Spillover Effects of Japan's Quantitative and Qualitative Easing on East Asian Economies*

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Abstract

This paper explores what spillover effects the Japan's quantitative and qualitative easing (QQE) had on East Asian economies. Under the new monetary policy regime, the Japanese yen depreciated substantially which raised a concern that it would have a beggar-thy-neighbor effect in the region. It is thus important to see what effects the QQE had on neighboring economies. In the analysis, we empirically investigate how stock markets in East Asia reacted to the yen's depreciation under the QQE. We find that stock markets in East Asia, which had first reacted to the yen's depreciation negatively, came to respond positively as the QQE progressed. This implies that the QQE had a much smaller beggar-thy-neighbor effect than what was originally concerned about. We show that the QQE benefited East Asian economies because positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region.

Key words: unconventional monetary policy, beggar-thy-neighbor effect, stock markets in Asia

JEL classification number: F10, F32, E52

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* An earlier version of this paper was presented at ADBI Annual Conference "Macroeconomic Shocks and Economic Growth in Asia" on 3-4 December 2015. We would like to thank Naoyuki Yoshino and other participants at the conference for useful comments.

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1. Introduction

After the 2007-09 global financial crisis (GFC), central banks in advanced countries launched a new set of non-standard policy tools, which have been labeled as the zero interest rate, quantitative easing (QE), credit-easing, or forward guidance policies. These unconventional monetary policies largely succeeded at achieving their domestic goals. However, they had a mixed effect on the rest of the world. They buoyed asset prices globally at the time of financial turmoil. But they also depreciated currencies and increased capital flows to the rest of the world, especially to emerging markets. When flows become excessive, with the risk of sudden reversals, they can give rise to policy strains in recipient economies.

Among unconventional policies in advanced countries, a number of studies suggested that highly accommodative monetary policy by Federal Reserve Board (FRB) has created major challenges for policymakers in the rest of the world, especially in emerging market economies (EMEs) (see, for example, Fratzscher et al. [2013], Chen et al. [2014], Bowman et al. [2014], Bauer and Neely [2014], Neely [2015], and Park [2016]). Table 1 summarizes the timeline of unconventional monetary policy in the United States after the GFC. Quite a few of EMEs experienced rapid capital inflows and strong currency appreciation pressures during 2010-12, while they saw a sharp reversal in episodes of market volatility after FRB Chairman Bernanke's tapering comments on May 22, 2013. However, Rogers et al. (2014) find that the spillover effects of unconventional policy were not symmetric across the countries and that U.S. policy shocks had larger effects on the rest of the world than those of the other advanced countries.[1]

The purpose of this paper is to explore what spillover effects Japan's unconventional monetary policy had on the rest of the world, especially on East Asian economies. Table 2 summarizes the timeline of Japan's unconventional monetary policy after the GFC. Like other central banks in advanced countries, the Bank of Japan (BOJ) adopted unconventional monetary

[1] Dekle and Hamada (2015) show that Japanese monetary policies have generally helped raise U.S. GDP, despite the appreciation of the dollar.

policy after the GFC. But it was after Prime Minister Abe advocated the new policy regime when the BOJ became more aggressive in its unconventional policy. Under the new regime which is called “Abenomics”, the Japanese government tried to revive its economy through implementing bold economic policies that will pull its economy out of prolonged deflation (see, for example, Fukuda [2015] for its details). In particular, on April 4th in 2013, BOJ Governor Kuroda introduced the "Quantitative and Qualitative Monetary Easing (QQE)" and committed to achieve 2% inflation target in 2 years.

Figure 1 depicts actual and predicted amount of base money in Japan from 2007 to 2016.[2] Like central banks in the other advanced countries, the BOJ increased its base money after the Lehman shock in September 2008. But compared with those in the other advanced countries, the changes of the base money had been modest in Japan. This was true even after the BOJ announced the “Comprehensive Monetary Easing” in October 2010. However, the Japan’s base money started to increase dramatically since late 2012 when Abenomics started. The increases were accelerated when the BOJ introduced the QQE in April 2013 and expanded the QQE in October 2014.

The foreign exchange market reacted to the new policy regime very sensitively (see, for example, Kano [2015]). As Figure 2 shows, the yen-dollar rate, which had been around 80 yen per dollar in 2012, depreciated to 88 yen at the beginning of January 2013 and to 102 yen per dollar on May 15, 2013. The expansion of the QQE on October 31 in 2014 led to further substantial depreciation of the Japanese yen. The depreciation had positive effects on the Japanese economy (see, for example, Shioji [2015]). However, at the early phase of Abenomics, several Asian emerging countries showed a serious concern about the yen’s depreciation because it may have a beggar-thy-neighbor effect and result in competitive devaluation in the region.

[2] The predicted amounts at the end of 2016 are based on the BOJ’s commitment.

For example, an article in International Business Times on March 1, 2013 suggested that "(t)his exchange rate strategy may help Japan in the long run but other countries view it as a nasty shot across the bow, a salvo that in fact could precipitate an all-out global currency war if it drives down the economies of Japan's allies and neighbors." It then cited a remark by South Korean President Park Geun-hye that "her government would take preemptive and effective steps to ensure stability for the won because a sharp fall in the yen has made business tougher for South Korean firms." An article in the Wall Street Journal on March 7, 2013 also reported a concern by the president of China Investment Corp. (China's giant sovereign-wealth fund) that "the new Japanese government was aiming to boost its exports at other countries' expense via a weaker currency" and that "(t)reating the neighbors as your garbage bin and starting a currency war would not only be dangerous for others but eventually be bad for yourself."

To what extent was their concern correct? To shed some light on this important policy issue, the following analysis explores what happened in East Asian financial markets by using daily stock price data. Specifically, we investigate what spillover effects the yen's depreciation caused by Abenomics had on stock prices in East Asian economies. We find that the stock markets in East Asia, which had first reacted to the yen's depreciation negatively, came to respond positively as the QQE progressed. This implies that the Japan's QQE had much smaller beggar-thy-neighbor effects than what was originally concerned about. We also find that this happened because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region as the QQE progressed.

As was pointed out by Fukuda (2015), the QQE caused not only substantial yen's depreciation but also substantial stock price recovery in Japan. Since stock price recovery has a positive spillover effect on neighboring economies, the QQE had both negative and positive spillover effects on neighboring economies. In particular, as the QQE progressed, the positive spillover effect came to dominate the beggar-thy-neighbor effect, so that the total effects of the

QQE benefited neighboring economies even if the yen depreciated substantially.

2. The Estimation

To investigate what effects the QQE had on neighboring economies, the following sections explore how stock markets in East Asia reacted to the yen's depreciation under the new regime. In the analysis, we examine how the stock price in an East Asian economy changed when the yen depreciated. Specifically, we estimate the following equation with constant term:

$$(1)\quad \Delta log\ SP_{j,t} = \sum_{j=0}^{2} \alpha_j \Delta ln(Yen_{t-j}) + \sum_{j=1}^{2} \beta_j \Delta USBond5_{t-j} + \sum_{j=1}^{2} \gamma_j \Delta USBond10_{t-j} + \sum_{j=0}^{2} \delta_j \Delta ln(China_{t-j}) + \sum_{j=1}^{2} \theta_j \Delta ln(SP_{j,t-j}) + \sum_{j=1}^{2} \varphi_j \Delta ln(EX_{j,t-j}),$$

where $SP_{j,t}$ = country j's stock price, Yen_t = the yen's exchange rate denominated in the US dollar, $USBond5_t$ = US 5-year government bond yield, $USBond10_t$ = US 10-year government bond yield, $China_t$ = China's stock price, and $EX_{j,t}$ = country j's exchange rate denominated in the US dollar. Subscript t denotes time period. $\Delta ln(X_t)$ means logged difference of X_t.

