Dear *Asian Economic Papers* author:

Enclosed, please find the pages for your article that is scheduled to appear in a forthcoming issue of *Asian Economic Papers.* This is your only chance to review your article. Please check these proofs for accuracy and consistency and answer any queries noted in the margins. Changes must be limited to those necessary to correct errors. Please do not send a revision of your article.

In order for your changes to be incorporated it is essential that your corrected proofs are received by the MIT Press **no later than 3 days** *from the day you received them.*

Please email your PDF with changes and comments, or a brief email listing the changes to:

Daniel Bouchard
MIT Press Journals
Phone: 617.258.0588
Email: bouchard@mit.edu

If your proofs are not returned promptly your article may be published as is. Please notify me immediately if you have any questions, or are unable to meet this deadline.

You may order reprints of your article by going to the MIT Press Journals reprint ordering site: www.sheridan.com/MITpress/eoc. There is no deadline for ordering, and you may use this system to order additional reprints at any time. If the system is not yet ready to accept orders for a current issue, please use the email reminder function. You are the only one receiving this letter; please coordinate with your co-authors.

Thank you for your cooperation.

Sincerely,

Daniel Bouchard
Senior Production Coordinator

Impacts of the U.S.–China Trade War on ASEAN: Case of Thailand

Bhanupong Nidhiprabha
Faculty of Economics
Thammasat University
2 Prachan Road, Bangkok 10200
Thailand
bhanupong@econ.tu.ac.th

Abstract
With nearly a year of trade dispute between the United States and China, it has become apparent that the global economy will slow down, and this will have direct impact on the world trade. We adopt a vector autoregressive model to examine the impact of the U.S.–China trade war on the Thai economy. The results indicate that Thailand's output and exports to key markets are adversely affected by the escalating trade dispute. The slowdown in the Chinese economy will also put further downward pressure on world commodity prices, which in turn will reduce Thailand's exports.

1. Introduction

The trade imbalance between the United States and China had become a thorny issue more than a decade ago. In the early 1980s, the tension caused by the United States' massive trade deficit with Japan was reduced by the appreciation of the yen.[1] After China's economic liberalization in the 1970s, the Chinese economy experienced strong growth in trade and investments, which shifted the attention of United States to China, and this has led to the increasing tariff rates on Chinese exports to the United States in 2018. The effects are highlighted by Woo (2008)—the issues are more than just the exchange rate adjustments of the renminbi, but also the structural effects of the two economies. The weak financial system in China, which has not effectively channeled personal savings into private investment, could not narrow the saving–investment gap in China. Although the renminbi has appreciated against the dollar, we still observe the widening trade gap between the United States with China. This suggests that simple exchange rate adjustments are not sufficient to correct the trade imbalances between the two countries. In fact, when higher tariff rates were imposed, the channel through which tariffs exert an impact on the trade imbalance

1 In 2019, the problem of the U.S.'s large trade deficit with Japan resurfaces again.

Asian Economic Papers 18:3 © 2019 by the Asian Economic Panel and the Massachusetts Institute of Technology
https://doi.org/10.1162/asep_a_00737

seems to be the same as the exchange rate channel (also known as the substitution effect), which alters the relative prices of commodities.

This paper demonstrates that the necessary conditions for correction of the trade imbalance are expected through the output adjustment as well as the relative price adjustment mechanism via changes in the exchange rates. When tariff rates are imposed, trade taxation distorts the consumption and production pattern, resulting in output contraction in other countries that have a high trade intensity with China. Rather than solving the trade deficit, the imposition of U.S. tariffs and the retaliation by China leads to lower global growth and thereby depresses the exports in emerging economies in Southeast Asia.

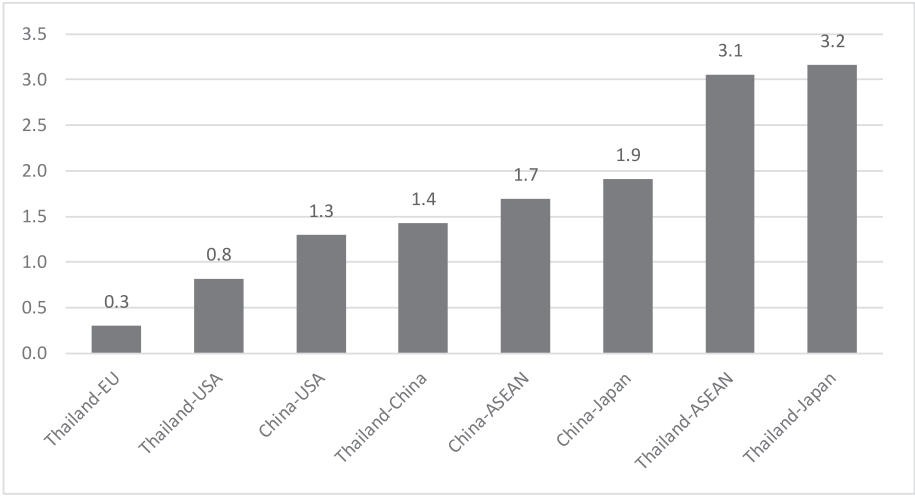
In this paper, we conduct a partial static analysis by estimating the import demand of Thailand's key trading partners. The changes in imports are decomposed into income and substitution effects. The latter effects incorporate the impacts of changes in the real effective exchange rates and import prices. In this paper, the analysis of the trade elasticities is also static. In addition, we also adopt the vector autoregression (VAR) framework to study the dynamic effects of U.S.–China trade disputes on the economy of Thailand. To provide dynamic trajectories of the exports, we adopt the dynamic VAR approach that includes lagged adjustment and feedback effects of fundamental determinants of trade flows.

In Section 2, we examine the impact of the trade war by analyzing the trade intensity relationship between Thailand and other trading partners. The effect on Thailand's exports will mainly be on the trade relationship between Thailand, Japan, ASEAN, the United States, and China. Section 3 presents the import demand elasticities of Thailand's products in various markets. In Section 4, we explore the vulnerability of Thailand's commodity exports and market diversification to select variables that fundamentally determine the demand for Thailand's exports. This information is incorporated into a VAR model presented in Section 5, depicting the relative importance of particular demand shocks, which stem from trade disputes and changes in income levels of trading partners. In Section 6, we deal directly with factors that move the baht real effective exchange rate. Section 7 examines the impact of China's business cycle on commodity prices, which are affected by China's slowdown caused by US tariffs on Chinese exports. Section 8 provides a policy conclusion.

