

IMPACTS OF QUANTITATIVE MONETARY EASING POLICY IN THE UNITED STATES AND JAPAN ON THE THAI ECONOMY

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This paper compares and contrasts the impact of quantitative easing (QE) monetary policy conducted by the Federal Reserve Bank and the Bank of Japan on the Thai economy. The impact of the first round of QE policy is related to Thailand's export market exposures, trade, and financial linkages with the United States and Japan. In the short run, QE has either an expansionary or contractionary effect on Thailand's output depending on whether the baht depreciates or appreciates against the US dollar and the Japanese yen. In the long run, when QE stimulates world output expansion, Thailand's manufactured output and exports respond positively to world economic recovery. In the medium run, the impact of QE is related to the appreciation of the Chinese yuan and the slowing of the Chinese economy, which further depresses Thailand's exports and prolongs Thailand's output recovery.

Keywords: Quantitative easing; Monetary policy; Emerging economies; Thai economy

JEL classification: E40, E58

I. INTRODUCTION

THE Global Financial Crisis (GFC) of 2007–8 led to recession in the United States in 2009 and a decline in Thailand's exports. Because of Thailand's high market exposure to the US and Japanese markets, it was difficult for such an export-led country to escape from the deflationary impact of the GFC. Although Thai financial institutions were mildly affected, the Thai stock price index was initially dampened by capital outflows and pessimistic sentiment. Unconventional monetary policy (UMP) conducted in the United States and Japan affected Thailand's capital flows, interest rates, exchange rates, and stock market. The massive injection of dollar liquidity also brought about booms in Thailand's asset markets, strengthening the Thai baht, and complicating the conduct of Thailand's monetary policy. The Bank of Thailand (BOT) has attempted to prevent baht appreciation by

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conducting a low interest rate policy to discourage capital inflows. But this easy monetary stance might rekindle inflationary pressure and propagate asset bubbles. In addition, when the US economy shows sign of sustained recovery, fear of the Federal Reserve Bank's (FRB)'s policy reversal creates the possibility of capital flights, liquidity risks, and exchange rate volatility in Asia. In July 2015, the baht hit a six-year low against the dollar. Moreover, the collapse of the Chinese stock market and the Greek debt crisis have created new risks and uncertainty for baht exchange rates.

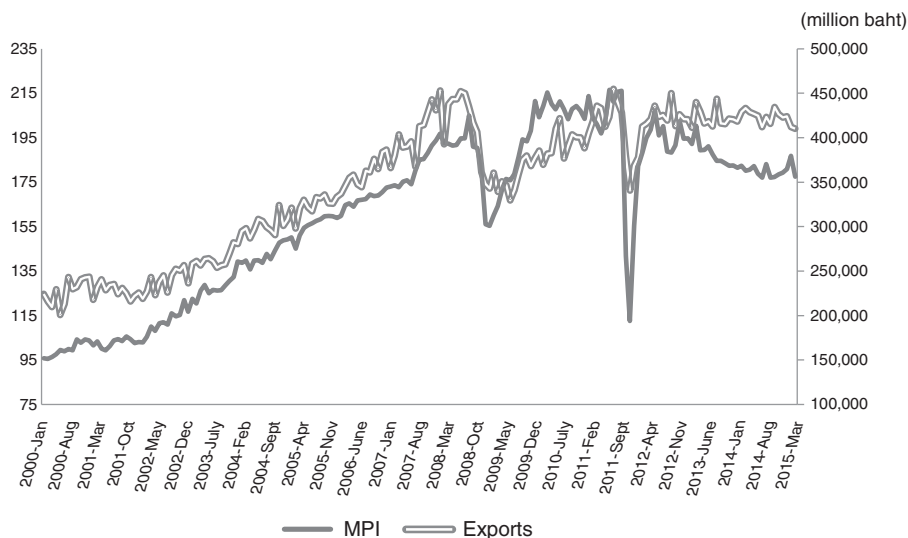
The Thai economy experienced a record low growth in 2014. Internal conflicts, political uncertainty, and the overthrowing of a democratic government led to deteriorating investment sentiment. Consumer confidence remained poor during this period of political violence and world recession.¹ The government struggled to stimulate the economy through public spending but it was too little and too late to offset declining private expenditure and exports. The Thai economy is driven by manufactured exports, which accounts for more than 60% of GDP. Declining exports since 2011 reflected the slow growth of manufacturing output (see Figure 1), highlighting the sluggish Manufacturing Production Index (MPI). Between January 2000 and July 2008, the MPI and exports increased steadily. The GFC temporarily decreased exports and manufacturing output. The V-shaped recovery was evident in the aftermath of the GFC. Another temporary collapse of exports and output occurred in November 2011, when floods disrupted production and exports.

In the first four months of 2015, Thailand's exports declined by 4% as a result of a global economic downturn and weak commodities prices in rice and rubber. According to Thampanich and McCombie (2013), changes in the terms of trade had an adverse effect on Thailand's growth performance. The decline in growth following the Asian financial crisis in 1998 was due to a dramatic decline in demand for its manufacturing exports. This negative impact on the demand for Thai exports was stronger than the positive substitution effect of baht depreciation. The currencies of Thailand's competitors also depreciated simultaneously with the baht, thereby weakening the impact of baht depreciation. According to macroeconomic stabilization, tax revenue should decline when output growth decelerates. The revenue from value added taxes echoes the strength of private consumption expenditure, while domestic sales of automobiles indicate the expected income of households. These two indicators point to the adverse consequences of the GFC in Thailand in 2008.

The slowdown in economic activity is captured by the declining M2 (broad money supply) growth rate since 2012 (see Figure 2). It reflects the slowing of economic activity as saving, investment, and consumption expenditures were depressed. The

¹ Consumer confidence fell for eight continuous months in September 2015.

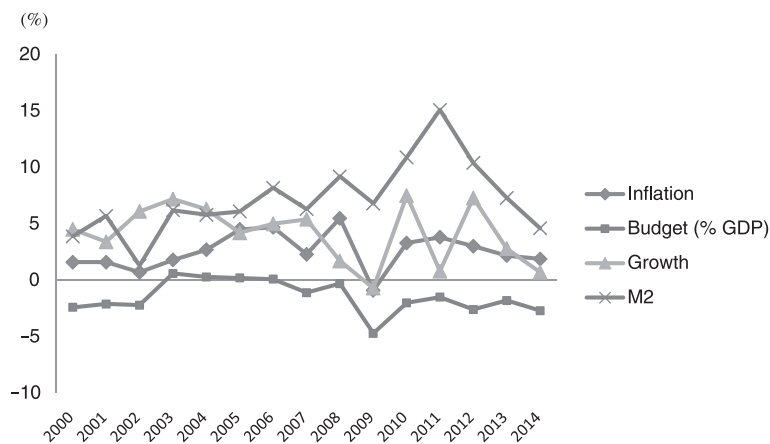
Fig. 1. Exports and Manufacturing Output



Source: Bank of Thailand.