Since Yen_t increases when the yen depreciates against the US dollar, its coefficient α_j would take negative (positive) sign if the yen's depreciation has a negative (positive) spillover effect on country j's stock price. The main focus in the following empirical analysis is which sign the coefficient α_j takes in East Asian economies. The yen's exchange rate is, however, changed by various exogenous factors. Since our focus is the effect of the yen's depreciation caused by Japan's unconventional monetary policy, we proxy $\Delta ln(Yen_{t-j})$ by the intra-daily change of the yen-dollar rate in Tokyo daytime, that is, the change of the yen-dollar rate from 9am in Tokyo time to 5pm in Tokyo time.[3] To the extent that the exchange rate responds to unanticipated news instantaneously, it is natural that all unanticipated news on Japan's

[3] Fukuda (2016) shows that the yen-dollar rate in Tokyo nighttime had very different features from that in Tokyo daytime.

unconventional monetary policy are reflected in the intra-daily change of the yen-dollar rate because the BOJ announces its policy in Tokyo daytime.[4]

In equation (1), we include various control variables to avoid spurious correlation caused by other external shocks. The first group of control variables are US government bond yields, that is, $USBond5_t$ and $USBond10_t$. Due to the QE policy by FRB, US short-term interest rates hit its zero bound after the GFC. But US long-term interest rates remained significantly positive even under the QE policy. It is thus likely that declines in $USBond5_t$ and $USBond10_t$ reflect expansion of the US unconventional monetary policy. Their coefficient would take positive (negative) sign if the expansion of the US QE policy has a negative (positive) spillover effect on country j's stock price. The second control variable is the stock price index in China (i.e, Shanghai SSEC) which is denoted by $China_t$. In the 2000s, most of the East Asian economies tightened linkage with the Chinese economy dramatically. It is thus likely that spillover effects of the Chinese stock market on East Asian stock markets became substantial. The coefficient δ_j would take positive sign if boom in the Chinese stock market has a positive spillover effect on country j's stock price. The third group of control variables are lagged values of the country j's stock price $SP_{j,t}$ and the country j's exchange rate $EX_{j,t}$. The variables reflect local shocks in country j.[5] In particular, the country j's exchange rate removes spurious correlation between the yen and the country j's stock price that may have arisen when the country j's exchange rate synchronized with the yen. To the extent that the currency devaluation had a positive effect on its local economy, the coefficient φ_j would take positive sign.

We took two-business day lags for all of the explanatory variables and estimated equation (1) with constant term. The sample period of estimation is from January 2, 2012 to December 31,

[4] From January 2010 to December 2015, the BOJ announced all of its statements on monetary policy and other important policy decisions between 10am and 3pm in Tokyo time.

[5] In the Appendix, we estimate equation (1) including other local variables such as local interest rates and country j's CDS. But our main results did not change even if we include the additional local variables in the estimation.

2015. However, it is likely that equation (1) had some structural break(s) in the sample period. Thus, we estimate equation (1) allowing structural break(s). To identify structural break(s), we apply the Bai-Perron test whose test statistics was provided by Bai and Perron (2003). Unlike the Chow test which tests for regime change at a priori known date, the Bai-Perron test identifies multiple unknown break dates. Assuming 15% trimming and allowing error distributions to differ across breaks, we use it to explore multiple unknown break dates and their significance at 1% level.

All data in the estimation are daily data. Local exchange rates were downloaded from *Datastream*. All of the other data were downloaded from *Nikkei Financial Quest*. We explore the effect of the yen's exchange rate on the stock price index in seven Asian economies: South Korea, Indonesia, Malaysia, Singapore, Thailand, Taiwan, and Hong Kong.[6] The stock price indexes used in the following analysis are Seoul Composite Index, Indonesia Jakarta Composite Index, Malaysia KLSE Composite Index, Singapore (SES) Strait Times Index, Thailand SET-Index, Taiwan Weighted Price, and Hong Kong Hang Seng Stock Index.

3. The Estimation Results

3-1. Structural break(s)

Table 3 summarizes the estimation results for seven Asian economies. For each economy, the second line in the table shows the sub-sample periods identified by the Bai-Perron structural break test. In all of the economies, the test identified either one or two significant structural breaks: one structural break in South Korea, Malaysia, Indonesia, Singapore, Taiwan, and Hong Kong, and two structural breaks in Thailand.

The identified dates of structural break(s) varied across the economies. However, except for Indonesia, Malaysia, and Hong Kong, the test identified a structural break between late May in

[6] We excluded China from the sampled economies because the reverse causality from the Chinese economy to the Japanese economy is more likely to happen in equation (1).

2013 and August in 2013. The sub-sample period before late May in 2013 includes the Abenomics' early phase during which the BOJ announced the 2% inflation target on January 22 in 2013 and started the QQE on April 4 in 2013. This implies that in most of the East Asian stock markets, the market responses at the early phase of Abenomics were different from those at the following phases of Abenomics.

The test also identified a structural break in Indonesia, Malaysia, Thailand, and Hong Kong either in 2014 or in early 2015. Around the structural break dates, the BOJ announced extending of the QQE on October 31 in 2014, while FRB announced tapering of QE3 on December 18 in 2013 and ending of QE3 on October 29 in 2014. Consequently, the yen-dollar rate, which had been relatively stable from late May in 2013 to August in 2014, showed substantial depreciation after September in 2014. It is likely that the structural break reflected the monetary policy changes in Japan and in the United States.

3-2. The effects of yen's depreciation

The main purpose of our analysis is to explore what spillover effects the Japan's unconventional monetary policy had on stock prices in the East Asian economies. Since the yen depreciated dramatically when Abenomics introduced the new policy regime, it is very important to see which sign the coefficient of $\Delta ln(Yen_{t-j})$ takes in equation (1) and how it evolves overtime for various stock price indexes in East Asian Economies.

Table 3 indicates that the coefficient of $\Delta ln(Yen_{t-j})$ before the first structural break is in marked contrast with that after the first structural break in the East Asian economies. That is, in the estimation period I, the sum of the coefficients, that is, $\sum_{j=0}^{2} \alpha_j$, was negative in all East Asian stock markets except in Hong Kong: -0.29 in South Korea, -0.05 in Indonesia, -0.07 in Malaysia, -0.08 in Singapore, -0.10 in Thailand, -0.10 in Taiwan, and 0.01 in Hong Kong. Although most of the coefficients were statistically insignificant, one of the coefficients was

significantly negative in South Korea, Singapore, Taiwan, and Hong Kong. However, in the estimation period II, the sum of the coefficients took large positive values in all East Asian stock markets: 0.37 in South Korea, 0.52 in Indonesia, 0.30 in Malaysia, 0.27 in Singapore, 0.59 in Thailand, 0.53 in Taiwan, and 0.40 in Hong Kong. In particular, none of the coefficients was significantly negative except for Malaysia and Singapore. This implies that the yen's depreciation, which had weak negative spillover effects at the early phase of Abenomics, came to have large positive spillover effects on East Asian stock markets at the following phases of Abenomics.

At the early phase of Abenomics, several Asian emerging countries showed a serious concern about the yen's depreciation because it may have a beggar-thy-neighbor effect in the region. The estimation results before the first structural break may have reflected such a concern. However, our results indicate that such a concern disappeared as Abenomics progressed and that most East Asian stock markets came to welcome positive spillover effects of the Japan's unprecedented unconventional monetary policy at the following phases of Abenomics.

3-3. The effects of US QE

Unlike the effect of the yen-dollar rate, the effects of the US government bond yields (i.e., $\Delta USBond5_{t-j}$ and $\Delta USBond10_{t-j}$) on the stock prices did not show clear-cut structural break(s) in any East Asian economies. But throughout the whole sample period, the coefficient of the 5-year government bond yield $\Delta USBond5_{t-j}$ tends to be negative for j = 1, 2, while that of the 10-year government bond yield $\Delta USBond10_{t-j}$ tends to be positive for j = 1, 2 in all of the East Asian stock markets.

Under conventional monetary policy where short-term interest rates are positive, it is likely that $USBond5_t$ declines more than $USBond10_t$ when FRB loosens its monetary policy. The negative sign of $\Delta USBond5_{t-j}$ thus implies that expansion of FRB's conventional policy might have a positive spillover effect on East Asian stock markets. However, under unconventional

monetary policy, there was little room for $USBond5_t$ to decline. Thus, $USBond10_t$ declined more than $USBond5_t$ as FRB expanded its QE policy. The positive sign of $\Delta USBond10_{t-j}$ thus implies that expansion of FRB's unconventional QE policy might have a negative spillover effect on East Asian stock markets.

3-4. The other effects

Except in the estimation period II in Malaysia, the effect of the current China's stock price (i.e., $\Delta ln(China_t)$) was significantly positive in all East Asian stock markets throughout the whole sample period. This reflects strong instantaneous linkage of the East Asian economies with the Chinese economy. However, the estimation result indicates that the positive spillover effect tends to be smaller after the structural break in most of the East Asian stock markets. The diminished effect may reflect excess volatility of China's stock prices accompanied by slowdown of China's growth rate in the following period.

Regarding the effects of lagged dependent variables, they were significantly positive in Indonesia, Malaysia, and Hong Kong, suggesting some persistency in their stock prices. But the constant term and lagged dependent variables were not significantly different from zero in most of the other East Asian stock markets. This implies that their stock prices were rather unpredictable when we control external shocks.

More interestingly, the coefficients of $\Delta ln(EX_{j,t-j})$ tended to take negative sign in many of the East Asian economies. In particular, the coefficient of $\Delta ln(EX_{j,t-j})$ was significantly negative in Indonesia, Malaysia, Singapore, and Hong Kong before the structural break and in South Korea, Singapore, Taiwan, and Hong Kong after the structural break. This implies that unlike conventional wisdom, local currency depreciation did not improve the local stock price in the East Asian economies in our sample period. The results are, however, not robust in alternative specifications. In section 5, we show that most of the coefficients of $\Delta ln(EX_{j,t-j})$ became

statistically insignificant when we include extra variables.