2. Trade intensity and impact of the U.S.–China Trade War

The United States has been one of Thailand's most important trading partners since the 1970s. However, since 2000, we observe that the share of Thailand's trade with the United States has been declining, whereas Thailand's trade with ASEAN and China has been expanding rapidly. Thailand's trade with Japan and ASEAN were three times larger than Thailand's overall trade with the rest of the world (Figure 1). In 2016, Thailand's trade intensity with China and the United States were 1.4 and 0.8 respectively, indicating that

Figure 1. Trade intensity index, 2016



Source: *ADB Integration Center (aric.adb.org).*

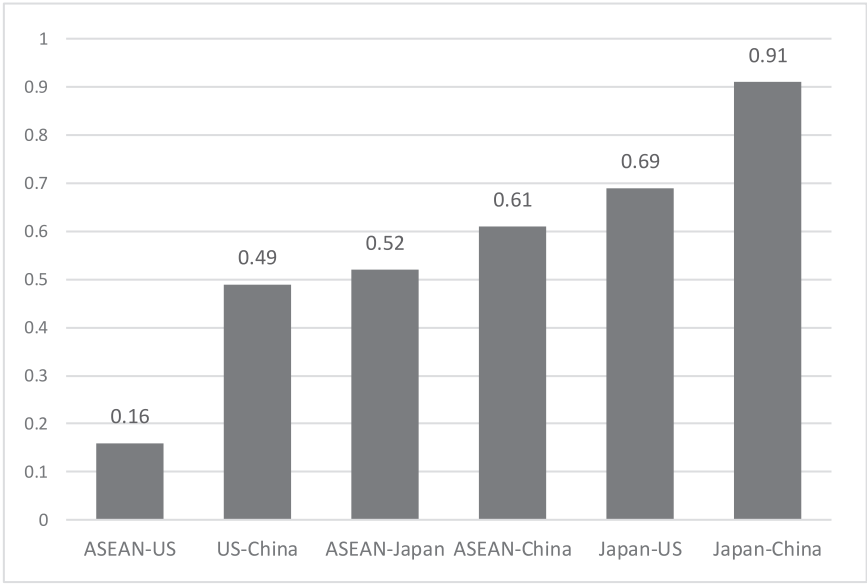
China has stronger trade effects with Thailand than does the United States. The trade intensity index between China and the United States (1.3) also suggests the importance of the United States as one of key trading partners of China. However, we observe from Figure 2 that China trades with ASEAN (1.7) and Japan (1.9) more intensively than the United States (1.3), as shown in Figure 1.

The trade intensity index shown in Figure 1 provides a clue to measuring the impact of the trade war between the United States and China. The effect of higher U.S. tariffs on China's exports must be conducted in light of both direct and indirect impact on the third parties, including ASEAN and Japan. In turn, the retaliation by China imposing higher tariffs on U.S. exports to China could also be examined similarly by considering the ripple effects of the trade war on the rest of the trading partners including ASEAN countries and Japan.[2]

The exports of Thailand is measured in the first difference that could remove the non-stationary components of Thailand's monthly exports to various markets, thereby establishing stationarity to the time-series variable. Figure 2 presents the correlation coefficients of different pairs of Thailand's regional exports to measure similarities in Thailand's exports by countries. Across the trading partners of Thailand, the exports to Japan and China

2 Note that because the trade intensity between Thailand and the EU is relatively low (see Figure 1), this paper will not focus on Thailand's trade to the EU markets.

Figure 2. Correlates of Thailand's exports by region (changes in export values: January 2000–April 2019)

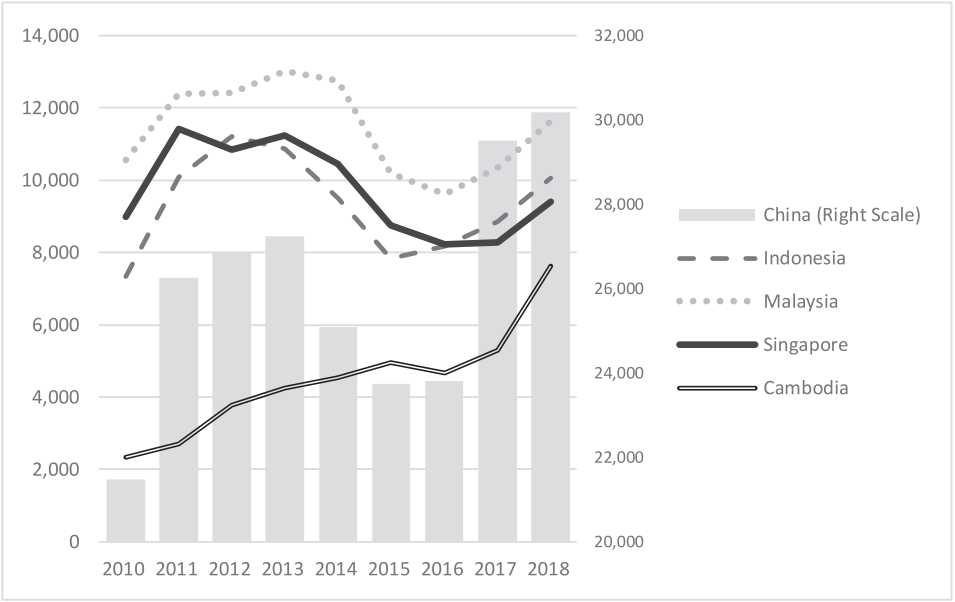


Source: *Bank of Thailand.*

exhibit the highest degree of co-movement (0.91), whereas Thailand's exports to ASEAN and the United States registered the lowest value (0.16). Thailand's exports to the United States and Japan has the second-highest correlation of 0.69. The strong co-movements reflect a similar pattern of import demand and domestic supply of commodities in the two importing countries, which are dictated by a similar factor endowment. Furthermore, high correlation is due to the increasing trend of intra-industry trade caused by spreading network trade within Asia.

On the other hand, the low correlation between Thailand's exports to ASEAN and the United States indicates differences in the export commodities in the two export markets. The U.S.-bound exports of Thailand are different from those shipped to ASEAN markets, whose factor endowments are likely to be similar to the exports of Thailand. Thailand's major exports to the United States are mechanical and electrical appliances, jewelry, rubber, meat, and fish and crustaceans, and significant exports of Thailand to ASEAN include vehicles, mineral fuels, sugars, beverages, and plastics. We also notice that the correlation between Thai exports to China and ASEAN is 0.61. The Granger causality test indicates that Thailand's exports to China and ASEAN are complementary; there is bi-directional causality, in which there are causes and effects to each other.

Figure 3. Thailand's exports to China and ASEAN (million US$)



Source: *Bank of Thailand.*

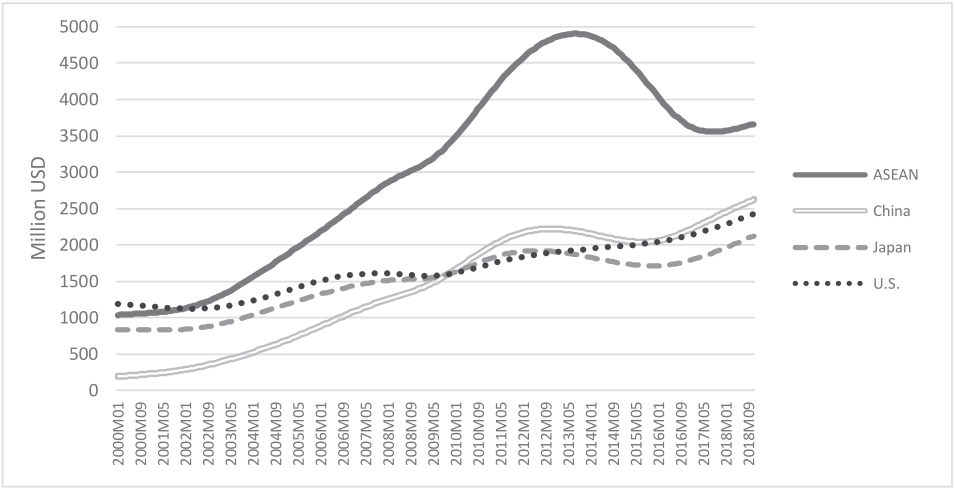
The top 10 export products of Thailand to Japan and China are similar, such as electrical and mechanical equipment and parts, rubber, meat, fish and crustaceans, plastics, and vehicles. Thus, we can observe strong correlations between Thailand's exports to China and Japan. The co-movements of these exports are the result of the same conditions in the world demand for these products as well as domestic supply conditions. If the trade war between the United States and China affects the international prices of these products, there would be repercussions on Thailand's exports through substitution and income effects in the overall demand system.