Note: Left scale = manufacturing production index.

Fig. 2. GDP Growth and Macroeconomic Indicators



Source: Bank of Thailand.

GDP growth rate was gyrating as the Thai economy was hit by internal and external shocks, because the V-shaped recovery was temporary rather than permanent. The inflation rate remained subdued because of the downturn in the global business cycle and weak primary commodity prices. Thailand experienced price deflation in early

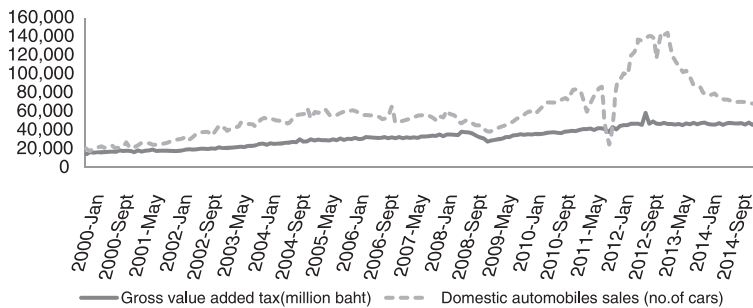
2015 as the world oil price declined sharply. Nevertheless, the fiscal budget deficit was sustainable as the deficit tends to increase during recessions and decrease during booms.

The recovery in private spending was apparent as the world economy slowly recovered from the GFC. In 2011, flooding substantially reduced automobile sales but the rebound was also spectacular as the Thai government employed fiscal measures to support consumer spending. As we can see in Figure 3, the stimulus seemed to work and the economy was poised to regain its pre-shock growth path. However, no sooner had the recovery taken place in 2013 as a result of export recovery and increased private spending, political turmoil and the subsequent military coup in May 2014 derailed economic recovery.

Automatic fiscal stabilizers on the revenue side have been working reasonably well. With ample space, the government could have used fiscal policy stimulus through infrastructure development to spur long-term growth. The difficulty of implementing public expenditure lay in frequent changes of government since the 2006 military coup. New governments could not focus on long-term growth, but rather had to deal with intermediate problems that continuously threatened government stability (Nidhiprabha 2014). After the coup in 2014, the Thai economy experienced the lowest growth among ASEAN countries. The fiscal policy could not effectively compensate the fall in export demand. The budget previously allocated to economic services was diverted to defense, increasing the public sector's wages, and income transfer payments (Nidhiprabha 2015). Fiscal policy has not been able to stabilize the economy, as there are urgent short-term policy issues the government has to tackle to maintain its power. However, monetary policy can still be implemented by the BOT in times of economic turbulence.

It is well known that monetary policy has a long and variable lag effect on the real sector. In many cases, monetary policy is too little too late to cope with shocks in aggregate demand. To increase the effectiveness of monetary policy, information

Fig. 3. Domestic Car Sales and Value Added Taxes

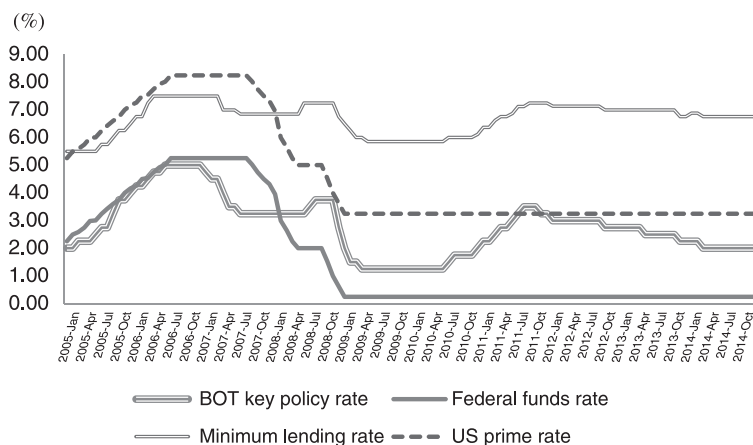


Source: Bank of Thailand.

and decision lags must be minimized. When experiencing a temporary external shock, a gradual approach to monetary policy adjustment is preferable to a sudden shift in monetary policy stance. However, when the shocks are persistent, a gradual approach may not be appropriate to deal with permanent shocks, because private expectations have adjusted to the new environment.

The FRB aggressively cut the federal funds (FF) rate immediately following the subprime crisis. Because of the linkage between short-term and bank lending interest rates, the US prime rate instantaneously declined after the FRB adopted an easy monetary policy stance (see Figure 4). There was a constant gap between the FF rate and the prime lending rate. Unlike interest rate adjustments in the United States, Thailand's Minimum Lending Rate (MLR) did not closely follow the BOT's monetary stance, signaled by changing the key policy interest rate. Because of the loose connection between the short term on long-term interest rates, monetary policy in Thailand has not been as effective as the FRB's influence on the US financial sector. The FF rate was maintained at 0.25% from January 2009 to September 2015. The UMP, through the FRB's massive injection of liquidity via the purchasing of corporate bonds, began in 2008. The BOT started tightening monetary policy by raising the key policy rate in May 2010 from 1.25% to 1.50% in September 2010. The rate hike peaked at 3.5% in August 2011. As a result, the interest rate differential between domestic and foreign markets was widening, encouraging capital inflows. With ample liquidity in the Thai money markets, the MLR did not decline by the same proportion as the BOT's interest rate cut. The MLR declined by 0.75% despite the 1.25% cut in the key policy rate. The gap between the prime rate and the MLR

Fig. 4. Policy and Market Interest Rates



Source: Bank of Thailand.

was widened from 2.75% in April 2007 to 3.5% by the end of December 2014. Maintaining a large interest rate gap over a long time complicates the BOT's monetary and exchange rate policy. The unwarranted fear of baht depreciation and the underestimation of recession probability precluded the BOT from engaging in timely monetary easing to spur growth. By February 2015, the BOT's key policy rate remained at 2%, despite the easy monetary policy stance that has been employed in more than 10 countries since the beginning of 2015. The central banks in Singapore, Indonesia, India, Australia, and Canada have already cut their policy rates to prevent capital outflows.²

Chung et al. (2012), who employed the FRB's macroeconomic model, found that large-scale asset purchases reduced the long-term interest rate by 50 basis points and raised the real GDP by 3%. In addition, the inflation rate was 1% higher than if the FRB had not carried out the program. Thus, the asset purchases prevented deflation in the United States. There is a question as to whether the recovery is still fragile, as consumption spending and residential investment remain weak. Furthermore, there is a question about the consequences of the possibility of the FRB's quantitative contraction (QC) after the FRB unloads its assets from the balance sheet, and whether the reversal of quantitative easing (QE) will lead to global adjustment of capital flows. Capital flights might lead to another foreign exchange crisis if the QE measures are abrupt and unanticipated.