4. Why Did the Japan's QQE Have Smaller Beggar-thy-neighbor Effect?

In the last section, we found that stock markets in East Asia, which had initially shown weakly negative responses to the yen's depreciation, came to respond positively as the QQE progressed. This implies that the Japan's QQE had a much smaller beggar-thy-neighbor effect than what was originally expected. The purpose of this section is to investigate why the Japan's QQE had such a smaller beggar-thy-neighbor effect in the seven Asian economies: South Korea, Indonesia, Malaysia, Singapore, Thailand, Taiwan, and Hong Kong.

The hypothesis we explores in this section is that the Japan's QQE had no beggar-thy-neighbor effect because positive spillover effect of Japan's stock market recovery dominated beggar-thy-neighbor effect of yen's depreciation. The QQE caused not only substantial yen's depreciation but also substantial stock price recovery in Japan. Since stock price recovery has a positive spillover effect on neighboring economies, this implies that the QQE could have both negative and positive spillover effects on neighboring economies. Thus, to the extent that the positive spillover effect dominated the beggar-thy-neighbor effect, the total effects of the QQE would have benefited neighboring economies even if it is accompanied by substantial yen's depreciation (Figure 3).

By using the same data set in the last section, the following analysis tests this hypothesis. To allow spillover effect of Japan's stock market recovery, we estimate the following equation with constant term:

$$
\begin{aligned}
(2)\quad \Delta log\, SP_{j,t} = {} & \sum_{j=0}^{2} \alpha_j \Delta ln(Yen_{t-j}) + \sum_{j=0}^{2} \phi_j \Delta ln(JSP_{t-j}) \\
& + \sum_{j=1}^{2} \beta_j \Delta USBond5_{t-j} + \sum_{j=1}^{2} \gamma_j \Delta USBond10_{t-j} + \sum_{j=0}^{2} \delta_j \Delta ln(China_{t-j}) \\
& + \sum_{j=1}^{2} \theta_j \Delta ln(SP_{j,t-j}) + \sum_{j=1}^{2} \varphi_j \Delta ln(EX_{j,t-j}),
\end{aligned}
$$

where JSP_t = Japan's stock price index (that is, Nikkei 225 index). The definitions of the other variables are the same as those in the previous sections.

Except that we added current and lagged values of the Japan's stock price index, that is, $\Delta ln(JSP_{t-j})$ for j = 0, 1, and 2, as explanatory variables, equation (2) is the same as equation (1). But its coefficient ϕ_j would take positive sign if Japan's stock market recovery has positive spillover effect on the neighboring economies. In contrast, the coefficient α_j would be negative if the yen's depreciation has a negative spillover effect on country j's stock price when we allow the effect of $\Delta ln(JSP_{t-j})$ for j = 0, 1, and 2.

We took two-business day lags for the explanatory variables and estimated equation (2) for the same sub-sample periods as those in Table 3.[7] The daily data of Nikkei 225 index is downloaded from *Nikkei Financial Quest*. Table 4 summarizes the estimation results for the seven Asian economies. It indicates that the US government bond yields (i.e., $\Delta USBond5_{t-j}$ and $\Delta USBond10_{t-j}$), the China's stock price (i.e., $\Delta ln(China_{t-j})$), and the local exchange rate (i.e., $\Delta ln(EX_{t-j})$) had essentially the same impacts on the East Asian stock prices as those in Table 3 even if we added current and lagged values of the Japan's stock price index as explanatory variables.

However, the coefficients of the Japanese yen (i.e., $\Delta ln(Yen_{t-j})$) had very different features from those in Table 3. First, in the estimation period I, the sum of the coefficients, that is, $\sum_{j=0}^{2} \alpha_j$, took large negative values in all East Asian economies: : -0.78 in South Korea, -0.42 in Indonesia, -0.25 in Malaysia, -0.53 in Singapore, -0.58 in Thailand, -0.55 in Taiwan, and -0.47 in Hong Kong. Even in Table 3, the sum of the coefficients was negative in the estimation period I. However, its magnitude became much larger when we add current and lagged values of the Japan's stock price index. Secondly, in the estimation period II, the sum of the coefficients

[7] In case of Thailand, we consolidated the estimation periods II and III.

turned into negative in most of the East Asian economies: -0.20 in South Korea, -0.13 in Malaysia, -0.19 in Singapore, and -0.57 in Hong Kong. Even in Indonesia, Thailand, and Taiwan where the sum of the coefficients were positive, its absolute value was much smaller in Table 4 than in Table 3. This implies that when we allow the effects of Japan's stock market recovery, the yen's depreciation no longer had large positive spillover effects on East Asian stock markets even in the following periods of Abenomics.

In contrast, the effect of the current Japan's stock price (i.e., $\Delta ln(JSP_{t-j})$) was significantly positive in all East Asian stock markets throughout the two sub-sample periods. The sum of the coefficients, that is, $\sum_{j=0}^{2} \phi_j$, exceeded 0.2 in most of the East Asian economies, suggesting strong positive spillover effect from Japan's stock market recovery to the East Asian stock markets. The positive spillover effect reflected strong instantaneous linkage of the East Asian stock markets with the Japanese stock market.

At the beginning of Abenomics, the positive spillover effect rarely dominated the negative spillover effect because the markets considered that the yen's depreciation had large beggar-thy-neighbor effect. Thus, in the estimation period I, the total effects of the Japan's QQE on local stock prices were negative in most of the East Asian economies. However, as the QQE progressed, the markets started to observe that the beggar-thy-neighbor effect of the yen's depreciation was, if any, small. Thus, in the estimation period II, the total effects of the QQE on the local stock prices became positive in all of the East Asian economies. The results in the estimation period II support our hypothesis that the Japan's QQE benefited neighboring economies because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region as Abenomics progressed.

5. Robustness

In previous sections, we found that stock markets in East Asia, which had initially shown

negative responses to the yen's depreciation, came to respond positively as the QQE progressed. We also found that this happened because the spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region as Abenomics progressed. The purpose of this section is to investigate its robustness when we include global market risk and extra local variables as explanatory variables. The global risk variable we used in the following analysis is the Chicago Board Options Exchange Volatility Index (VIX) which is a popular measure of the implied volatility of S&P 500 index options. The extra local variables we used in the following analysis are "10-year sovereign CDS" and "overnight interest rate". Including many explanatory variables may raise a concern for multicollinearity in the regressions. Moreover, these new local variables are not ideal explanatory variables because financial markets are illiquid in emerging Asian economies. Some of their daily data are very sticky for a long period. But often referred to as the fear index, the VIX represents a measure of the global market's expectation of volatility over the next 30-day period. In addition, "10-year sovereign CDS" may reflect long-run risk in each economy, while "overnight interest rate" may reflect the monetary policy in each economy.

By using the same data set in previous sections, the following analysis estimates equations (1) and (2) with these extra variables for six Asian economies: South Korea, Indonesia, Malaysia, Singapore, Thailand, and Taiwan.[8] Specifically, we estimate the following equation with constant term:

$$
\begin{aligned}
(3)\quad \Delta log\, SP_{j,t} = {} & \sum_{j=0}^{2} \alpha_j \Delta ln(Yen_{t-j}) + \sum_{j=0}^{2} \phi_j \Delta ln(JSP_{t-j}) \\
& + \sum_{j=1}^{2} \beta_j \Delta USBond5_{t-j} + \sum_{j=1}^{2} \gamma_j \Delta USBond10_{t-j} + \sum_{j=0}^{2} \delta_j \Delta ln(China_{t-j}) \\
& + \sum_{j=1}^{2} \eta_j \Delta VIX_{t-j} + \sum_{j=1}^{2} \theta_j \Delta ln(SP_{j,t-j}) + \sum_{j=1}^{2} \varphi_j \Delta ln(EX_{j,t-j}) \\
& + \sum_{j=0}^{2} \lambda_j \Delta ln(CDS_{j,t-j}) + \sum_{j=0}^{2} \rho_j \Delta ln(ONRate_{j,t-j}),
\end{aligned}
$$

[8] To save the space, we dropped Hong Kong from the sample in this section.

where VIX_t = the Chicago Board Options Exchange Volatility Index (VIX), $CDS_{j,t}$ = country j's 10-year sovereign CDS and $ONRate_{j,t}$ = country j's overnight interest rate. The definitions of the other variables are the same as those in equations (1) and (2).

We took two-business day lags for the explanatory variables and estimated equation (3) for the same sub-sample periods as those in Table 3. However, when there are multiple breaks, we merged the latter sub-periods into a single sub-period. The daily data of VIX, 10-year sovereign CDS', and overnight interest rates are downloaded from *Datastream*.[9] Table 5 summarizes the estimation results for the six Asian economies. It reports the estimation results with and without current and lagged values of the Japan's stock price (i.e., $\Delta ln(JSP_{t-j})$).