Figure 3 illustrates that the impact of China's business cycle on Thailand's exports are substantial.[3] When China's growth slowed down during the period 2014–16, its imports from Thailand declined precipitously, and so did Thailand's exports to Malaysia, Indonesia, Singapore, and Cambodia.[4]

3 See the detailed analysis of the impact of China factor on the Thai economy in Nidhiprabha (2018).

4 Incidentally, Thailand's exports to Vietnam and the Philippines sustained its uptrend during this period, which could be explained by the fact that the two countries' structure of network trade is not as strong as those in other ASEAN countries.

Figure 4. Trends of Thailand's exports to major markets



Source: *Bank of Thailand.*

There are likely to be ripple effects on the Thai economy from the U.S.–China trade war. A reduction in China's growth, influenced by China's new normal growth and rebalancing policy, can be aggravated further by shrinking China's exports to the United States, which in turn reduces demand for raw materials and intermediate products from Thailand and other ASEAN countries. Thus, the decelerating growth of the Chinese economy generates a second-round effect on Thailand's exports. Because of the strong interdependence of ASEAN network trade, the third-round impact would be felt through the reduction of Thailand's exports to other ASEAN partners, whose income growth rate is negatively affected by a declining growth rate of China's output.

Monthly data usually exhibit variations of temporary shocks from supply and demand factors as well as seasonality. After removing these non-stationarities, we obtain the long-term trends of Thailand's exports in different markets (Figure 4). There is a close relationship between Thailand's exports to China, ASEAN, and Japan. For Thailand's exports to the United States, the co-movement with Thailand's exports to China is less pronounced, demonstrating a clear sign of decoupling of the ASEAN economies from the United States.[5] It provides a clue to formulate a strategy for reducing the adverse consequences of the trade war. Because China has become a new locomotive for Asian economies, unless China

5 According to Rajah (2019), East Asia is now driving its own demand. China's import demand has eclipsed the United States as a source for final demand for the rest of the region.

uses a domestic policy stimulus, there would be a significant consequence to Thailand and other ASEAN countries that rely heavily on China's imports.

3. Import demand elasticities

Sustained current account surplus can be a sign of a weakening economy. As the country slows down, its demand for imports declines faster than exports. A deceleration in output growth, after a decline in exports, reduces demand for intermediate inputs, and delays purchasing imported capital goods for enhancing export capacity. Consumers cut down imported luxuries goods, which are sensitive to income changes. On the contrary, a strong growth economy experiences a current account deficit. The Thai economy has been experiencing a trade surplus since the GDP growth grew below its trend growth path in 2014. When the economy grew above this trend, Thailand witnessed the current account deficit, as the demand for imports increased more rapidly than output. Conversely, when the economy slumps (GDP declines below the trend growth rate), the current account deficit turned into a surplus, driven by the excess of saving over investment. The adjustments to this external equilibrium require changes in the exchange rate and output growth of the domestic economy. It is therefore imperative to examine the values of exports elasticity with respect to output and the exchange rates of Thailand and major trading partners.

Since monthly data on income are not available, we can use total imports of each country as a proxy of activity or scale variables, because Thailand's exports are a small fraction of the total value of imports of particular markets. The interpretation of the elasticity is slightly different from the income elasticity of demand for imports if the overall import elasticity is greater than unity. In the case of China, Thailand's product can penetrate deeper into the Chinese market when China experiences an upturn in economic activity. On the other hand, if the elasticity is less than unity, as in the case of Japan and Hong Kong, Thailand's market share in these two markets will be shrinking during economic expansion.

A simple demand for imports can be expressed in the following equation:

$$\log(M_{it}) = \alpha + \beta \log(REER_{it}) + \log(Y_{it}) + \epsilon_{it}, \tag{1}$$

where M_i stands for Thailand's exports to the corresponding i^{th} country: China, the United States, ASEAN, Japan, and Hong Kong; $REER_i$ is the real effective exchange rate (REER) of the i^{th} importing country, Y_i is economic activity in country i, proxied by values of total imports of the corresponding country. China's total import value is used as an economic activity variable of ASEAN and Hong Kong, indicating the synchronized business cycles of the ASEAN region and Hong Kong with China. ASEAN's REER is the average real

Table 1. Elasticities of import demand for Thailand's products

Variable	China	U.S.	ASEAN	Japan	Hong Kong
Total Imports	1.11***	0.981***	0.707***	0.85***	0.582***
	(0.018)	(0.04)	(0.031)	(0.038)	(0.034)
REERi	−0.27**	0.55***	0.719*	−0.366***	−0.637***
	(0.117)	(0.116)	(0.404)	(0.071)	(0.274)
Constant	−4.266***	−6.903***	−3.59	−0.268	2.911*
	(0.428)	(0.9)	(1.62)	(0.636)	(1.605)
AR(1)	0.363***	0.341***	0.402***	0.391***	0.106*
	(0.066)	(0.055)	(0.061)	(0.064)	(0.062)
Adj R^2	0.981	0.88	0.977	0.929	0.883
DW	2.08	2.085	2.029	2.19	1.984

Notes: *Standard errors are in parentheses.* ***Statistically significant at the 1 percent level;* **statistically significant at the 5 percent level;* *statistically significant at the 10 percent level.*

effective exchange rate of Malaysia, Singapore, the Philippines, and Indonesia. We apply the autoregressive moving average maximum likelihood method of estimation to equation (1), using monthly data between January 2000 and April 2019.

Except for the ASEAN REER, all variables are statistically significant at 0.01 percent. The Wald statistic indicates that the baht REER is a redundant variable in all five equations. The results suggest that Thailand's exports to major trading partners are affected by its trading partners' economic activity and their REER. From Table 1, it is clear that two key factors, real effective exchange rates and output, exert positive impacts on Thailand's export values (Table 1). The results of Table 1 also indicate that China's economic activity seems to have a substantial effect on Thailand's exports—more than economic activity in Japan, ASEAN, the United States, and Hong Kong.

We observe that when the dollar REER appreciates, the U.S.-bound exports of Thailand increase.[6] However, when the REERs of China, Japan, and Hong Kong appreciate, the value of Thailand's exports into these markets declines. The asymmetric impacts of changes in the REERs on Thailand's exports reflect different elasticities of the demand for imports in different markets. If the import demand is price inelastic, due to the lack of close substitutes, a reduction in import prices, caused by an exchange rate appreciation, leads to a higher value of import bills. In the next section, we discuss the import penetration of Thailand's products to Thailand's three critical markets: the United States, China, and Japan. It seems that the U.S. markets have a higher degree of substitution for Thailand's products. Therefore, the demand for imports in the United States is more elastic than in other markets, implying that the dollar appreciation leads to a fall in Thailand's export prices and higher export values in the U.S. market.