Breedon, Chadha, and Waters (2012) construct a counterfactual path of bond yields to estimate the impact of QE. They find evidence that the 2009–10 QE program significantly lowered government bond yields, through a portfolio balance channel, by 50 basis points. According to Joyce, McLaren, and Young (2012), over the period from March 2009 to January 2010, the Bank of England (BOE) spent £ 200 billion—14% of annual GDP—on government securities. The evidence indicates that QE purchases financed by the central bank have had a significant impact on the British economy. Baummeister and Bernati (2010) investigate the macroeconomic impact of lower long-term bond spread during the 2007–9 recession period. They conclude that a compression of the long-term yield spread has had a powerful effect on output growth and inflation. Their counterfactual simulations illustrate that UMP actions in the United States and the United Kingdom averted deflation and output collapses.

The literature seems to suggest that QE has a positive impact on the economy in the medium term. Nevertheless, a doubt remains as to whether the US and Japanese economies can actually sustain recovery with strong productivity growth that can generate an expansionary impact on the world economy. We now turn to a discussion of the impact of the QE on Thailand's exchange rates and exports.

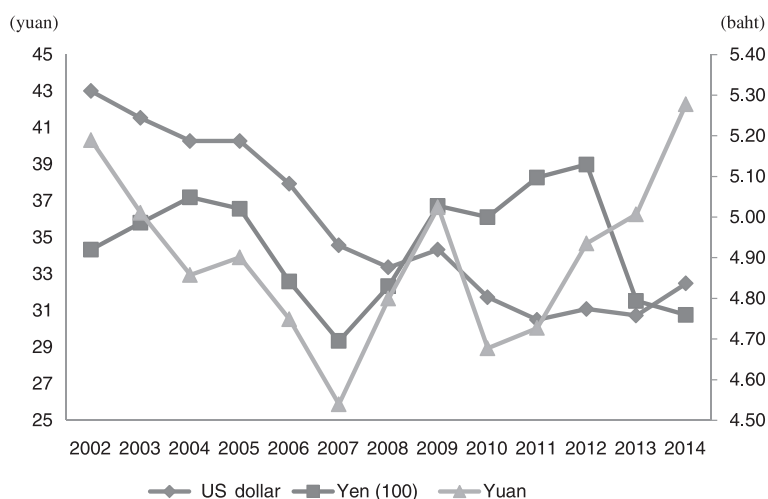
² In May 2015, the BOT cut the key policy rate to 1.5% and maintained that rate throughout 2015.

II. IMPACTS ON EXCHANGE RATES AND EXPORTS

The large injection of the dollar into world liquidity led to appreciation of the yen and other Asian currencies. The yen appreciation against the Thai baht and other Asian currencies meant that exports would increase provided the Japanese market remained dominant. Moreover, if the QE leads to output expansion in the United States and Japan, the income effect from expanding output in these two economies can boost exports in Asia. On the other hand, if their export markets are concentrated heavily in the US market, the substitution effect caused by the appreciation of the domestic currency against the US dollar can mitigate the expansionary income effect of the QE.

Because Thailand's international trade is conducted mainly in US dollars, the QE and QC have a significant impact on the Thai baht. In general, the price of the dollar in terms of the baht trended downward from 2002 to 2014 while the price of the yen in terms of the baht fluctuated more than the dollar (see Figure 5). The reason for this volatility is that the BOT has intervened heavily to stabilize the baht/dollar exchange rate, allowing the baht/yen exchange rate to adjust accordingly to the international arbitrage condition. The BOT attempted to slow down the baht appreciation in order to prevent export shortfalls caused by the rapid baht appreciation against the dollar. The ratio of the baht/dollar and baht/yen exchange rates simply demonstrates the fluctuations in the yen/dollar exchange rate, which is a result of the asset expansion of the FRB and the Bank of Japan (BOJ).

Fig. 5. Baht Exchange Rates



Source: Bank of Thailand.

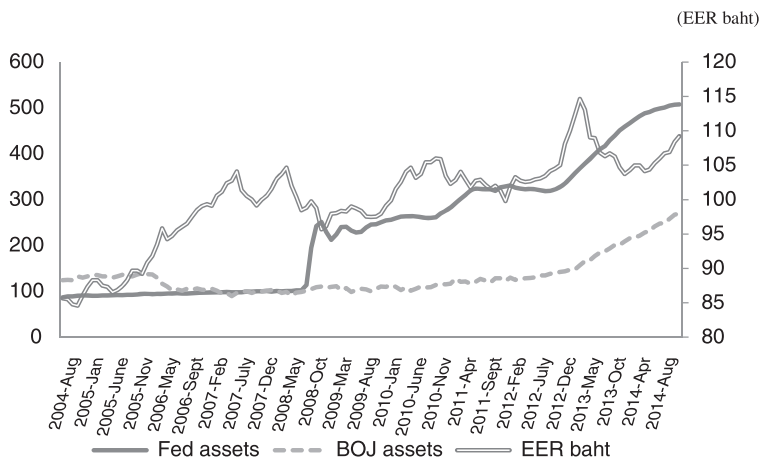
The depreciation of the baht against the Chinese yuan is largely due to the baht's appreciation against the dollar being less than that against the yuan.

When the baht appreciated against the yen and the dollar simultaneously in 2005–6 and 2013, the impact on Thailand's export sector was substantial in terms of the loss in international competitiveness. As the baht appreciated, the BOT intervened heavily in spot and forward markets. The share of the net forward position in total international reserves increased to 24% in 2008 when the baht appreciated against the dollar in June 2005 from 41.3 baht to 31.5 baht in March 2008, representing a 31% appreciation. As the QE liquidity injection slowed down, the baht depreciated marginally before climbing to a new high of 29.3 baht in April 2013, prompting the BOT to intervene heavily once again in the forward market.

Even if the BOT succeeded in postponing the baht appreciation, the BOT would pay a high price in terms of foreign exchange losses as long as the dollar trended upward. In the long run, export firms may get complacent, knowing that the central bank will bail them out when the exchange rate turns against them. This kind of moral hazard will not take place unless the BOT refrains from unnecessary market intervention.

By expressing the value of the assets purchased by the FRB and the BOJ in the form of an index (2007 = 100), we can see the relative strength of the QE of the two central banks (see Figure 6). The FRB has been more aggressive than the BOJ in asset purchases. Consequently, the broad effective real exchange rate of the Thai

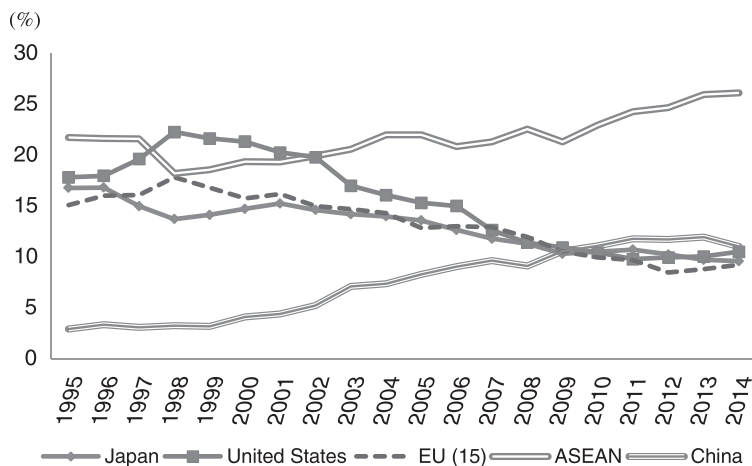
Fig. 6. Quantitative Easing Index and Thailand's International Competitiveness: Broad Real Effective Exchange Rate (EER)



Source: Federal Reserve Bank.