Because of possible multicollinearity, some of the control variables became less significant when we added the extra local variables in Table 5. In particular, the coefficient of $\Delta ln(EX_{j,t-j})$, which tended to be significantly negative in Tables 3 and 4, became statistically insignificant in most of the East Asian economies. The overnight interest rate was not significant in most of the regressions, while 10-year sovereign CDS was not significant in Singapore and Taiwan. However, VIX was significantly negative in almost all of the regressions. More importantly, most of the explanatory variables, especially the key variables, $\Delta ln(Yen_{t-j})$ and $\Delta ln(JSP_{t-j})$, had essentially similar impacts on the East Asian stock prices to those in Tables 3 and 4 even if we added the extra explanatory variables.

Without current and lagged values of $\Delta ln(JSP_{t-j})$ as explanatory variables, Table 5 replicated the estimations results in section 3. That is, in all of the East Asian stock markets, the sum of the coefficients of $\Delta ln(Yen_{t-j})$ was negative in the estimation period I, while it took large positive value in the estimation period II. This implies that even if we allow the effect of VIX and two extra local varibales, the stock markets in East Asia, which had first reacted to the yen's

[9] In Singapore, 10-year sovereign CDS never changed in the estimation period II. We thus used sovereign CDS of Singapore Power Ltd. in the estimation period II.

depreciation negatively, came to respond positively as the QQE progressed when we do not allow the positive spillover effect of Japan's stock price recovery.

Even when we include current and lagged values of $\Delta ln(JSP_{t-j})$ as explanatory variables, Table 5 replicated the estimations results in section 3 in the estimation period I. That is, in the estimation period I with current and lagged values of $\Delta ln(JSP_{t-j})$, the sum of the coefficients of $\Delta ln(Yen_{t-j})$ took large negative values, while that of $\Delta ln(JSP_{t-j})$ took positive value in all of the East Asian stock markets. This implies that the Japan's QQE, which caused the dramatic yen's depreciation, had both negative and positive spillover effects on neighboring economies. However, in the estimation period II, that of $\Delta ln(Yen_{t-j})$ was positive except in Singapore even when we include current and lagged values of $\Delta ln(JSP_{t-j})$, although the sum of the coefficients of $\Delta ln(JSP_{t-j})$ was positive except in Thailand. The feature is in marked contrast with that in Table 4. The result more strongly supports our view that the stock markets in East Asia came to respond positively as the QQE progressed. But it is not consistent with our hypothesis that the Japan's QQE had no beggar-thy-neighbor effect because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect of yen's depreciation. This happened because including many extra explanatory variables may have caused multicollinearity and made the estimation results unstable in the regressions. Unlike in the estimation period I, most of the coefficients of $\Delta ln(Yen_{t-j})$ were not statistically significant in the estimation period II when we include current and lagged values of $\Delta ln(JSP_{t-j})$ in Table 4.

6. Alternative Reasons

6-1. Japan's exports

In previous sections, we explored what spillover effects the QQE had on East Asian economies. We found that the stock markets in East Asia, which had first reacted to the yen's depreciation negatively, came to show positive responses as the QQE progressed. In particular,

we demonstrated that the QQE could benefit the East Asian economies because positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect of yen's depreciation in the region. However, even if we allow the positive spillover effect, the yen's depreciation had very limited beggar-thy-neighbor effects on East Asian stock markets as the QQE progressed. The purpose of this section is to explore another reasons on why the QQE had much smaller beggar-thy-neighbor effects than what was originally concerned about. Specifically, this section reports two types of stylized facts that may explain why the QQE had limited beggar-thy-neighbor effects.

One type of stylized facts is how Japan's exports changed when the yen depreciated substantially under Abenomics. Figure 4 depicts Japan's exports in terms of their yen-denominated amount, their dollar-denominated amount, and their volume from January 2011 to January 2016. Soon after the new regime started, Japan's exports made modest improvement from January 2013 to March 2013. However, after March 2013, the improvement did not persist even if the Japanese yen remained weak. The amount of yen-denominated exports increased on average. But we can see no significant increases in the volume. More importantly, the amount of dollar-denominated exports showed significant declines on average after Abenomics started.

The results are essentially the same even for Japan's exports to Asian emerging economies. Figure 5 depicts the dollar-denominated amount of Japan's exports to Asia, South Korea, and China from January 2011 to February 2016. The exports increased soon after Abenomics started in December 2012 and after the BOJ expanded the QQE at the end of October 2014. But the improvement was modest. More importantly, the improvement did not persist even if the yen depreciated substantially. The dollar-denominated amount of Japan's exports to Asia on average rather declined after Abenomics started.

The declined exports accompanied by increased imports deteriorated Japan's current account

surplus in the same period. This is especially true for international trade with Asian countries. Figure 6 depicts Japan's yen-denominated trade balanced with Asia from January 2010 to February 2016. In pre-Abenomics period, Japan had large trade surplus against Asian countries except in February 2012. But the trade account against Asian countries turned into deficit in January 2013 and remained almost balanced since then. As a result, Japan's external imbalances were largely reduced in the Abenomics period. Despite a serious concern, the trade balance statistics shows that the yen's depreciation did not have a beggar-thy-neighbor effect in the region. It is likely that this made East Asian people's concern for the yen's depreciation smaller as the QQE progressed.

One may argue that weak external demand in the world economy may explain why Japan's exports did not increase even if the yen depreciated substantially. The US economy accomplished relatively fast recovery from the GFC. But European economies remained weak after the Euro crisis, while emerging economies, especially China, slowed down their growth rates since 2012. Thus, overall demand in the world economy was weak, which resulted in weak demand for Japanese export goods.[10] However, even comparing exports in other countries, the amount of Japan's exports declined more substantially after the new policy regime started. Figure 7 depicts Japan's exports, world total exports, and aggregated exports in advanced economies from January 2011 to January 2016. All of them are denominated in the US dollar. In pre-Abenomics period when the yen was very strong, we can see no significant difference among them. But after late 2012, both world total exports and aggregated exports in advanced economies only showed limited decline, while Japan's exports declined significantly.

6-2. Exchange rates in East Asian countries

The second type of stylized facts is how exchange rates in East Asian countries changed after

[10] The world growth rate which was around 5% in 2010 declined to around 2.5% in 2013. In particular, China's growth rate which was over 10% in 2010 became less than 8% in 2012.

the yen-dollar rate depreciated dramatically under Abenomics. As was seen in Figure 2, the yen-dollar rate, which had been around 80 yen per dollar in 2012, depreciated to 102 yen per dollar on May 15, 2013. The expansion of the QQE on October 31 in 2014 led to further depreciation of the Japanese yen. The purpose of this sub-section is to explore how the exchange rates in East Asian economies responded to the yen's dramatic depreciation under the Japan's unconventional monetary.

Figure 8 depicts accumulated exchange rate changes against the US dollar in the currencies of Japan and of eight East Asian economies: China, South Korea, Indonesia, Malaysia, Singapore, Thailand, Taiwan, and Philippines. The sample period is from November 15, 2012 to October 16, 2015. In the figure, we divide the sample period into the three sub-sample periods: (i) from November 15, 2012 to May 31, 2013, (ii) from June 1, 2013 to August 29, 2014, and (iii) from September 1, 2014 to December 31, 2015. In each sub-sample period, we normalized the initial value to be 100 and see how accumulated exchange rate changes evolved during the sub-sample period.

The first sub-sample period (i) is the early phase of Abenomics when the introduction of unprecedented unconventional policy was announced. In the figure, we find remarkable asymmetry between the Japanese yen and the other East Asian currencies. That is, the Japanese yen depreciated by nearly 25%, while the other East Asian currencies depreciated only modestly. Consequently, the Japanese yen depreciated not only against the US dollar but also against the other East Asian currencies for the first sub-sample period. Before Abenomics started, the yen had remained very strong against the other East Asian currencies.[11] We may interpret that the yen's depreciation at the early phase of Abenomics is an adjustment process of such excess appreciation of the yen that had occurred in the pre-Abenomics period.

The second sub-sample period (ii) corresponds to the period when the yen remained relatively

[11] For example, from July 2 2007 to December 30 2011, the yen appreciated against the US dollar by 37%, while the Korean Won depreciated against the US dollar by 24%.

stable against the US dollar. The yen was stable because the BOJ released no additional news on its unconventional policy during the sub-period. Among the East Asian currencies, Indonesia Rupia depreciated by 20%, while Korean Won appreciated by 10%. However, the other East Asian currencies were relatively stable against the US dollar. Consequently, the Japanese yen was relatively stable against most of the other East Asian currencies for the sub-sample period. After the excess appreciation was adjusted, the yen had been stable until the BOJ took an additional policy action.