6 We will deal with this issue further when discussing the role of the exchange rates in Section 6.

4. Static analysis of export commodities

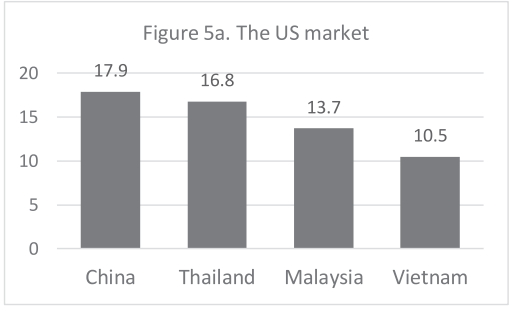
A rise in U.S. tariffs and retaliation by China would reduce the volume of trade in both countries. The recent estimates of U.S. import demand and export supply elasticities by Fajgelbaum et al. (2019), using changes in the United States and retaliatory tariffs, indicate that the U.S. imports from targeted countries declined 31.5 percent, while targeted U.S. exports fell 11.0 percent. We can infer from that study that Thailand would experience the following repercussions from this trade war. There would be a replacement effect of trade disputes: (1) Thailand can export more to the United States by replacing Chinese exports. For example, Thailand's integrated circuits, computer, and automobile parts would increase, subject to domestic supply condition; (2) Thailand can export more to China, replacing the U.S. exports to China. In 2017, The U.S. exports of vegetables and fruit, vehicles and parts, fish and crustaceans represented 25 percent, 19 percent, and 17 percent, respectively, of China's imports. Besides, there may be diversion effects of the trade disputes: (3) China's exports to the United States can be diverted to Thailand. In this case, Chinese steel products have already dominated Thailand's markets. Thailand's imports of Chinese steel-rolled sheets and steel bars amounted to 31 percent and 72 percent of total imports, respectively.[7] Finally, (4) U.S. exports to China are diverted to Thailand. Between 2013 and 2017, Thailand's imports of U.S. soybeans increased 17 percent annually. The share of imports of U.S. soybeans amounted to 36 percent in 2017. The rising trend of Thailand's imports of U.S. soybeans corresponds to the excess supply, which results in rapidly rising stockpiles in the United States.

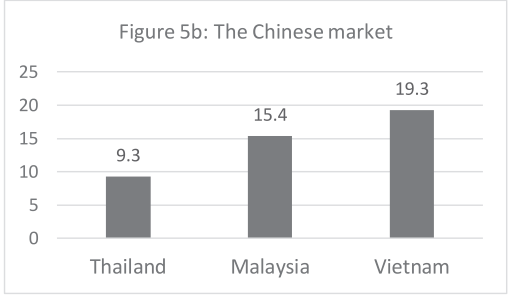
China, the United States, and Japan are important export destination of Thailand's export of electrical machinery and equipment (product 85), which is a prime example of the infra-industry trade for Southeast Asian nations. Figure 5a shows that the United States is the most important market for China (18 percent), followed by Thailand (17 percent), Malaysia (14 percent), and Vietnam (10 percent). For the Chinese import market, electrical machinery exports have the highest share in Vietnam's total exports (19 percent), compared with 15 percent for Malaysia, and 9 percent for Thailand (Figure 5b). For the Japanese import market (Figure 5c), Thailand has the most significant exposure at 14 percent, followed by Malaysia (7 percent) and China (6 percent). There exists a substantial degree of network trade of electrical machinery and equipment.

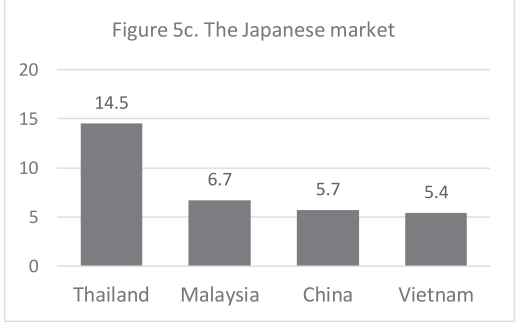
A demand shock caused by trade barriers such as the U.S.–China trade war can lead to a significant revenue shortfall in exporting countries, where the share of the U.S. and Chinese markets are large and significant. Furthermore, electrical and electronic products are

7 In 2018, there were 11 cases of anti-dumping duties imposed by Thailand on Chinese steel products.

Figure 5. Exposure of electrical machinery and equipment (product 85) in 2018 (unit: percentage share of total product exports)







Source: *International Trade Center.*

highly business-cycle–sensitive.[8] If the Trump tariffs and retaliatory tariffs of trading partners, such as cars and automotive parts, reduced world imports, the world GDP growth would decelerate and further reduce the price of oil and depress the world demand for manufactured exports.

8 The domestic sales of smartphones in China declined by 17 percent in 2018.

China, the United States, and Japan are the top three markets for electrical products for Thailand, Malaysia, and Vietnam. They are highly exposed to demand shocks in their most important markets. The market concentration of the top three markets ranges from 35 percent to 40 percent of their electrical machinery and equipment. China's export markets also concentrate in the United States and Japan. In 2019, if the Chinese economy is inevitably slowing down to 6 percent, ASEAN countries would have to bear the brunt of China's import growth sputtering. According to Figure 6b, Vietnam may be the most vulnerable, but because of the highly integrated supply chain, Thailand could be hit hardest.

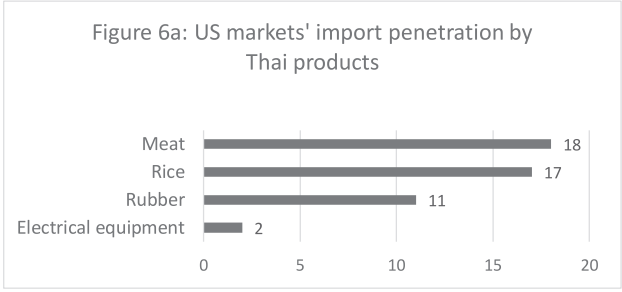
Thailand has some potential to gain export market share in the United States, China, and Japan. Rubber has excellent potential, representing 11 percent of U.S. rubber imports, 30 percent and 21 percent in China and Japan's total imports, respectively. Although Thailand's share of electrical equipment in the three markets is only 5 percent or less, meat amounted to 18 percent and 34 percent in the United States and Japan, respectively (Figures 6a and 6c). Thailand's exports of sugar represent 12 percent and 21 percent of China and Japan's total imports, respectively (Figures 6b and 6c).

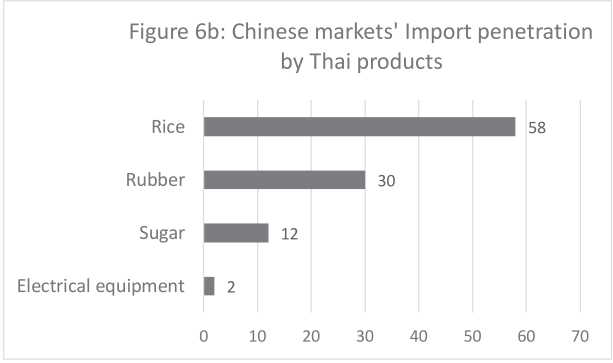
In 2017, the share of Chinese products in U.S. total imports was still high, indicating abundant opportunities for other countries to replace China's large share in U.S. imports. These imported commodities include electrical equipment (42 percent), mechanical appliances (32 percent), clothes (33 percent), and steel products (32 percent). In contrast, Thailand's export penetration into the U.S. market is low compared with the Chinese and Japanese markets. If Thailand's cost of production and the exchange rate are not competitive enough, there will be little gain from the U.S.–China trade dispute for Thailand's products in the U.S. market. In the first five months of 2019, according to the U.S. Department of Commerce, Vietnam and Bangladesh, exploiting their cheap labor in garment and footwear, increased their exports to the U.S. market by 36 and 14 percent, respectively. In Taiwan and South Korea, the export growth of semiconductors to the United States is around 23 percent and 14 percent, respectively. Thailand could not take advantage of replacing China's exports in these commodities due to high labor cost and the lack of skilled labor in electronic industries.