Note: Left scale = index (2007 = 100).

Fig. 7. Thailand's Exports by Destination



Source: Bank of Thailand.

Note: Left scale corresponds to percentage of Thailand's total exports.

baht appreciated considerably as a result of the sheer force of the QE in 2008, causing the Broad Real Effective Exchange Index (EER) of the baht to appreciate by 15% by April 2014. In the case of the United States, Warburton (2013) finds evidence that the trade weighted dollar was affected by the interest spread, which tracks QE, although unexpected changes in national financial conditions, the FF rate, and the velocity of money account for more variation in the trade-weighted index of the dollar.

The loss of Thailand's international competitiveness can be captured by the sluggish growth of Thailand's exports to the United States, Japan, and China. The GFC already caused a substantial decline in Thailand's exports in 2009; the adverse consequences from the QE exacerbated this decline. Nevertheless, Thailand's exports did not perform poorly in ASEAN markets (see Figure 7). Like the Thai baht, other ASEAN currencies also appreciated against the dollar after the QE programs. Although Thailand's exports to ASEAN remained flat between 2012 and 2014, Thailand's dependency on ASEAN markets has become increasingly important.³ From 1995 to 2015, its dependency on the United States, Japan, and the EU has declined to 10% while ASEAN markets and China have become the major export destinations. The fluctuating business

³ ASEAN intercountry trade is low and is therefore unable to substitute for the loss of exports to developed economies (Simarmata 2013).

cycle in China informs its import fluctuations and the volatility of ASEAN exports.

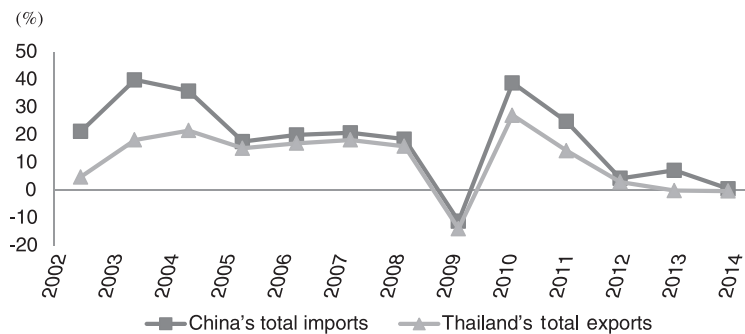
Thailand's poor export performance can be partly attributed to the expansion of the dollar supply that caused baht appreciation. Export-oriented firms suffered more than domestic market-oriented firms. They ran lower capacity utilization, thereby discouraging them from undertaking capital investments despite the benefits from baht appreciation that cheapened imported capital goods. Viewed in this light, QE programs have a far-reaching impact on investment and the long-term productivity growth of the country.

When the yuan appreciates against the dollar, China's export growth slows down. This means lower demand for Thailand's exports. The medium run impact of QE works through income effect when the Chinese economy experiences a downturn in growth because of the appreciation of the yuan. Hence, there is fear of a sudden yuan depreciation and another currency war if China needs to stimulate its export-driven economy via yuan devaluation.

Thailand's exports to China are significant, ranking eighth. As shown in Figure 8, Thailand's exports move in line with China's total imports. The decline in Thailand's exports in recent years can be attributed to China's economic downturn. A further downturn in the Chinese economy would translate into a bleak future for Thailand's exports and economic growth.

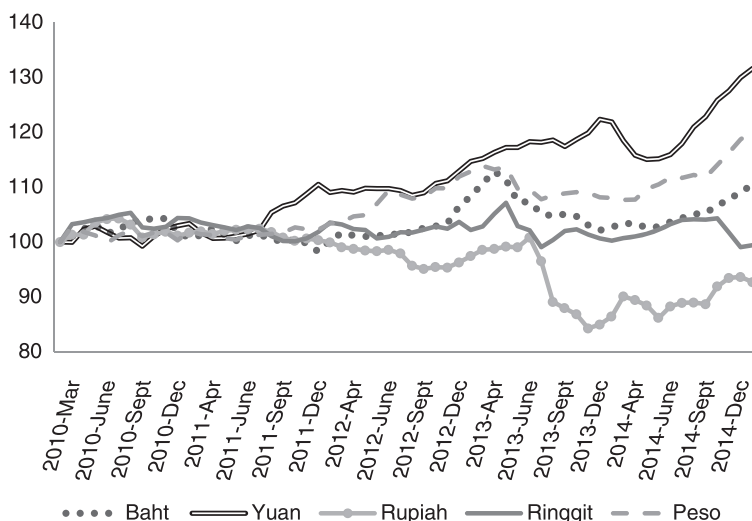
The indirect impact of QE via China took the form of yuan appreciation (see Figure 9), which caused sluggish exports and economic activity. Nevertheless, the yuan appreciation has been beneficial for Thailand's tourism industry. However, the slowdown in China's exports as the appreciation of the yuan's real exchange rate sent ripple effects to the rest of the world. China and her major importing trade partners experienced a similar growth deceleration.

Fig. 8. China Factor



Source: Bank of Thailand.

Fig. 9. Real Effective Exchange Rates



Source: Federal Reserve Bank.

Note: Left scale corresponds to the index 100 = 2010.

Because of the appreciation in the real effective exchange rate, China's total export growth slowed from 20% in 2011 to only 6% in 2014. Similarly, Thailand's export growth rate declined from 30% to 5% during the same period. The appreciation of the Malaysian ringgit reduced export growth from 14% to 3%. Despite the depreciation of the Indonesian rupiah, Indonesia's export growth collapsed from 29% to -3%. The appreciation of the Philippine peso decelerated the Philippines' export growth from 8% to 4% in 2013. These ASEAN countries had between 11–13% export exposure to the Chinese market. China's total import growth declined from 25% to just 1% in 2014. Economic activity in China was affected by the yuan appreciation and therefore has strong repercussions on the growth performance of ASEAN countries.