The third sub-sample period (iii) corresponds to the period when the yen showed another substantial depreciation against the US dollar. At the beginning of the period, the BOJ expanded the QQE. But unlike for the first sub-sample period, we can see no conspicuous asymmetric changes between the yen and the other East Asian currencies for the third sub-sample period. Depreciation was modest in the Chinese Yuen. But the other East Asian currencies depreciated substantially. In particular, Indonesia Rupia depreciated by more than 30% and Malaysia Ringgit depreciated by nearly 20%. On December 18, 2013, FRB announced tapering of QE3. It is likely that this caused synchronized depreciation in the East Asian currencies and the yen.

Table 6 reports how the value of the yen changed against eight East Asian currencies after the GFC. The table normalized the value on July 2, 2007 to be 100 and shows the yen's value on the three specific dates in the Abenomics period: December 31, 2013, December 31, 2014, and December 31, 2015. Noting that smaller value means yen's depreciation again the East Asian currency, we can see that after the GFC, the Chinese Yuen appreciated against the yen by more than 10% and that the Singapore Dollar appreciated against the yen by nearly 5%. However, no other East Asian currencies show such significant appreciation against the yen after the GFC. This implies that once we allow the fact that the yen was very strong against the other East Asian currencies in the pre-Abenomics period, the yen's depreciation in the Abenomics period did not necessarily mean weak yen against East Asian currencies. This may also explain why the

yen's depreciation had limited beggar-thy-neighbor effects in the region.

7. Concluding Remarks

In this paper, we explored what spillover effects the QQE had on East Asian economies. After Prime Minister Abe advocated the new policy regime, the yen's substantial depreciation raised a concern that it would have a beggar-thy-neighbor effect in the region. However, contrary to the initial concern, our empirical results indicated that the stock markets in East Asia, which had first reacted to the yen's depreciation negatively, came to show positive responses as the QQE progressed. This implies that the Japan's QQE had much smaller beggar-thy-neighbor effects than what was originally concerned about. Our empirical results also supported a view that this happened because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region as the QQE progressed.

However, it is worthwhile to be noted that even if we allow the positive spillover effect, the yen's depreciation had very limited beggar-thy-neighbor effects on East Asian stock markets as the QQE progressed. Section 6 discussed two stylized facts that may explain the reasons. But we may point out two other reasons. One is the increased role of supply chain in East Asia. In the 2000s, a number of Japanese corporations shifted their plants from home to East Asia. It is likely that a beggar-thy-neighbor effect of the Japan's monetary policy was very small under increasing overseas production of Japanese corporations. In literature, Fukuda and Doita (2016) showed that Japan's exports remained weak even when the yen depreciated substantially because of weak external demand and increased overseas production. In their model, a change of the exchange rate had no effect on exports because of fixed costs for shifting the plant location across the countries. Their paper confirmed that the model could track Japan's exports reasonably well especially after the new policy regime started.

The other is limited role of the yen as an international currency. In East Asia, the US dollar is

dominant international currency. Thus, highly accommodative monetary policy in the United States could have large impacts on the rest of the world, including emerging Asian economies. In contrast, the internationalization of the Japanese yen has been limited even in Asian region. This may imply that unlike the US unconventional policy, the Japan's unconventional monetary policy had limited negative spillover effect on Asian economies.

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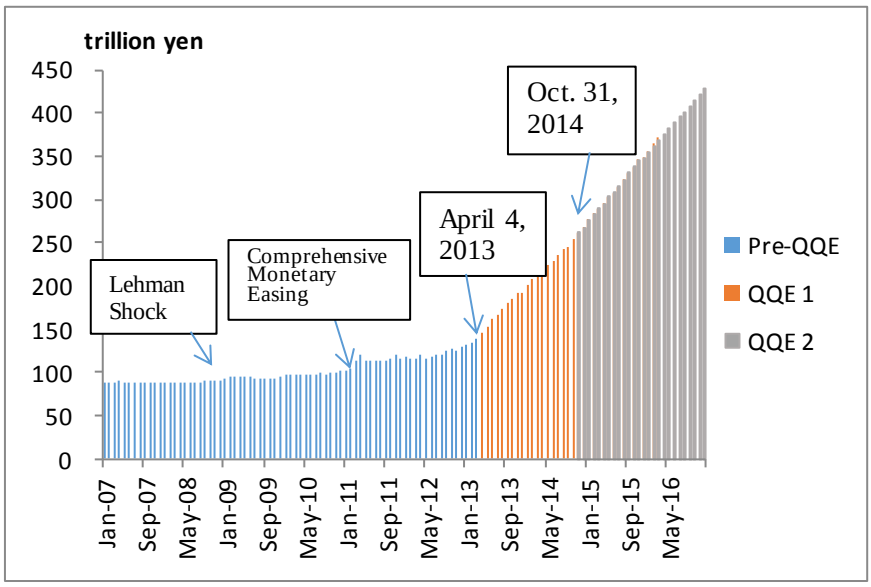
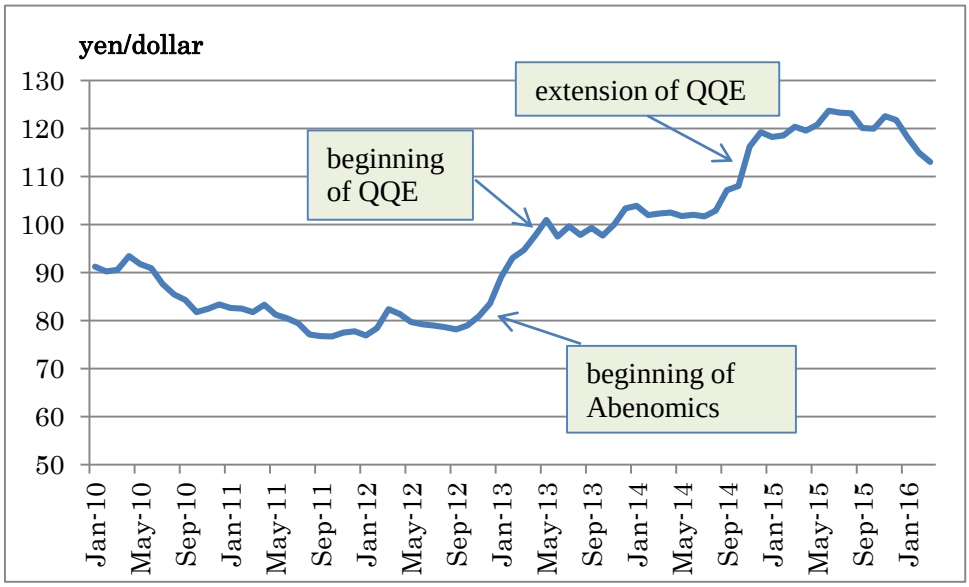
Figure 1. Base Money in Japan



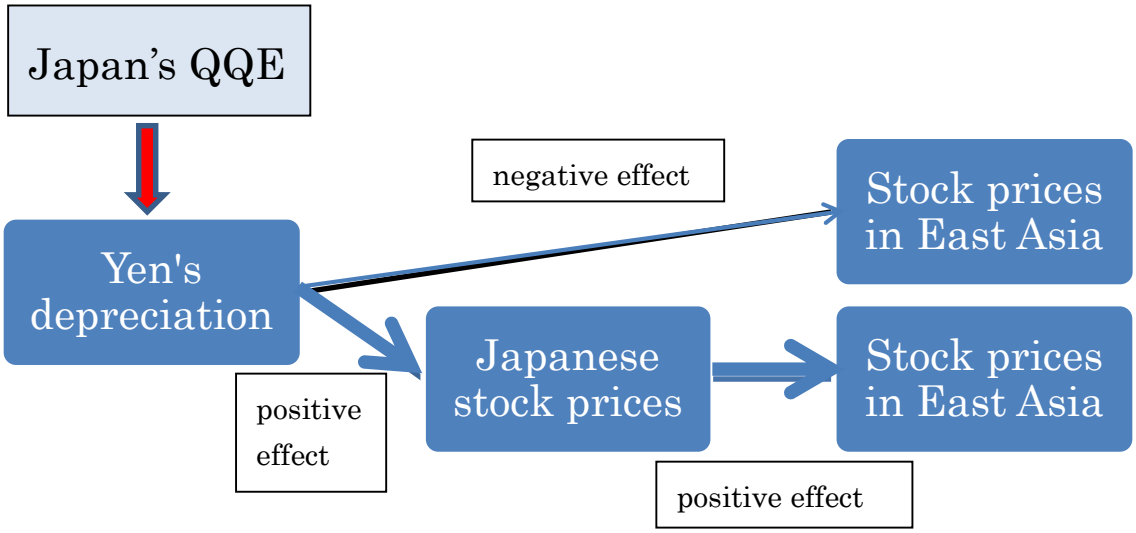
Source: Bank of Japan.