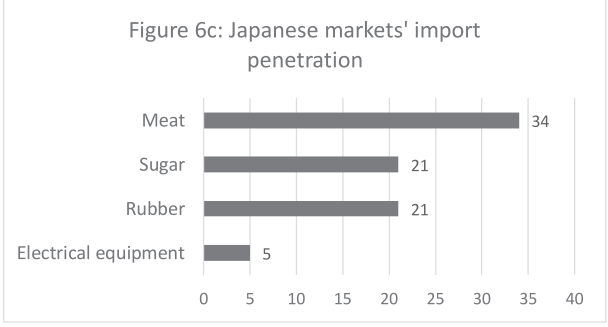
5. Dynamic analysis from a VAR model

A simulation from a multi-country global general equilibrium model by Li, He, and Lin (2018) shows that China will be hurt by the trade war, although the negative impacts are affordable. The United States can gain under unilateral sanction measures to China but will lose if China retaliates. Amiti, Redding, and Weinstein (2019) find evidence that Trump's tariffs in 2018 reduced U.S. real income by US$ 1.4 billion. Foreign countries that have retaliated against the United States also experienced income losses. Sznajderska (2019), using a global VAR model, provides evidence that a 1 percent negative China GDP shock reduces

Figure 6. Import penetration by Thailand's exports (2018)
(unit: percentage share of total imports)







Source: *International Trade Center.*

global growth by 0.22 percent, and that the impacts are stronger in emerging economies than advanced economies.

Han, Qi, and Yin (2019), using a global VAR model, argue that economic policy uncertainty from the United States produces the biggest negative spillovers on the Chinese economy,

through a reduction in exports, industrial output, and a depreciation of the renminbi. This finding is consistent with the result obtained from a general equilibrium model constructed by Handley and Limão (2017). They argue that by reducing policy uncertainty, through accession to the World Trade Organization by China in 2001, the threat of a trade war has declined. As a result, the United States can lower its prices and increase its income by the equivalent of a 13-percentage-point permanent tariff decrease during the period 2000–05. Hence, if that theoretical and empirical model is accurate, the case of the 2018–19 trade war could have a more devastating effect because there is higher tariff hiking from both countries, together with heightened policy uncertainty.

Malaysia is the largest importing country of Thai products in the ASEAN region (Figure 3). Recall that Thailand exports intermediate products to ASEAN countries, which in turn export final products to China. If there is a shift in the demand from American products to locally produced goods in China, Thailand would be able to supply raw materials to other ASEAN countries. It is imperative to investigate whether Thailand would benefit from the trade war by increasing exports to ASEAN markets after China has imposed retaliatory tariffs on American products.

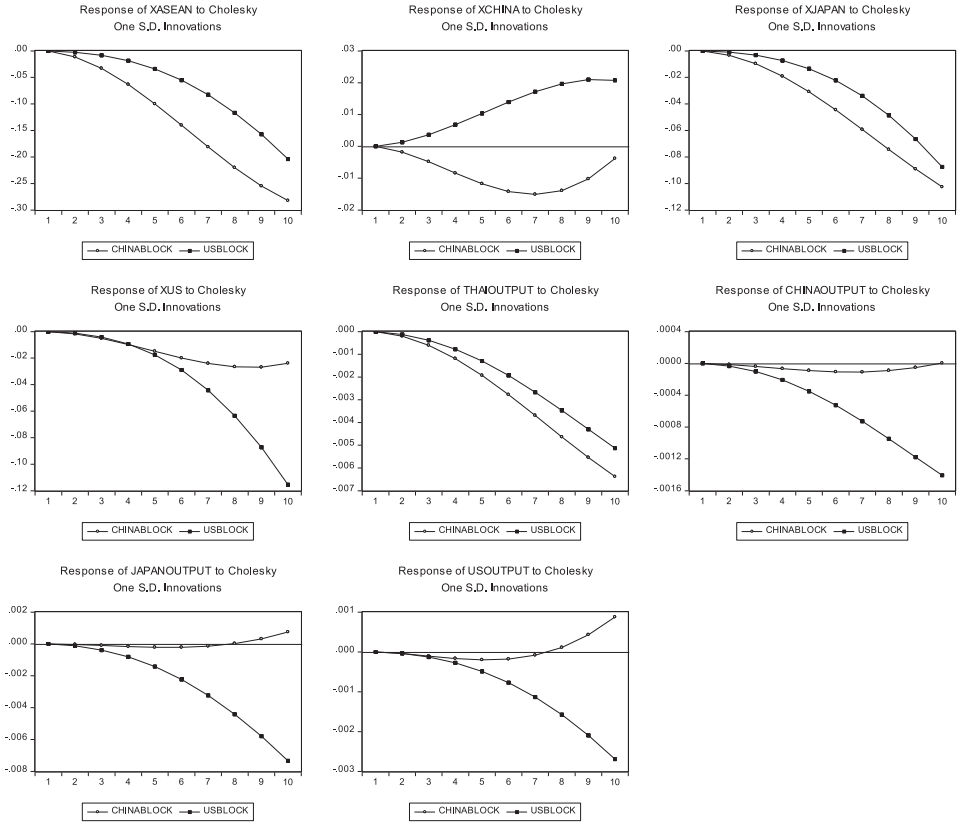
A VAR model, using monthly data from January 2000 to April 2019, is used to analyze the impacts of the U.S.–China trade war on Thailand's exports and output. The novel feature of the model is a proxy of trade impediments. Because it is too early to pinpoint the exact tariff rates imposed by the United States and China, we examine the long-term trends of U.S. exports and imports from China, based on U.S. statistics. The long-term trends of the two series, obtained from the Hodrick-Prescott filter, exhibits a rising trend. A proxy for the trade sanctions of imports from China is obtained by using the negative value of the changes in the trend value of the U.S. imports from China (*USblock*).

Similarly, the retaliation by China is proxied by the negative value of the changes in the trend value of the U.S. exports to China (*Chinablock*). In sum, we ask a hypothetical question of what would happen to Thailand's output and exports to the United States, China, Japan, and ASEAN, using counterfactual data, had the United States cut down on imports from China, which in turn decreased imports from the United States. Together with these two trade block variables, there are four variables representing manufacturing output from the United States, China, Japan, and Thailand. There are another four variables, including Thailand's exports, in US$ million to the United States, China, Japan, and ASEAN countries.

The VAR model can be expressed in the following equations:

$$Y_{it} = \alpha_i + \sum_{j=1}^{n} \beta_{ij} \quad Y_{it-j} + \sum_{j=1}^{n} \delta_{ij} (Chinablock)_{it-j} + \sum_{j=1}^{n} \theta_{ij} (USblock)_{it-j} + \varepsilon_{it}. \qquad (2)$$

Figure 7. Impacts of the U.S.–China trade war on Thailand's exports



$$(Chinablock)_{it} = \vartheta_i + \sum_{j=1}^{n} \mu_{ij} \quad Y_{it-j} + \sum_{j=1}^{n} \sigma_{ij} (Chinablock)_{it-j} + \sum_{j=1}^{n} \omega_{ij} (USblock)_{it-j} + \Phi_{it}. \quad (3)$$

$$(USblock)_{it} = \varphi_i + \sum_{j=1}^{n} \tau_{ij} \quad Y_{it-j} + \sum_{j=1}^{n} k_{ij} (Chinablock)_{it-j} + \sum_{j=1}^{n} \pi_{ij} (USblock)_{it-j} + \rho_{it}. \quad (4)$$

Where Y_i $(i = 1 \ldots 8)$ represents Thailand's exports (in US$) in four markets, and industrial production index for Thailand, the United States, China, and ASEAN countries (the time subscript "j") runs from 1 to 2.