III. IMPACT ON ASSET MARKETS

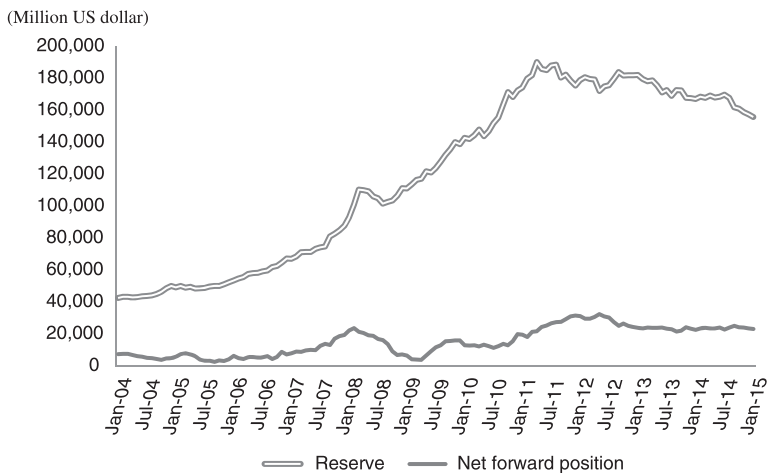
The UMP conducted by the FRB since 2008 has affected long-term interest rates through QE. Low interest rates produced portfolio reallocations from US markets. Kiley (2014) illustrates the co-movement between interest rates and equity prices caused by monetary policy changes. A decline in long-term interest rates induced by monetary policy statements associated with zero bound on the short-term interest rate had a positive impact on equity prices prior to 2009. Furthermore, the QE also

influenced equity prices in emerging economies. Because of the influx of capital inflows through portfolio investment, stock markets in Asia experienced strong market performance. Thailand's level of international reserve reached an all-time high of US\$ 181 billion in May 2011 (see Figure 10), thanks to capital inflows induced by the QE. The rising international reserves imply that the BOT continued buying the dollar to prevent the baht from appreciating. Since then, the BOT stopped buying the dollar and started selling the dollar to prevent the baht from depreciating. As a result, the level of the international reserve declined gradually as the baht depreciated to almost 33 baht at the end of 2014. The BOT intervenes regularly in both directions, indicating that fear of floating still prevails in the mindset of monetary authorities.

It is difficult to find an optimum foreign exchange rate to achieve external equilibrium. Encouraging exports and maintaining price stability simultaneously complicate monetary policy. Adjusting the key policy interest rate may not achieve both targets. The rising amount of international reserve prior to the GFC, which continued into the QE episodes, implies a rapidly enlarging monetary base and money supply in emerging economies.

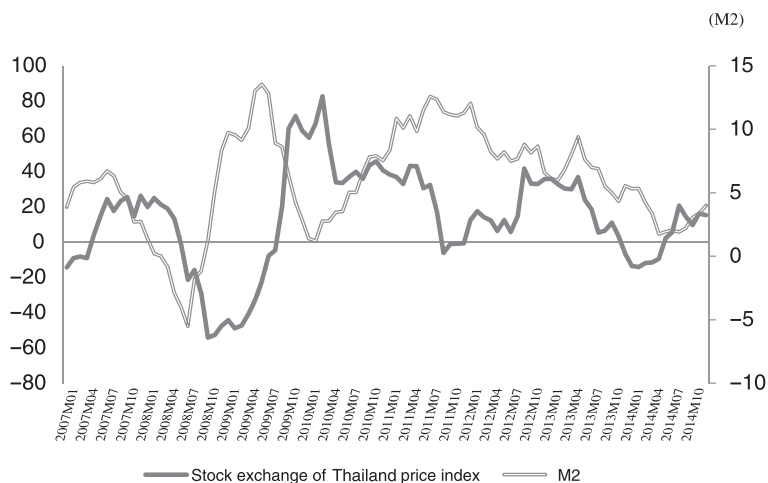
Thailand's stock prices rose in line with the expansion of money supply. Since the economy experienced slow growth, interest rates from bank deposits remained at low levels, increasing the attractiveness of portfolio investment. The rate of return from investing in the stock market and the expansion of money supply are related (see Figure 11). The rise in the stock price in Thailand is partly due to investors' sentiment driven by share prices on Wall Street. Thus the QE conducted in the United

Fig. 10. International Reserves



Source: Bank of Thailand.

Fig. 11. Money Supply Expansion and Stock Market Booms 2007–14



Source: Bank of Thailand.

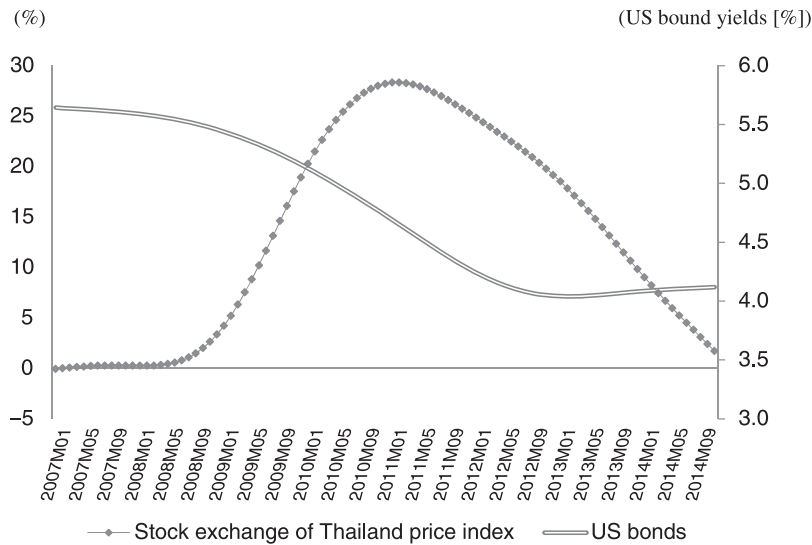
Note: Left scale = % change (year on year).

States has had direct and indirect impacts on Thailand's stock market. Other Southeast Asian stock markets also rose in line with the Dow Jones Index because the regions have become more closely related with one another. As such, Asian share prices move in tandem with Wall Street.

Using 94 observations from January 2007 to December 2014, the hypothesis that the growth rate of M2 Granger causes stock market returns cannot be rejected at a very high level of statistical significance, and the causation runs both ways. This evidence indicates that enlarged money supply leads to rising stock market prices in Thailand (see Figure 11). The stock prices are also determined by portfolio capital inflows. The QE in the United States dampened the rate of return from investment in US corporate bonds (see Figure 12), making it more attractive to shift portfolio investment away from the US market. Had the BOT not intervened in the foreign exchange market, the money supply would not have grown at a very high rate, which subsequently led to asset price appreciation. The impact of the QE therefore also depends on a particular exchange rate policy setting. A more stable exchange with intervention regularity would lead to more expansion of money supply, notwithstanding the central bank's sterilization.

