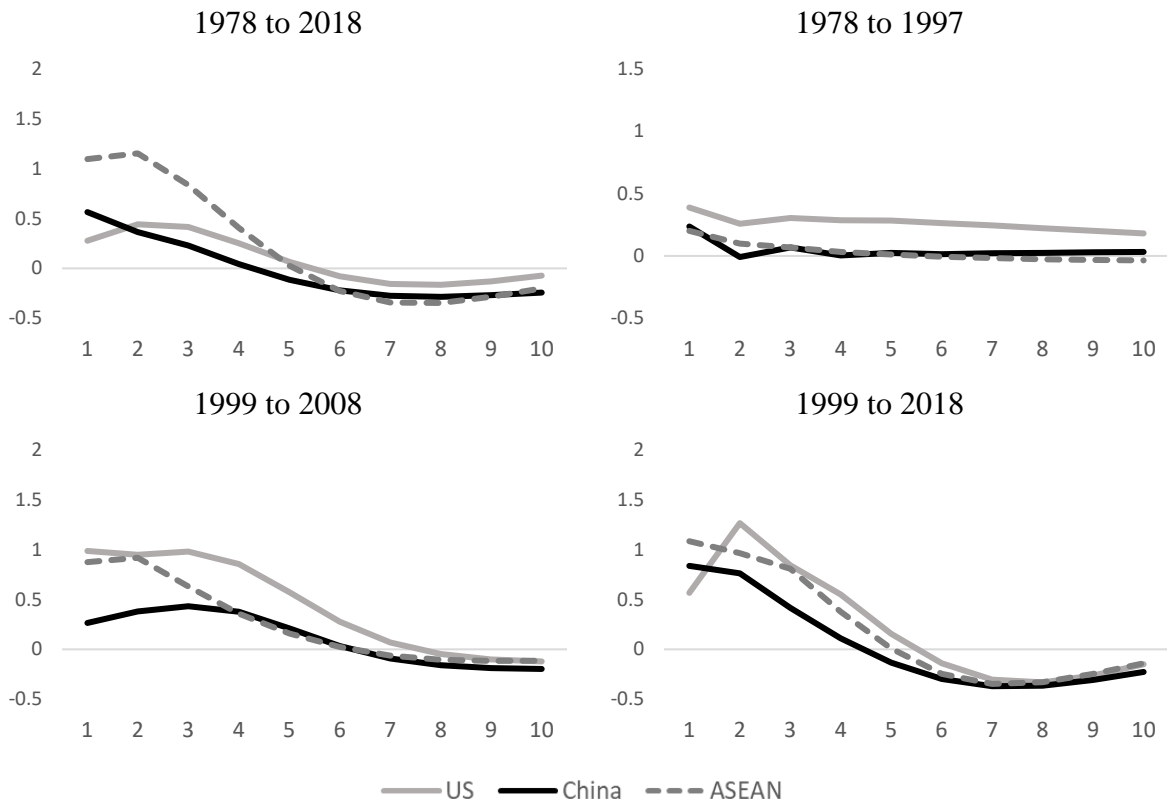
**Figure 4: ASEAN-5 - Responses of GDP Growth to Shocks in US, China and ASEAN, by Periods**