The result from the impulse response functions shows that the anti-trade actions by the United States on China's exports led to substantial damage to Thailand's exports in all markets except China. (Figure 7). When China retaliated by increasing retaliatory tariffs on

American products, however, Thailand's exports to China experienced a sharp decline in the first three quarters. The U.S. tariff hikes hurt China more than China's tariff retaliation. It seems that China's response to the U.S. tariff hike does not hurt China in the long run. It pays off for China to respond to the U.S. sanctions.

The driving forces behind Thailand's output are from fluctuations in China's output and the U.S. output. Two forces are attributed to the contractionary impact of the trade war. First, in terms of trade volume, China's demand is much higher than the demand for Thailand's exports from the United States. Secondly, China's income elasticity of the demand for Thailand's products is larger than the United States. The conclusion is similar for the case of Japan, whose demand for Thailand's products is higher than the United States. The impulse response functions highlight the contractionary effect of the trade war on output growth of Thailand's major trading regions.

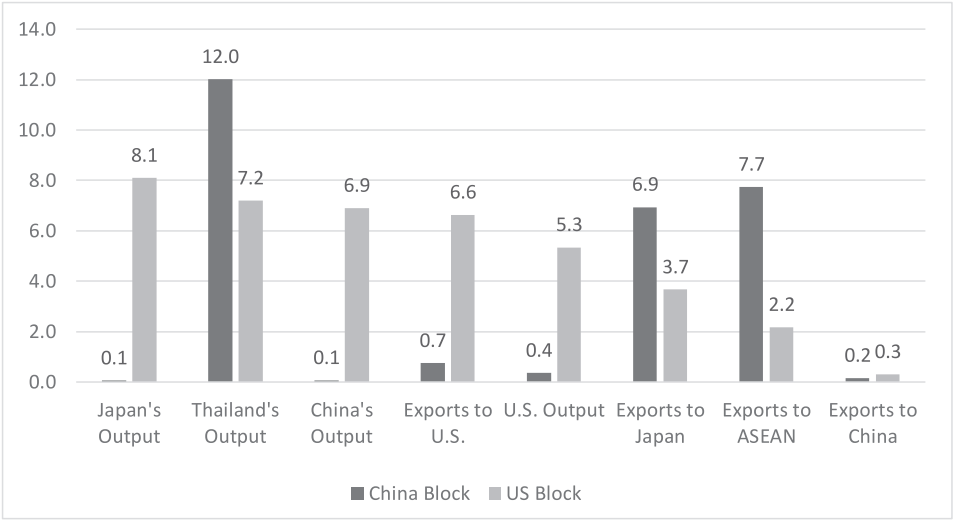
When the United States raises tariffs against China, there are more significant deflationary impacts on China, the United States, and Japan than when China retaliates. Trump's tariffs are more devastating than China's retaliation because the U.S. tariffs have upended the supply chains of production in Asia. The trade war badly hurts Thailand's exports to ASEAN, Japan, and the United States. But the deflationary impact is more profound for Japanese and ASEAN markets by China's tariff hikes than the United States' increased tariff rates. When the United States imposes higher tariffs on China, Thailand's exports to the United States decline much more than China's retaliation.

Figure 8 depicts the variance decomposition of the impacts of trade shocks from the United States and China's anti-trade actions. Recall that the variables *Chinablock* and *USblock* are proxied by the changes in the trend values of the U.S. imports and exports from China. The decomposition indicates, in descending order, that the trade disputes initiated by the United States depress Japan's output the most, followed by Thailand, China, and the United States. On the other hand, Thailand's production would be severely affected most by China's retaliatory tariffs on U.S. products. The contractionary impact is felt through a reduction in Thailand's exports to ASEAN and Japan.

The contractionary impacts on Thailand's output stem from trade impediments in the United States and China. The impulse response functions of Thailand's output to changes in GDP of the United States, China, and Japan are consistent with the regression results reported in Section 3, which indicate the dominance of income over substitution effects in demand for Thai products from the three economies.

In June 2019, China increased tariffs of around US$ 60 billion on U.S. goods, with punitive tariffs ranging from 5 to 25 percent in retaliation to the United States raising taxes on US$ 200 billion in Chinese goods to 25 percent from the previous 5 percent imposed

Figure 8. Variance decomposition of the impact of the U.S.–China trade war on output and Thailand' exports (at the 10th month after the shocks)



Source: *VAR impulse response functions.*

earlier. The two countries so far have already exchanged tariffs on US$ 360 billion worth of the two-way trade. The global growth slowdown, caused by the deepening trade disputes between the United States and China and political uncertainties in Europe, dampened the demand for Thai products. The ongoing trade war could cause a slowdown in Thailand's exports of electronics, automobiles, garments, rubber, and plastics, which are linked to the U.S.–China supply chains. Consequently, the Bank of Thailand predicted that Thailand's GDP would slow to 2.8 percent in the first half of 2019.

Recall that the variance decomposition is derived from a counterfactual simulation. In reality, before the trade war broke out, the long boom of China's exports to the United States was responsible for Thailand's output expansion, thanks to China's trade expansion and increasing trading activity between Thailand, Japan, and ASEAN countries. About 19.2 percent of Thailand's output fluctuations can be explained by the trade disputes (Figure 8).[9] Trade disputes and tariff retaliation would end up hurting both parties. The striking conclusion is that the non-retaliating policy seems to be welfare-enhancing for China and the United States. This finding is consistent with Amiti, Redding, and Weinstein (2019), discussed earlier.

9 To save space, I report only decomposition of Thailand's output. A table of variance decomposition for all variables in the VAR model is available on request.

There are also considerable consequences of the trade war on third parties. Unlike Thailand, which suffers from trade sanctions from both the United States and China (Figure 7), Japan experiences output loss as the United States ratchets tariffs against the Chinese products, whereas Japan marginally gains from the Chinese blockage of American products. The reason behind the asymmetric impacts on Japanese output is the diversion and substitution effects of the trade disputes. As long as Japan can substitute American products in Chinese markets, Japan's manufacturing benefits from replacing China's imports from the United States, thanks to the substitutability of products made in Japan and the United States. On the other hand, Japan's output growth would slow down when the United States imposes sanctions on imported goods from China. The interdependency of the network trade between China and Japan, which is more pronounced than the interdependency between the United States and Japan, has intensified the synchronization of the business cycles between the two biggest economies in Asia.

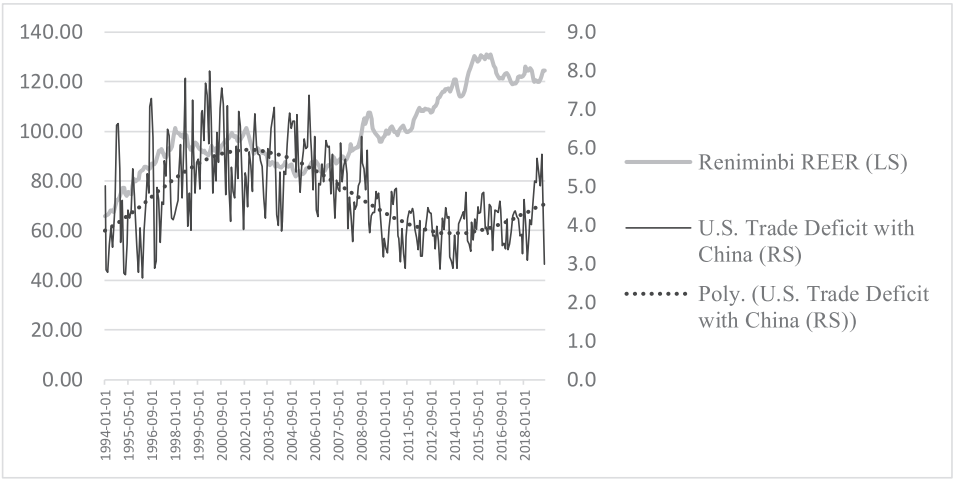
The VAR analysis ignores the repercussion of the trade dispute on the exchange rates of major world currencies. It is infeasible to include all key exchange rates of Thailand's trading partners due to an insufficient degree of freedom. Furthermore, there has been a considerable structural change in trade structure since China joined the World Trade Organization in 2001. Thus, there is no point in extending the data to cover the period before 2000. The more appropriate question is to ask whether the trade war affects key exchange rates and how they would change the baht REER.