The cyclical components of stock prices, which are caused by the arrival of random good and bad news, can be removed from actual values by the Hodrick-Prescott (HP) filter. The HP trend of the annual rate of return in Thailand's stock

Fig. 12. Trends of SET Returns and US Bond Yields



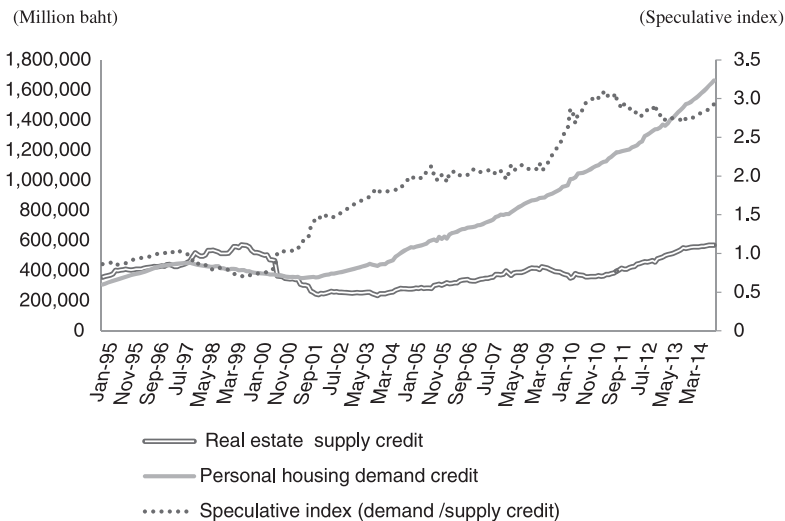
Source: Bank of Thailand.

market and US corporate bond yields is shown in Figure 12. The substantial gap between the two rates of return explains portfolio investment flows to emerging markets, including Thailand. The low and declining yield from the US bond markets made Southeast Asian stock markets relatively attractive and hence more capital inflows and rapid appreciation of Asian currencies. The continued appreciation of the baht would make Thailand's assets even more attractive. Portfolio investment from abroad caused further appreciation of the baht. Other asset prices are also affected by these capital inflows.

Rising asset prices in the property sector lead to expansion in bank credit and vice versa (see Figure 13). The steady rising level of property credit for real estate development and personal housing perpetuates asset price bubbles, aggravated by speculation in the property sector. We can measure the degree of speculation by computing the ratio of personal housing credit and real estate development credit. As shown in Figure 13, personal housing loans expanded more rapidly than loans for real estate developers. This suggests a heightening degree of speculation in the real estate sector. The rising tide of speculation was apparent in 2001 and continued unabated up to 2010.

The amount of bank credit extended to the property sector has been astronomically high, compared to the credit level during the period of the Asian Financial Crisis in 1997–8. Excessive credit growth in the non-traded sector causes a relocation of

Fig. 13. Property Credit and Real Estate Speculation

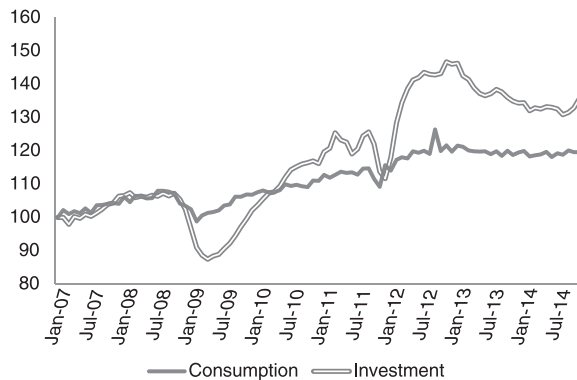


Source: Bank of Thailand.

resources to the non-traded sector, while the export sector shrinks. The situation is akin to Dutch disease, when the real exchange rate appreciates, shifting resources from the traded sector to the non-traded sector. Seen in this light, the impact of QE conducted in high-income countries has a profound macroeconomic impact on emerging countries like Thailand. There is evidence provided by Amonhaemanon et al. (2014) showing that real estate in Thailand was used to hedge against inflation from 1987–2011. The very high rate of return from the real estate sector after the GFC was the result of speculative demand, fueled by personal housing credit (see Figure 13). Asset prices are increasingly deviating from fundamentals. Household debts are increasing while household incomes remain stagnant. Inevitably, the property bubble will burst unless the excess supply can be eliminated by a massive price correction and contraction in residential supply in the long term.

An excessive reliance on UMP by the FRB has produced a boom in Thailand's asset prices. The increased asset values could have led to higher private spending for consumption and investment via the wealth effect on consumption and the Tobin's Q effect. As shown in Figure 14, consumer spending and investment were depressed by declining investor sentiment and deteriorating consumer confidence. The wealth effect on private spending, if any, would not be strong enough to offset the depressing impact of pessimistic expectations. During recessions, consumers are trying to maintain their previous levels of consumption through borrowing to smooth consumption expenditures. As a result, the level of Thai household debt increased

Fig. 14. Private Consumption and Private Investment



Source: Bank of Thailand.

Note: Index 100 = 2007.

considerably to 85% of GDP in 2015. Asset is concentrated on the top quintile of the Thai population, which has a high marginal propensity to save. The wealth effect on consumption from QE-enhanced asset prices therefore remains weak.

The consumption index remained flat from 2012 to 2015. Consequently, household debts have been increasing considerably, limiting the wealth effect of asset price appreciation. On the other hand, the private investment index has fluctuated: a sharp rebound after the GFC after 2009, a temporary shock as a result of the 2011 floods, and a V-shaped recovery in 2012. Political turmoil and the 2014 coup further depressed investment. In addition to the sluggish growth in Europe and China, private investment declined again from 2013 to 2015.

Unlike the instantaneous impact of the QE on exchange rates, its impact on output is not transmitted immediately, as the pass-through effect on output is slow. The expansionary impact of QE is felt through credit availability and balance sheet effects. It takes considerable lags before consumption and investment expenditures respond to stimulus. Because of different financial structures, level of household debts, and trade structure in the United States and Japan, the short- and long-term impacts are dissimilar in direction and magnitude.

In general, UMP to stimulate growth enlarged the monetary base in the United States and Japan, resulting in capital outflows and depreciation of the dollar and the yen. Emerging countries received substantial flows of portfolio investment, which raised stock prices in Asia. Undoubtedly, QE has increased the value of financial assets in these countries. On the other hand, QE has had a strong impact on exchange rates due to capital inflows. Table 1 summarizes the anticipated QE effects on Thailand's output and the direction of the baht exchange rates in the

TABLE 1
Expected Effects of Quantitative Easing on Thailand

Source of Shocks	Nominal Baht Exchange Rates	Impact on Thailand's Output	
		Short-Run Impact	Long-Run Impact
FRB's asset expansion	Appreciation (baht/dollar)	—	+
BOJ's asset expansion	Appreciation (baht/yen)	—	+
Yuan appreciation against US dollar	Depreciation (baht/yuan)	+	—

Note: FRB = Federal Reserve Bank; BOJ = Bank of Japan.

short and long term. Expansion of the FRB's assets led to baht appreciation against the dollar. Similarly the BOJ's asset expansion caused the baht to appreciate against the yen.