Figure 2. The Yen-dollar Exchange Rate before and after Abenomics



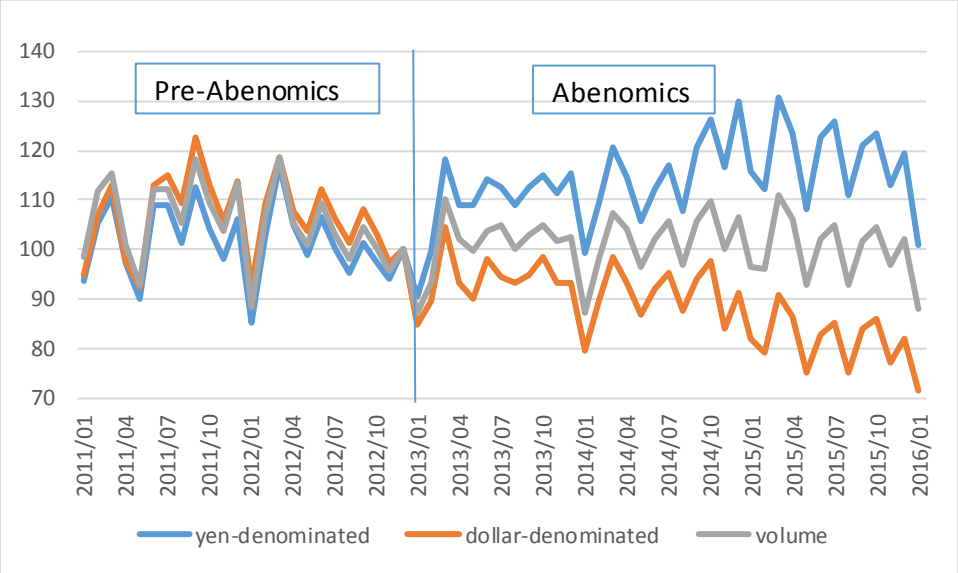
Source: Bank of Japan.

Figure 3. Direct and Indirect Effects of Yen's Depreciation on East Asian Stock Prices



Note: When the positive effect dominates the negative effect, the total effect of the yen's depreciation will have positive spillover effect on stock price in East Asia.

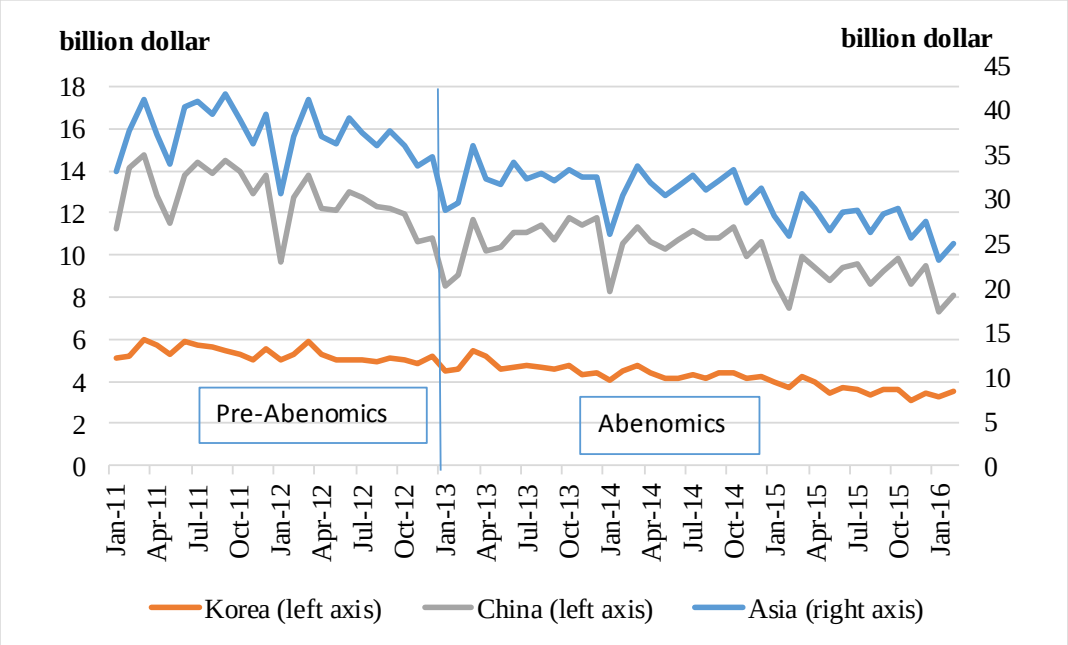
Figure 4. Japan's Exports from January 2011 to December 2014



Note) Each of the exports is normalized to be 100 in December, 2012.

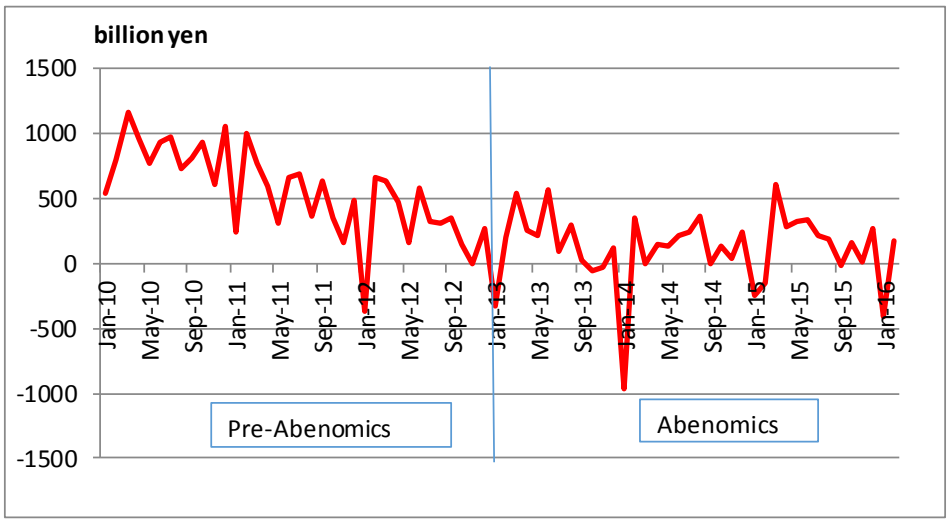
Source: Ministry of Finance, Trade Statistics of Japan. IMF, International Financial Statistics.

Figure 5. Japan's Exports to Asia, Korea, and China



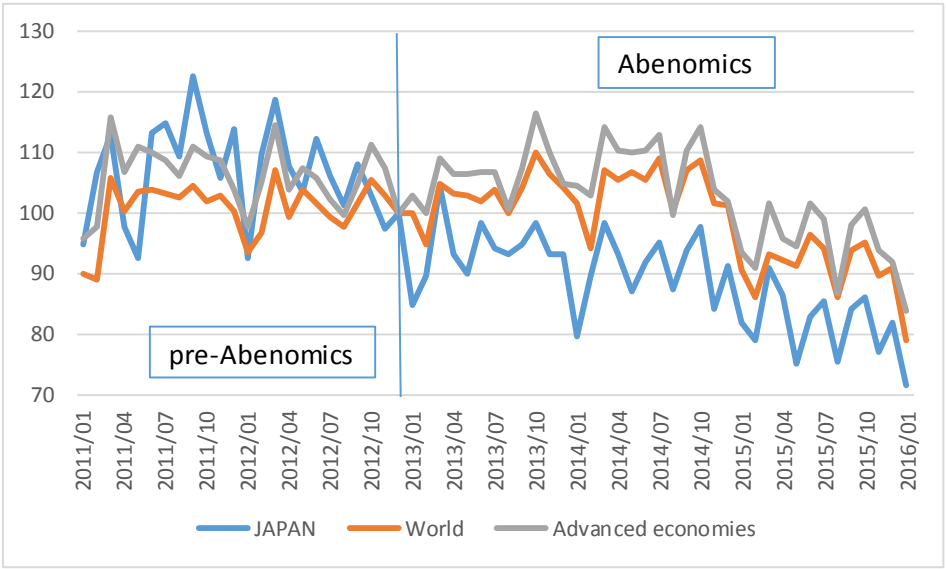
Source: Ministry of Finance, Trade Statistics of Japan.

Figure 6. Japan's Trade Balance with Asian Countries



Source: Ministry of Finance, Trade Statistics of Japan.