6. Exchange rates matter

China has long been accused of being a currency manipulator, even though the renminbi REER appreciated from 2005 to 2013. During this period, the U.S. trade deficit against China gradually declined. The U.S. trade deficit with China, measured by the ratio of import to export trends, exhibited a declining trend. During this period, the expansion of the Chinese economy was rapid, generating high import demand for U.S. goods, in addition to the declining import prices caused by renminbi appreciation. Since 2014, however, it has become apparent that the U.S. trade deficit has widened. There are at least two reasons for this. First, the renminbi REER started depreciating against the dollar. The second reason, more important than the first one, is due to China's new normal growth policy. The continued slowdown in China's economic activity translates into lower demand for U.S. goods.

To make matters worse, the Trump tariffs on US$ 250 billion of Chinese goods produce a negative income effect on import demand for U.S. products. If China is forced to appreciate the currency, a small degree of the renminbi appreciation will not offset the negative impact on import demand caused by Chinese growth slowdown. The United States can correct current account disequilibrium by decelerating its output growth while China'

Figure 9. The U.S. trade deficit with China and the renminbi REER



Source: *Federal Reserve Bank.*

output growth must accelerate. Moreover, the successful external equilibrium adjustments require the renminbi to sustain its appreciation against the dollar.[10]

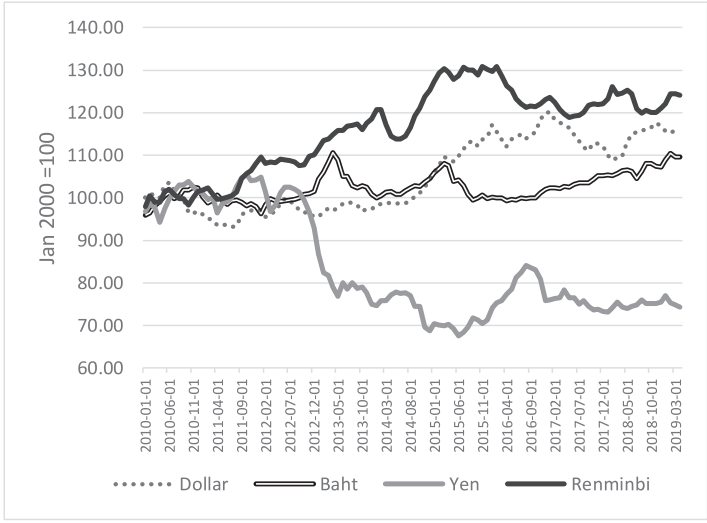
We would like to see how these foreign exchange adjustments act as an equilibrating mechanism. The data shown in Figure 9 indicate the long-run relationship between the renminbi REER and the trend of the trade deficit.[11]

From January 2010 to March 2019, the baht REER remained relatively stable when compared to major trading partners (Figure 10). The stability of the baht REER bodes well for the Bank of Thailand's continued intervention and obsession with preserving the baht stability. When the Japanese yen REER depreciated, the baht REER appreciated accordingly. Through foreign exchange arbitrage, a surge in one major currency leads to adjustments in other currencies to maintain the interest parity condition. In the event of a protracted trade war between the United States and China, there would be strong repercussions on exchange rate adjustments, including the baht REER. The baht REER moved in line with the renminbi REER, as China has become Thailand's most important market (Figure 3). Thus, if the trade war causes renminbi appreciation, so would the baht REER appreciate. The second-round effect of the trade war is in the form of exchange rate adjustments.

10 At the end of June 2019, the renminbi depreciated by 4.8 percent against the dollar from a year earlier.

11 The Granger causality test suggests the two-way causation between the two variables. Exchange rates matter for correcting the disequilibrium in the trade account balance.

Figure 10. REERs in comparison



Source: *Federal Reserve Bank.*

We focus our attention on recent movements of the REERs since 2015. To understand how recent changes in major trading partners' REERs affect Thailand's competitiveness, we apply fully modified least squares to investigate how the renminbi affects the baht REER. Using data from January 2015 to March 2019, we obtain the following regression result:

$$\begin{aligned}\Delta \log(baht\ REER_t) = {} & 0.008\,\Delta \log(US\ REER_t) - 0.06\,\Delta \log(Yen\ REER_t) \\ & (0.009)\ (0.08) \\ & + 0.346^{***}\,\Delta \log(Renmibi\ REER_t) + 0.422^{***}\,\Delta \log(ASEAN\ REER_t)\,. \quad (5) \\ & (0.134)\ (0.194)\end{aligned}$$

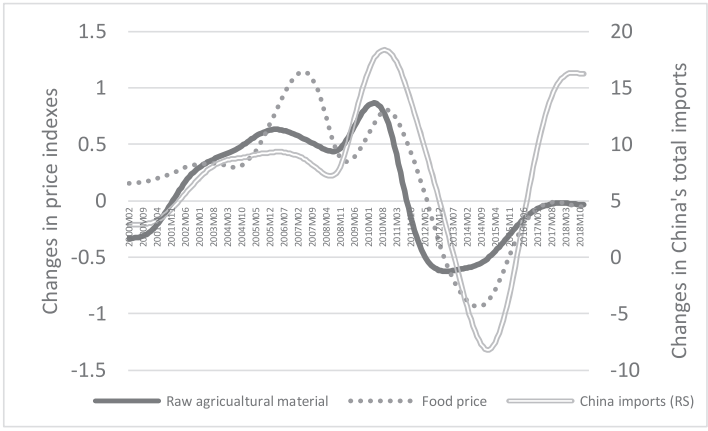
$R^2 = 0.23, \mathrm{SSR} = 0.003$

Standard errors are in parenthesis, $^{***}p < 0.01$

Only the movements of the REERs of China and ASEAN are found to be statistically significant. Because ASEAN and China are Thailand's most important markets, changes in these economies' REERs affect Thailand's international competitiveness. If the trade war leads to renminbi appreciation, Thailand will lose its competitiveness because of the resulted baht appreciation.

It should be noted that the bilateral exchange rate between the baht and the dollar also depends on the real factors and capital account. In July 2019, the baht appreciated to 30.5

Figure 11. Changes in trends of commodity price indexes and China's imports



Source: *Mundi Index and Federal Reserve Bank.*

baht, the six-year high, thanks to steady capital inflow into Thailand's asset markets. It turns out that the baht is the currency that experienced the highest rate of appreciation in the world.[12] As a result, Thailand's exports in July 2019 declined by 6.3 percent from a year earlier. Exchange rates do matter—in particular, for small- and medium-sized exporters.