Thailand's manufacturing output would respond negatively (positively) to baht appreciation (depreciation) because Thailand's manufacturing sector is driven by export demand. In the short term, the impact of QE is transmitted via a substitution effect through exchange rate changes. In the long run, when output and employment increase in the United States and Japan, we would observe an increase in Thailand's output caused by a rising demand for Thailand's manufactured goods. There is also a positive indirect output effect from network trade expansion when these two economies import more goods from other ASEAN countries. The short-term indirect impact of QE is on the appreciation of the yuan against the dollar and depreciation against the baht. In the medium term, the appreciation of the yuan against the dollar can retard the growth of the Chinese economy. In turn, the sputtering growth in China leads to a negative impact on Thailand's exports and GDP growth in the long run.

IV. IMPULSE RESPONSES TO QE SHOCKS

Casual empiricism cannot be used to answer questions regarding the impact of QE on the Thai economy. A vector auto regressive (VAR) model has been widely applied to analyze the impact of QE. Harada and Masujima (2009) employ a VAR model to answer the question of whether an increase in monetary base raises aggregate output in Japan. Their model indicates that the impact of QE is primarily transmitted through asset prices and bank balance sheets. Their findings reveal that Japan's monetary policy has been effective in easing prolonged economic downturn. While the FRB and the BOJ acquired private assets through expanding the monetary base, the yen/dollar exchange rate would consequently be altered. Kano and Morita (2015) find evidence that money demand shocks are caused by the long-term interest rate differentials between the United States and Japan. The depreciation of the yen/dollar nominal exchange rate in the post-Plaza accord exhibits a common stochastic trend

of the yen/dollar rate, which is dictated by the monetary base differential between the two countries. Fukuda (2015) advances the hypothesis that the news shocks about Abenomics was successful in changing market expectations in stock prices and the yen/dollar rate. Favorable responses to news on Abenomics by foreign investors led to improving market sentiments despite the fact that the news was revealed during the day in Japan. Fukuda (2015) points out that foreigners' trade is conducted when it is nighttime in Japan, and the dramatic market responses happened only in time zones where foreign investors were active. Both stock prices and yen/dollar rates had structural breaks during the day and during the night. In sum, the QE has an impact on exchange rates and asset prices in the United States and Japan.

According to Kapetanios et al. (2012), the effects of the BOE's purchase of assets can be captured by using three different VAR models. The results indicate that QE has a peak effect on output and price level at around 1.5 percentage points. Sinclair and Ellis (2012) argue that the impact of QE in various countries can be different, depending on the structure of the economy and the fiscal policy response. Since the world's financial markets are closely linked, the underlying drivers of movement of bond yields are not just domestic factors. In the UK context, international factors dominate local development in the UK bond price movement, but not to the complete exclusion of domestic factors. When evaluating the impact of QE it must be borne in mind that a small open economy, abstracting from the impact of global movements in financial markets, can lead to very different conclusions. Menon and Ng (2013) use a VAR model to examine the impact of QE in the Eurozone. Although direct impacts are small, a further shock can lead to a much larger adjustment in risks and asset valuations. There is a real possibility that vulnerability in the Southeast Asian region increases following massive inflows of capital and buildup of debt, related to successive bouts of QE in the United States and Japan. Joyce, McLaren, and Young (2012) point out that Western economies remain weak and sluggish, indicating that, even if the QE programs work, they need to be supplemented by other measures, since the recessionary forces have been very strong.

The earlier conjecture on the impact of QE, shown in Table 1, will be scrutinized by employing Thailand's monthly data on key macro variables. To meet this objective, an unrestricted VAR model is constructed. The model includes the FRB's total assets, the BOJ's total assets, the baht/dollar and the baht/yen exchange rates, the BOT's key policy rate, the Stock Exchange of Thailand price index (SET), Thailand's exports, MPI, and the BOT's coincident index. The data are obtained from the FRB, the BOJ, and the BOT. The coincident index provided by the BOT captures five economic activities in real terms: manufacturing output, imports, domestic automobile sales, value-added taxes, and debit to demand deposits. In effect, the coincident index provides an approximation of monthly GDP series. All variables are in the form of first difference to remove non-stationarity

components. The VAR model is estimated using 144 observations from March 2003 to December 2014.

To estimate the response to a shock of the FRB's assets to macro variables of Thailand, the VAR model uses a Cholesky decomposition of the variance-covariance matrix of residuals to make sure that the residuals from the estimation system are orthogonal. Changes in the FRB and the BOJ's assets are weakly exogenous with respect to other variables in the system, namely, the baht/dollar rate, the baht/yen rate, the BOT's key policy rate, Thailand's stock price index, Thailand's total exports and manufacturing production index, and Thailand's economic coincident index. The underlying assumption is that variables at the beginning of the ordering contemporaneously affect the macro variables that follow, while the latter variables impact the former only with two-period lags. Changes in the ordering system of the macro variables do not substantially change the conclusion of the impulse analysis.