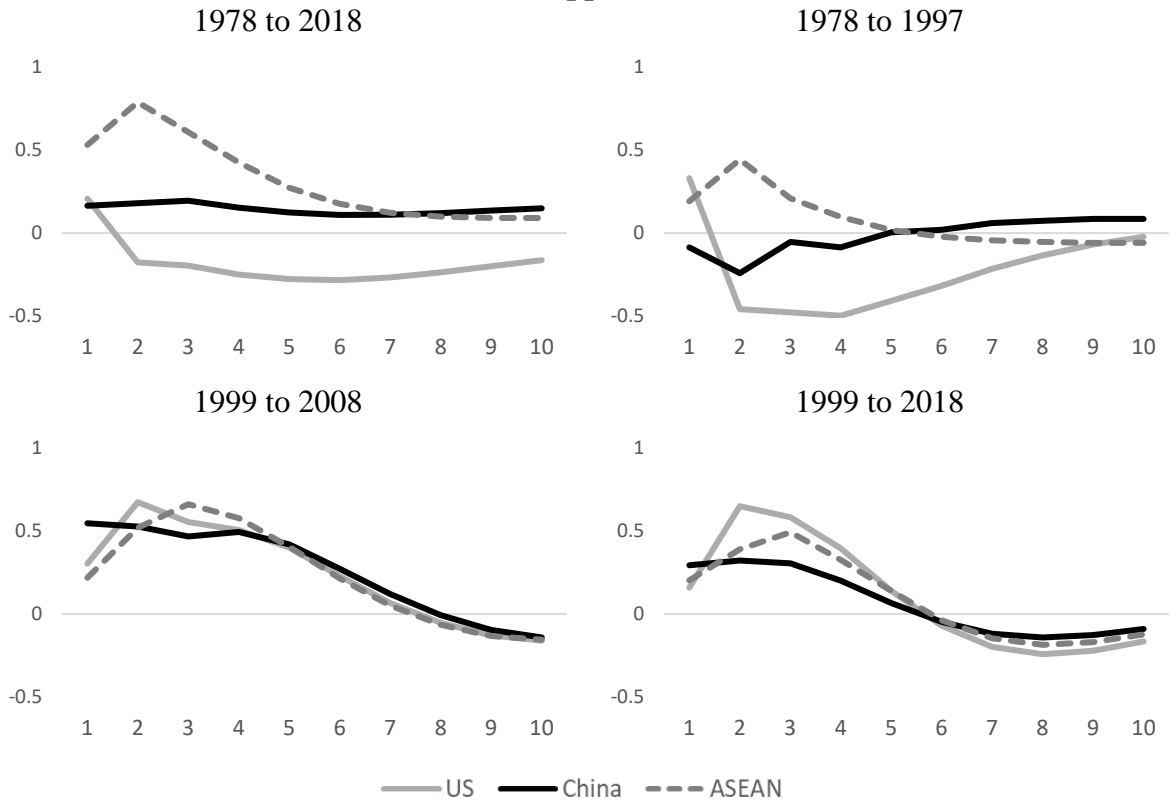
### Malaysia



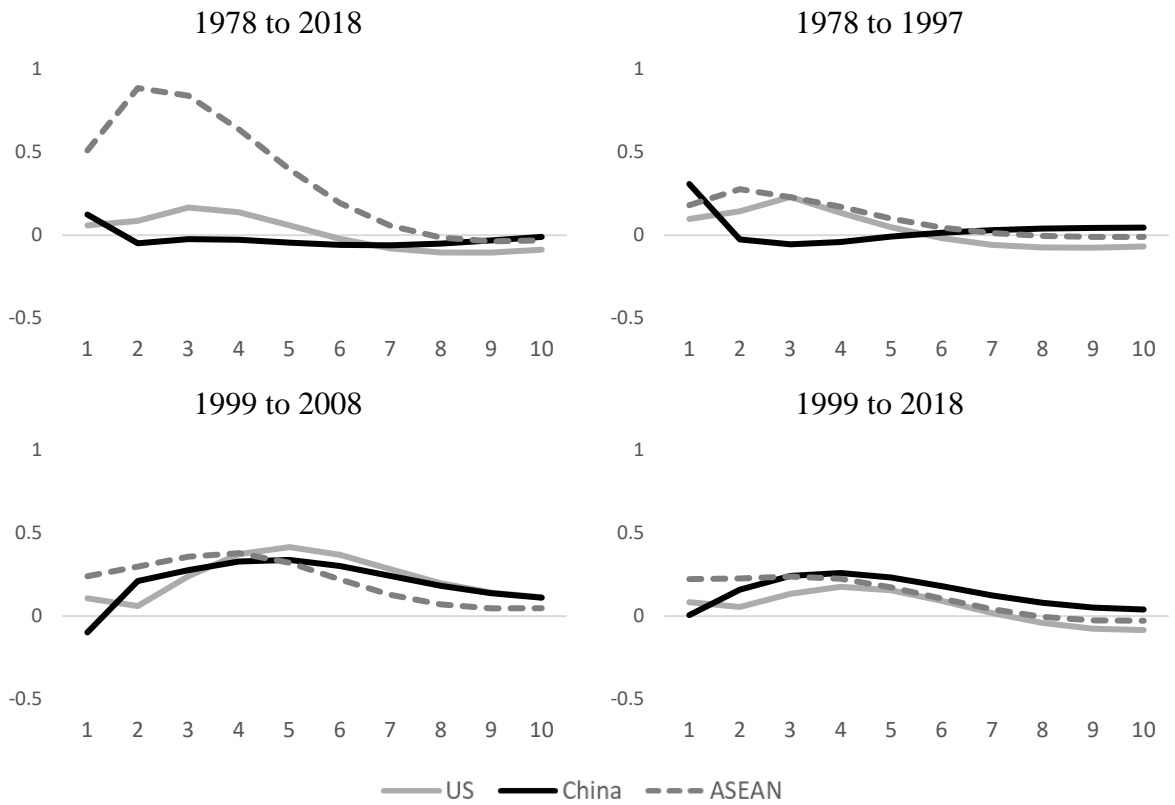
### Thailand



### Philippines



### Indonesia



**Table 1: Timeframe of Analysis**

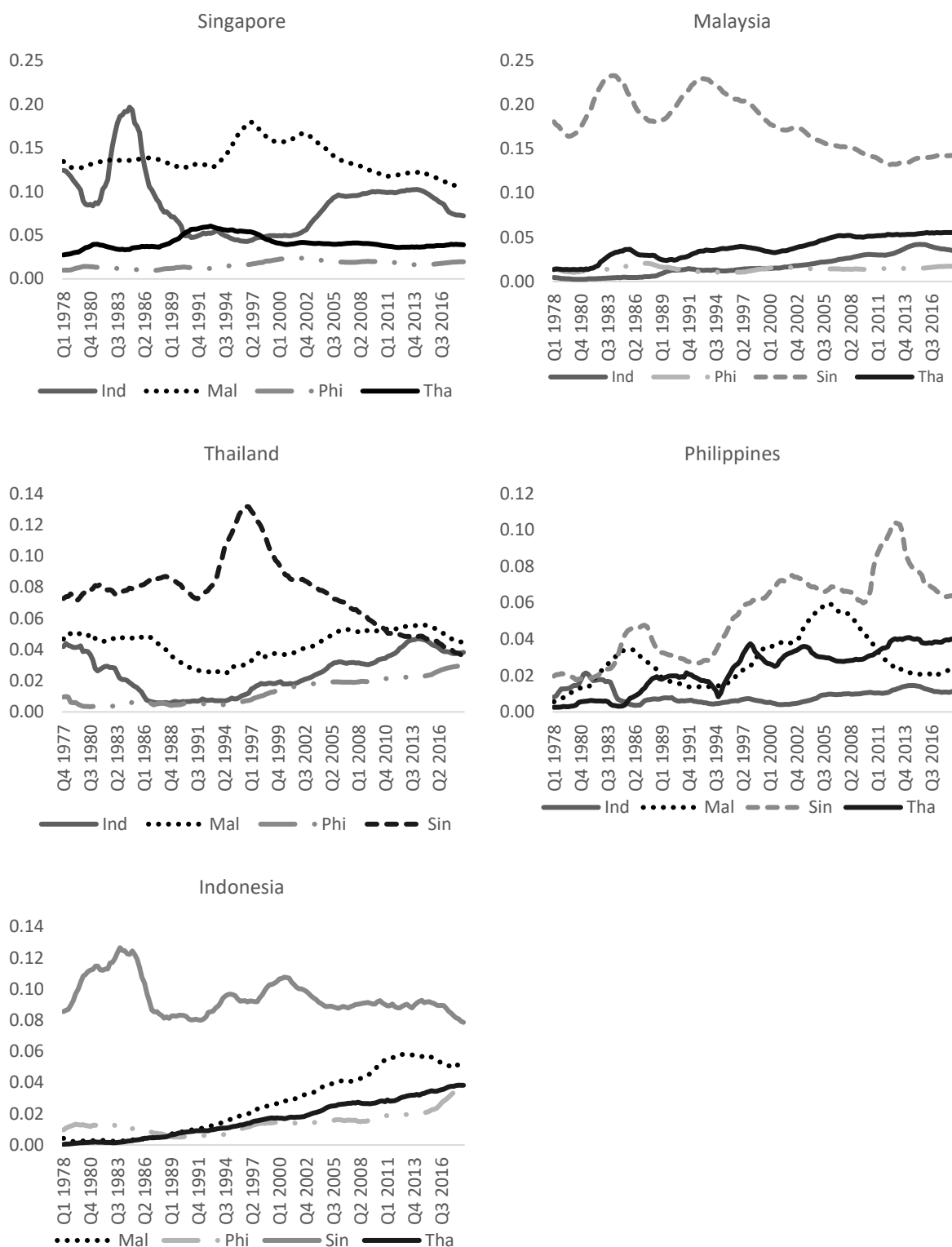
Description	Timeframe
Full period	1978:Q1 - 2018:Q2
Pre-Asian Financial Crisis (AFC)	1978:Q1 - 1997:Q4
Post-Asian Financial Crisis (AFC)	1999:Q1 - 2018:Q2
Pre-Global Financial Crisis (GFC)	1999:Q1 - 2008:Q2