Figure 7. Dollar-denominated Exports in Japan and in Other Countries

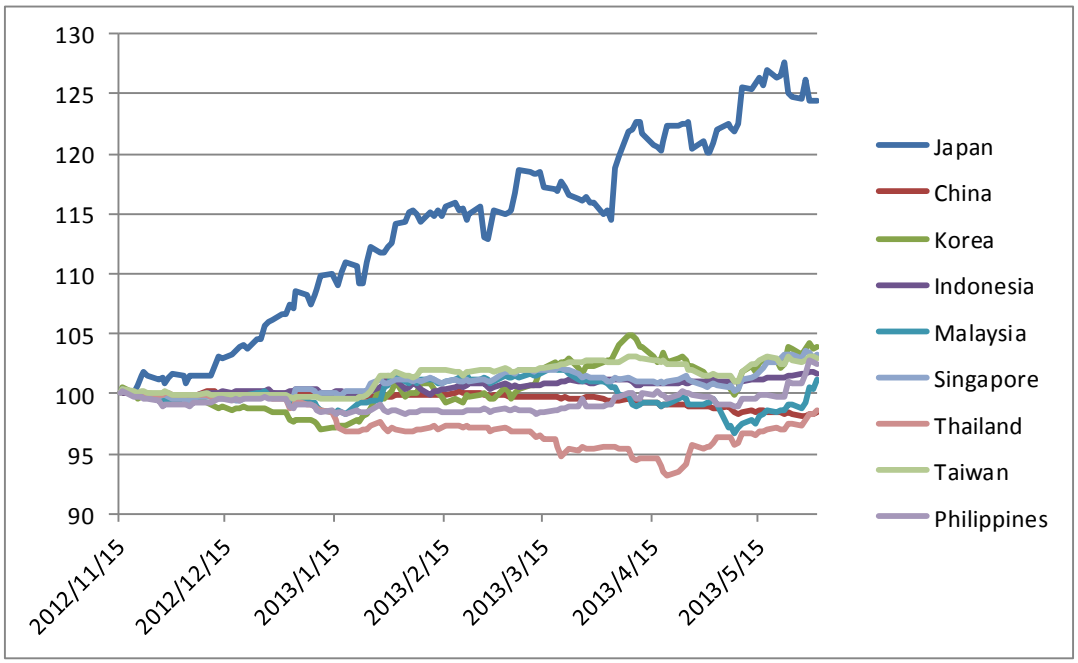


Note: Each of the exports is normalized to be 100 in December, 2012.

Source: IMF, International Financial Statistics.

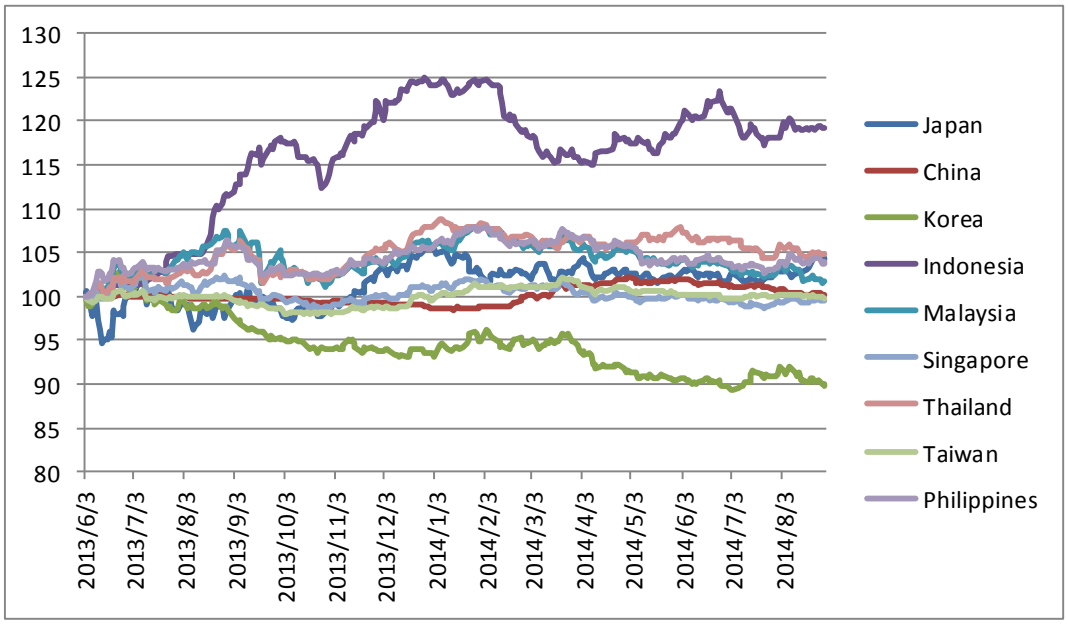
Figure 8. Accumulated Exchange Rate Changes in East Asia Currencies

(1) From November 15, 2012 to May 31, 2013.



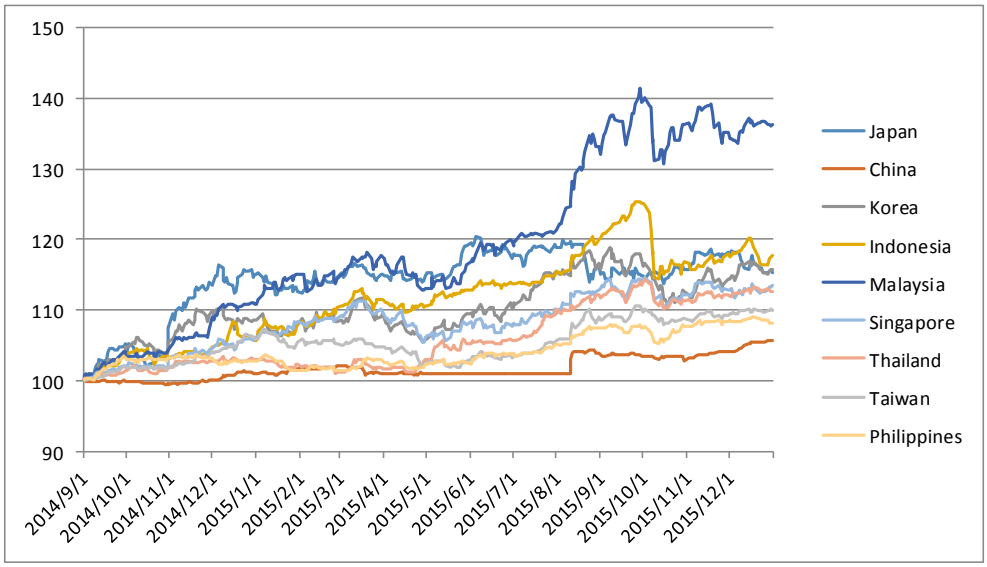
Note: We normalize the value on November 15, 2012 to be 100.

(2) From June 1, 2013 to August 29, 2014.



Note: We normalize the value on June 1, 2013 to be 100.

(3) From September 1, 2014 to December 31, 2015.



Note: We normalize the value on September 1, 2014 to be 100.

Table 1. Timeline of US Unconventional Monetary Policy

Date	Description	Category
25-Nov-08	The initial announcement of QE1 that the Federal Reserve would purchase up to $100 billion of agency debt and up to $500 billion of agency MBS.	QE1
18-Mar-09	The FOMC statement, which announced purchases of Treasury securities of up to $300 billion and increased the size of purchases of agency MBS and agency debt to up to $1.2 trillion and $200 billion, respectively.	QE1
31-Mar-10	Completion of QE1	
10-Aug-10	"To help support economic recovery in the context of price stability, the Committee will keep the Federal Reserve's holdings of securities at their current level by reinvesting principal payments from agency debt and agency mortgage-backed securities in longer-term Treasury securities."	QE2
3-Nov-10	QE2 announced. "[T]he Committee intends to purchase a further $600 billion of longer-term Treasury securities by the end of the second quarter of 2011, a pace of about $75 billion per month."	QE2
30-Jun-11	QE2 completed	
31-Aug-12	QE3 hinted: "The Federal Reserve will provide additional policy accommodation as needed to promote a stronger economic recovery and sustained improvement in labor market conditions in a context of price stability."	QE3
13-Sep-12	QE3 announced: "If the outlook for the labor market does not improve substantially, the Committee will continue its purchases of agency mortgage-backed securities, undertake additional asset purchases, and employ its other policy tools as appropriate." "will continue to maintain interest rates extremely lowuntil at least mid-2015."	QE3
22-May-13	Bernanke's testimony to Congress (known as "taper tantrum"): "In the next few meetings, we could take a step down in our pace of purchase."	Taper
19-Jun-13	Bernanke's press conference: "If we see continued improvement and we have confidence that that is going to be sustained, then in the next few meetings, we could take a step down in our pace of purchases."	Taper
18-Sep-13	Tapering delayed: "decided to wait a little longer to make sure the economy is conforming to" their positive economic outlook	
18-Dec-13	Tapering of QE3 announced	Taper
29-Oct-14	End of QE3 announced	
16-Dec-15	End of ZIRP: The FOMC statement, which decided to raise the target range for the federal funds rate to 1/4 to 1/2 percent.	

Note of Table 1: In the table, we categorize US unconventional monetary policy into QE1, QE2, QE3, and Taper.