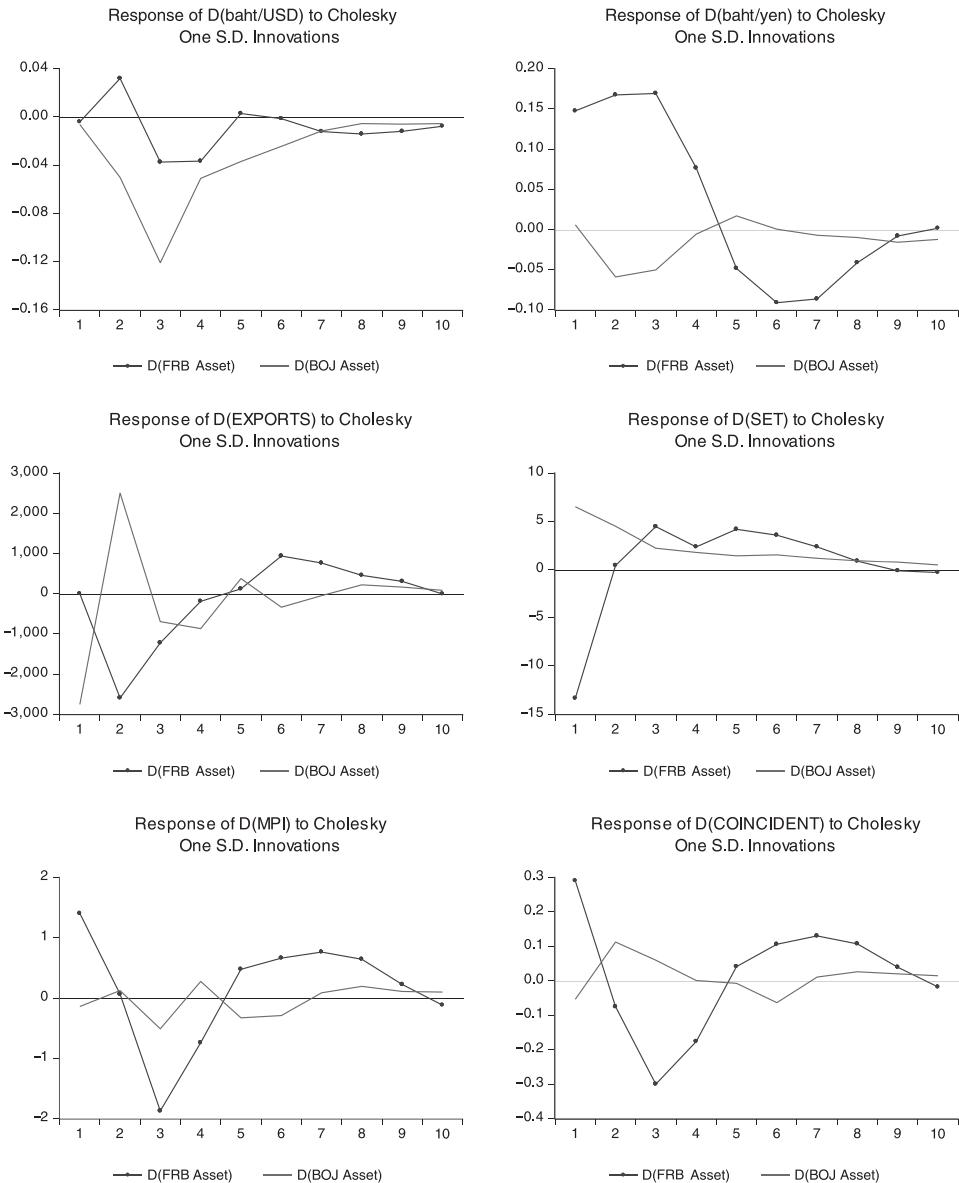
The impulse response functions of key macro variables to shocks in the FRB's total assets and the BOJ's assets are reported in Figure 15. In the case of the FRB's QE operation, the baht/dollar exchange rate appreciates immediately, although the magnitude of the appreciation dies off slowly and almost disappears within the first 10 months. The baht/dollar exchange rate appreciates to a lesser degree in response to the BOJ's QE measures, or about one-third of the impact of the FRB's QE. We can conclude that QE implementation in the United States and Japan led to an appreciation of the baht/dollar rate in the short term.

In terms of the impact of the QE on the baht/yen rate, we observe that it appreciates immediately after the BOJ's action. The appreciation continues for four months and disappears by the 10th month. The response of Thailand's exports to QE is transmitted via the movements of the two exchange rates discussed earlier. The impulse response function reveals that the contractionary impact on exports is more severe in the first four months before it dies off. This is a reflection of the undershooting of the baht exchange rate that would tend to gravitate back to its normal level after the shock dissipates.

As far as the impact of asset prices is concerned, the FRB's QE program causes a negative impact in the first two months, but it begins to push the stock price higher after three months. The lag effect of QE on US corporate bond yields and its announcement effect initially created market pessimism in the aftermath of the subprime crisis. As the yield curve becomes flatter, portfolio reallocation takes place, when investors seek higher rates of return in foreign stock markets. The accumulated response of the stock market becomes positive, albeit disappearing in three quarters. For the BOJ's QE, the positive impact on Thailand's stock price happens immediately after the operation, although its impact dies off slowly after three quarters.

Since manufactured output amounted to more than 80% of Thailand's total exports, the export contraction follows the decline in manufacturing output. The FRB's QE has a stronger contractionary impact than the BOJ's action. This is due

Fig. 15. Impact on the Thai Economy: Quantitative Easing Operation by the Federal Reserve Bank and the Bank of Japan



Source: Author's calculation.

Note: FRB stands for Federal Reserve Bank and BOJ stands for Bank of Japan.

to stronger appreciation of the baht/dollar exchange rates and the fact that more than 85% of Thailand's international transactions are conducted in US dollars. Nevertheless, the output contraction decelerates after two quarters as the baht/dollar rate rebounds to its initial level. The coincident index is a measurement of the overall economic activity and exhibits similar movements because investment and consumption expenditures are primarily determined by output and income levels.

We can conclude that QE launched by the FRB and the BOJ had contractionary impacts on the Thai economy in the short and medium term through the effect of baht appreciation which depressed Thailand's export demand. Moreover, unless the QE programs generate sustainable recovery in the United States and Japan, Thailand's economic recovery will be protracted because of declining exports, plunging commodity prices, and sluggish consumption and investment expenditures.

V. CONCLUDING REMARKS

If the export-growth engine is damaged by the appreciation of the baht against the dollar, fiscal policy must be employed to counteract the economic downturn. Given political instability and the loss of investor confidence, expansionary fiscal policy is less effective when undertaken during the absence of consumer confidence. Because the military coup in May 2014 disrupted the fiscal budget process, it was impossible to employ fiscal policy to offset the collapse in export growth. As a result, Thailand's exports barely grew in 2014 and its output growth rate declined from 2.3% in 2013 to 0.7% in 2014. Notwithstanding the economic downturn, the stock market and the property sector were booming, thanks to capital inflow from other parts of the world. One has to ask if Thailand is approaching its Minsky moment.⁴

One of the adverse consequences of the QE conducted in industrial countries is the loss of Thailand's competitiveness due to real exchange rate appreciation. Thailand has shifted its resources from the traded to the non-traded sector, which has become buoyant by capital inflow. Dutch disease has eroded the international competitiveness of Thailand's export sector. Thailand's policy response to the adverse impact of the QE was too little and too late. The large interest-rate differentials still remain. As long as the baht continues to appreciate against the dollar, the export sector will not be able to generate growth and produce a V-shaped recovery as it did in the aftermath of the 1997 Asian Financial Crisis. Furthermore, macro-prudential policy must be urgently implemented to prevent asset bubbles. Allowing exchange rates to restore external equilibrium can mitigate the impact of external shocks that might lead to capital inflows or instigate capital flight. Even when the baht started to depreciate against

⁴ A prolonged period of rapid acceleration of debt, which would eventually lead to systemic output contraction and asset price depreciation.

the dollar in the second half of 2015, the expansionary effect of the baht depreciation is insignificant because other emerging economies' currencies are also depreciating against the dollar. Moreover, the slowdown in economic growth in China has dramatically reduced the demand for imports from the rest of the world. The contractionary income effect on the demand for Thailand's exports is stronger than the offsetting expansionary effect of currency depreciation.

The conclusion from the paper is that a small and relatively open economy such as Thailand is vulnerable to UMP in the United States and Japan. Not only does the Thai baht appreciate against the dollar, the real effective exchange rate of the yuan also appreciates considerably. Consequently, China's exports and output growth decelerate, further reducing China's demand for imports from the rest of the world. We cannot underestimate the indirect impact of QE that exerts a negative impact on the growth of China's exports. While fiscal policy is not operating effectively due to Thailand's political constraints, conducting monetary policy in increasingly volatile global markets is one of the greatest challenges faced by the BOT.

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