**Table 2: ASEAN-5 - Ranked by Export Shares and Output Multipliers**

Q4 1997		Q2 2008				Q2 2018	
Export Rank	Multiplier Rank	Export Rank	Multiplier Rank	Export Rank	Multiplier Rank	Export Rank	Multiplier Rank
<b>Singapore</b>							
Asean 0.290	Asean 0.541	Asean 0.285	Asean 0.621	Asean 0.239	Asean 0.647	Asean 0.239	Asean 0.647
US 0.175	US 0.093	China 0.095	US 0.208	China 0.136	China 0.282	China 0.136	China 0.282
China 0.026	China 0.087	US 0.089	China 0.192	US 0.069	US 0.219	US 0.069	US 0.219
<b>Malaysia</b>							
Asean 0.267	Asean 0.634	Asean 0.242	Asean 0.840	Asean 0.251	Asean 0.785	Asean 0.251	Asean 0.785
US 0.193	US 0.269	US 0.159	US 0.237	China 0.133	US 0.255	China 0.133	US 0.255
China 0.025	China 0.177	China 0.084	China 0.119	US 0.097	China 0.154	US 0.097	China 0.154
<b>Thailand</b>							
Asean 0.186	US 0.176	Asean 0.164	Asean 0.356	Asean 0.149	Asean 0.425	Asean 0.149	Asean 0.425
US 0.181	Asean 0.057	US 0.132	US 0.159	China 0.117	US 0.169	China 0.117	US 0.169
China 0.029	China 0.042	China 0.092	China 0.042	US 0.112	China 0.146	US 0.112	China 0.146
<b>Philippines</b>							
US 0.348	US 0.249	US 0.175	Asean 0.337	US 0.150	Asean 0.414	US 0.150	Asean 0.414
Asean 0.128	Asean 0.132	Asean 0.152	US 0.208	Asean 0.136	US 0.146	Asean 0.136	US 0.146
China 0.012	China 0.066	China 0.106	China 0.067	China 0.112	China 0.122	China 0.112	China 0.122
<b>Indonesia</b>							
Asean 0.144	Asean 0.192	Asean 0.177	Asean 0.501	Asean 0.206	Asean 0.417	Asean 0.206	Asean 0.417
US 0.135	China 0.149	US 0.104	US 0.042	China 0.125	US 0.065	China 0.125	US 0.065
China 0.039	US 0.136	China 0.084	China 0.036	US 0.109	China 0.033	US 0.109	China 0.033

Notes: Export rank is based on export shares at given time period while multiplier rank is based on the normalized output multipliers, estimated by dividing the four-quarter cumulative impulse responses to each of the growth shocks against the responses to its own shock.

**Appendix Figure 1: Export Shares with ASEAN, 1978Q1-2018Q**



Notes: Sin – Singapore; Mal – Malaysia; Tha – Thailand; Phi – Philippines; and Ind – India. Export share refers to exports going to the partner (ASEAN5) to total exports of the reporter (individual AMS). A higher export share indicates a higher degree of integration between countries. Source: IMF (2019).

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## Notes

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<sup>1</sup> The trade tensions can also affect the region's direct exports to the US, and not just China (Tham et al., 2019).

<sup>2</sup> Direct effects refer to the influence of one country's output growth on that of another, through the bilateral trade connections between them. The indirect effects capture the impact of one country on another via its influence on the output growth of its trading partners - through supply chains and third markets. Indirect effects mean that shocks in one economy can affect other economies and regions despite weak direct trade linkages (Dungey et al., 2018).

<sup>3</sup> Global shock is approximated by the US and China.

<sup>4</sup> The vast literature has focused on quantifying the impacts of difference channels of shocks, namely monetary and financial shocks.

<sup>5</sup> The export data from Singapore to Indonesia are not available at the start of the sample period and thus the corresponding imports of trading partners are used as exports data for that period.

<sup>6</sup> Latest quarterly data available at the time of study is 2018Q2. Since the data ends at 2018Q2, there is only a limited coverage of the US-China trade war episode that began in January 2018.

<sup>7</sup> With quarterly data, we can have a sufficiently long time series, which is needed for reliable statistical inference.

<sup>8</sup> Dungey et al. (2018) provides justification for the selection of trade (exports) weights.

<sup>9</sup> The SVAR framework is considered suitable as we are only dealing with a relatively small number of variables.

<sup>10</sup> The IIT is calculated using the aggregate Grubel-Lloyd (1975) index, at the harmonized system (HS) 6-digit level for 2017.