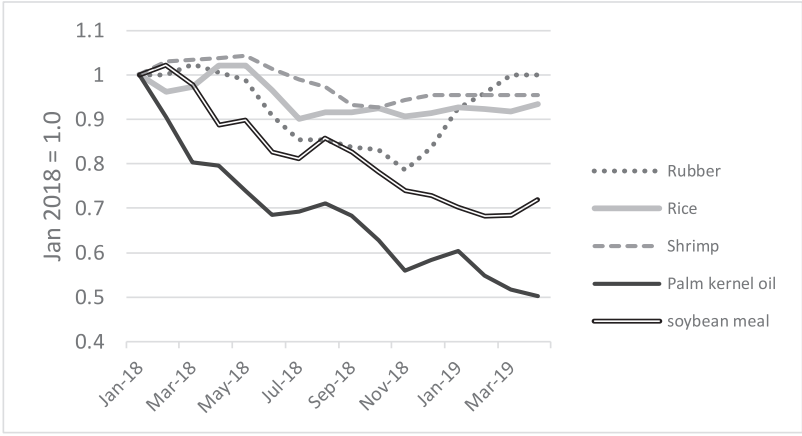
7. Impacts on commodity prices

China is the world's largest buyers of commodities. A growth slowdown, whether from China's new normal growth policy or adverse effects from Trump's tariffs, can exert an enormous influence on world commodity prices. Shown in Figure 11 are changes in the trends of world commodity price indexes: raw agricultural materials and food products. The price index of raw agricultural materials includes rubber, cotton, and oilseed, and the price index of food price covers, among other food items, rice, sugar, chicken, and shrimp. The two series move together during the peaks and troughs of China's business cycle. There is a long-run relationship between the level of China's total imports and the commodity price indexes. The causation runs from China's imports to the price of agricultural raw materials, which in turn affect the food prices.[13]

12 On 3 July 2019 the baht appreciated against the dollar by 8.6 percent (year-on-year); the yen appreciated by 2.6 percent, and the renminbi depreciated against the dollar by 3 percent.

13 Based on data from January 2000 to December 2018, the three series are cointegrated. China's imports Granger-cause the price of raw agricultural materials, which in turn Granger-cause the food price index.

Figure 12. Declining commodity prices



Source: *Mundi Index.*

If the trade war generates a negative impact on China's growth, as indicated by the impulse response function of China's output to shocks from trade disputes (Figure 7), the ripple effect on weakening China's import demand will reduce commodity prices. Indeed, world commodity prices have declined significantly since January 2018. As shown in Figure 12, the prices of rice, rubber, shrimp, palm kernel oil, and soybean meal have dropped appreciably. The price of palm kernel oil declined by 50 percent in April 2019 from the level in January 2018. The prices of soybean meal and rice also fell by 30 percent and 10 percent, respectively, during the same period.

The prices of these agricultural commodities are crucial for the livelihood of farmers in emerging economies, where many still live in poverty. Because export revenues from agricultural products depend more on export prices than quantities (Nidhiprabha 2017), sustained weak commodity prices decelerate the speed of poverty reduction. Furthermore, low farm prices compel governments to provide agricultural subsidies, at the expense of capital spending, thereby hampering long-term economic growth. Little did trade negotiators realize that the outcome of their negotiations affects the welfare of the poor around the world.

8. Concluding remarks

According to the estimated income and the real effective exchange rate elasticities, the negative impacts of the trade war on shrinking world trade volume outweigh the positive substitution effects on Thailand's exports. The latter effect depends on Thailand's ability

to compete successfully in the United States and Chinese markets. When considering the output and substitution effects among different export markets, the simulation from the VAR model indicates that the trade war hurts countries that raise trade barriers more than hurting their trading partners. The third parties caught in the middle of the trade war are affected by decelerating global growth and experience an economic downturn. There is also a negative term of trade effect on commodity prices, which are influenced by China's declining demand for commodities. A full-blown trade war between the United States and China would immediately generate a negative impact on Thailand's output growth. The adverse effect will be long-lasting.[14]

The indirect impact of Trump's tariffs is on the global slowdown, particularly in Thailand's major trading partners. The negative effect on output is stronger than the positive diversion effect that might occur from substitution effects. Thailand's GDP contracts, because of a slowdown in economic activities in the United States, China, and Japan. The negative impact on Thailand's GDP will be even higher if we incorporate the negative effect of slackening global demand, which crimps on consumer and investor confidence. China's economic slowdown translates into lower demand for commodities. The result in declining commodity prices further complicates poverty eradication and might retard long-term growth of the economy because capital spending is curtailed for the sake of agricultural subsidies.

Incidentally, there is also a long-term impact on output and exports in Southeast Asian emerging economies that might benefit from the relocation of production networks from China by the United States and Chinese companies. The effect will be permanent as it will change the structure of value chains of manufacturing productions.

Because ASEAN economies have a different degree of vulnerability to trade shocks, the relative contractional impact of the trade war would hinge on the individual country's international trade exposure as well as domestic policy responses. The baht real effective exchange rate moves in line with the renminbi and other ASEAN real effective exchange rates. The policy implication is that stimulus policy packages of China can ameliorate the contractionary effect of the trade war. The People's Bank of China and the U.S. Federal Reserve have already considered implementing monetary policy stimulus. China's fiscal policy has become more expansionary in 2019. Unless China maintains high growth and currency appreciation, the U.S.–China trade disputes will remain for many years to come.

14 Some of the Trump tariffs could remain even after the conclusion of the trade deal between the United States and China. The 25 percent tariff on light trucks imposed in 1964 still remains until today and it has shielded U.S. car manufacturers from Thailand's exports of one-ton pickup trucks.

References

Amiti, Mary, Stephen J. Redding, and David Weinstein. 2019. The Impact of the 2018 Trade War on U.S. Prices and Welfare. Center for Economic Policy Research, International Trade, and Regional Economics Discussion Paper DP13564.

Fajgelbaum, Pablo D., Pinelopi K. Goldberg, Patrick J. Kennedy, and Amit K. Khandelwal. 2019. The Return to Protectionism. NBER Working Paper No. 25638.

Handley, Kyle, and Nuno Limão. 2017. Policy Uncertainty, Trade, and Welfare: Theory and Evidence for China and the United States. *American Economic Review 107*(9):2731–2783.

Han, Liyan, Mengchao Qi, and Libo Yin. 2016. Macroeconomic Policy Uncertainty Shocks on the Chinese Economy: A GVAR Analysis. *Applied Economics 48*(51):4907–4921.

Li, Chunding, Chuantian He, and Chuangwei Lin. 2018. Economic Impacts of the Possible China-U.S. Trade War. *Emerging Markets Finance and Trade 54*(7):1557–1577.

Nidhiprabha, Bhanupong. 2018. *Macroeconomic Policy for Emerging Markets: Lessons from Thailand*. London: Routledge.

Nidhiprabha, Bhanupong. 2017. The Rise and Fall of Thailand's Export-Oriented Industries. *Asian Economic Papers 16*(3):128–150.

Rajah, Roland. 2019. East Asia's Decoupling. Lowy Institution Working Paper No. 1.

Sznajderska, Anna. 2019. The Role of China in the World Economy: Evidence from a Global VAR Model. *Applied Economics 51*(15):1574–1587.

Woo, Wing Thye. 2008. Understanding the Sources of Friction in the U.S.–China Trade Relations: The Exchange Rate Debate Diverts Attention from the Optimum Adjustment. *Asian Economic Papers 7*(3):61–95.