Table 2. Timeline of Japan's Unconventional Monetary Policy

Date	Description	Governor
19-Dec-08	On Monetary Policy Decisions: Additional Measures regarding Money Market Operation Tools. Lowering of the Bank's target for the uncollateralized overnight call rate by 20 basis points; it will be encouraged to remain at around 0.1 percent.	Shirakawa
1-Dec-09	Enhancement of Easy Monetary Conditions. Intoruduction of a new funds-supplying operation: Fixed loan interest rate (the target for the uncollateralized overnight call rate: 0.1 percent). Three-month duration	Shirakawa
18-Dec-09	Clarification of the "Understanding of Medium- to Long-Term Price Stability". The midpoints of most Policy Board members' "understanding" are around 1 percent CPI inflation rate.	Shirakawa
5-Oct-10	Comprehensive Monetary Easing.	Shirakawa
15-Nov-12	Abe's announcement to conduct unlimited quantitative easing.	Shirakawa
20-Dec-12	Enhancement of Monetary Easing.	Shirakawa
22-Jan-13	The "2% Price Stability Target" under the Framework for the Conduct of Monetary Policy. Joint Statement of the Government and the Bank of Japan on Overcoming Deflation and Achieving Sustainable Economic Growth.	Shirakawa
4-Apr-13	Introduction of the "Quantitative and Qualitative Monetary Easing (QQE)".	Kuroda
31-Oct-14	Expansion of the Quantitative and Qualitative Monetary Easing (QQE).	Kuroda
29-Jan-16	Introduction of "Quantitative and Qualitative Monetary Easing (QQE) with a Negative Interest Rate"	Kuroda

Table 3. The Basic Estimation Results

(1) South Korea

	Estimation Period I			Estimation Period II		
	1/02/2012 - 8/01/2013			8/02/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_{t})$	0.14	1.29		0.21	2.10	***
$\Delta ln(Yen_{t-1})$	-0.38	-3.39	***	0.09	0.85	
$\Delta ln(Yen_{t-2})$	-0.05	-0.46		0.08	0.78	
$\Delta USBond(5)_{t-1}$	-0.12	-4.38	***	-0.02	-1.42	
$\Delta USBond(5)_{t-2}$	-0.09	-2.94	***	0.01	0.70	
$\Delta USBond(10)_{t-1}$	0.11	5.20	***	0.03	2.31	**
$\Delta USBond(10)_{t-2}$	0.07	3.08	***	0.00	-0.23	
$\Delta ln(China_{t})$	0.24	6.68	***	0.07	4.21	***
$\Delta ln(China_{t-1})$	0.00	-0.12		-0.01	-0.45	
$\Delta ln(China_{t-2})$	0.02	0.54		-0.01	-0.46	
Constant	0.00	0.14		0.00	0.11	
$\Delta ln(Stock_{t-1})$	-0.11	-1.88	*	0.01	0.20	
$\Delta ln(Stock_{t-2})$	0.02	0.43		0.00	0.02	
$\Delta ln(EX_{t-1})$	-0.09	-0.72		-0.17	-2.74	***
$\Delta ln(EX_{t-2})$	-0.01	-0.08		-0.04	-0.71	

(2) Indonesia

	Estimation Period I			Estimation Period II		
	1/02/2012 - 1/13/2014			1/14/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_{t})$	0.23	1.81	*	0.32	2.08	**
$\Delta ln(Yen_{t-1})$	-0.19	-1.51		0.11	0.72	
$\Delta ln(Yen_{t-2})$	-0.08	-0.65		0.08	0.53	
$\Delta USBond(5)_{t-1}$	-0.14	-5.00	**	-0.03	-1.18	
$\Delta USBond(5)_{t-2}$	-0.03	-1.09		-0.05	-2.28	**
$\Delta USBond(10)_{t-1}$	0.08	3.51	***	0.04	1.75	*
$\Delta USBond(10)_{t-2}$	0.02	0.70		0.05	2.39	**
$\Delta ln(China_{t})$	0.28	6.60	***	0.06	2.68	***
$\Delta ln(China_{t-1})$	-0.04	-0.85		0.02	1.01	
$\Delta ln(China_{t-2})$	-0.02	-0.49		-0.04	-1.89	
Constant	0.00	0.84	*	0.00	0.55	
$\Delta ln(Stock_{t-1})$	0.09	2.01	**	0.01	0.20	
$\Delta ln(Stock_{t-2})$	-0.02	-0.52		-0.05	-1.11	
$\Delta ln(EX_{t-1})$	-0.24	-1.69	*	-0.06	-0.59	
$\Delta ln(EX_{t-2})$	0.16	1.13		-0.07	-0.72	

(3) Malaysia

	Estimation Period I			Estimation Period II		
	1/02/2012 - 12/11/2014			12/12/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.09	1.75	*	0.46	3.06	***
$\Delta ln(Yen_{t-1})$	-0.08	-1.60		0.12	0.81	
$\Delta ln(Yen_{t-2})$	-0.07	-1.42		-0.29	-1.89	*
$\Delta USBond(5)_{t-1}$	-0.02	-2.47	**	-0.02	-0.76	
$\Delta USBond(5)_{t-2}$	0.00	-0.23		-0.03	-1.16	
$\Delta USBond(10)_{t-1}$	0.03	3.44	***	0.03	1.12	
$\Delta USBond(10)_{t-2}$	0.00	0.24		0.03	1.27	
$\Delta ln(China_t)$	0.10	6.14	***	-0.03	-1.42	
$\Delta ln(China_{t-1})$	-0.04	-2.57	**	0.02	1.38	
$\Delta ln(China_{t-2})$	0.01	0.57		-0.04	-2.18	**
Constant	0.00	0.95		0.00	0.16	
$\Delta ln(Stock_{t-1})$	0.07	1.93	**	0.15	2.31	**
$\Delta ln(Stock_{t-2})$	-0.01	-0.37		0.10	1.55	
$\Delta ln(EX_{t-1})$	-0.15	-3.05	***	-0.04	-0.59	
$\Delta ln(EX_{t-2})$	-0.01	-0.23		-0.05	-0.71	

(4) Singapore

	Estimation Period I			Estimation Period II		
	1/02/2012 - 7/23/2013			7/24/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.13	1.52		0.42	4.75	***
$\Delta ln(Yen_{t-1})$	-0.04	-0.44		0.06	0.68	
$\Delta ln(Yen_{t-2})$	-0.17	-1.92	*	-0.21	-2.29	**
$\Delta USBond(5)_{t-1}$	-0.09	-4.12	***	0.00	-0.15	
$\Delta USBond(5)_{t-2}$	-0.03	-1.31		0.00	0.29	
$\Delta USBond(10)_{t-1}$	0.08	4.55	***	0.01	1.07	
$\Delta USBond(10)_{t-2}$	0.02	1.05		0.01	0.56	
$\Delta ln(China_t)$	0.20	7.00	***	0.08	5.29	***
$\Delta ln(China_{t-1})$	-0.07	-2.22	**	-0.01	-0.74	
$\Delta ln(China_{t-2})$	0.01	0.36		-0.02	-1.61	
Constant	0.00	1.69	*	0.00	-0.71	
$\Delta ln(Stock_{t-1})$	-0.06	-1.10		0.03	0.79	
$\Delta ln(Stock_{t-2})$	-0.03	-0.67		0.06	1.36	
$\Delta ln(EX_{t-1})$	-0.22	-2.23	**	-0.26	-3.14	***
$\Delta ln(EX_{t-2})$	-0.10	-0.99		0.12	1.53	

(5) Thailand

	Estimation Period I			Estimation Period II			Estimation Period II		
	1/02/2012 - 5/15/2013			5/16/2013 - 1/15/2014			1/16/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.24	1.79	*	0.42	1.65	*	0.38	2.95	***
$\Delta ln(Yen_{t-1})$	-0.19	-1.40		-0.12	-0.46		0.06	0.44	
$\Delta ln(Yen_{t-2})$	-0.15	-1.13		0.29	1.08		0.03	0.21	
$\Delta USBond(5)_{t-1}$	0.00	-0.03		-0.12	-2.06	**	0.01	0.56	
$\Delta USBond(5)_{t-2}$	-0.03	-0.93		0.03	0.46		-0.03	-1.31	
$\Delta USBond(10)_{t-1}$	0.03	1.22		0.03	0.63		0.00	0.00	
$\Delta USBond(10)_{t-2}$	0.04	1.53		-0.06	-1.07		0.03	1.40	
$\Delta ln(China_t)$	0.13	3.23	***	0.28	2.73	***	0.06	3.40	***
$\Delta ln(China_{t-1})$	-0.03	-0.68		-0.13	-1.27		-0.01	-0.53	
$\Delta ln(China_{t-2})$	-0.02	-0.50		0.08	0.83		0.01	0.32	
Constant	0.00	2.83	**	0.00	-0.90		0.00	0.07	
$\Delta ln(Stock_{t-1})$	-0.03	-0.46		0.02	0.26		0.00	-0.10	
$\Delta ln(Stock_{t-2})$	0.08	1.50		-0.18	-2.10	**	0.03	0.70	
$\Delta ln(EX_{t-1})$	-0.02	-0.11		-0.11	-0.32		-0.05	-0.39	
$\Delta ln(EX_{t-2})$	0.26	1.70	*	0.13	0.43		-0.04	-0.34	

(6) Taiwan

	Estimation Period I			Estimation Period II		
	1/02/2012 - 7/30/2013			7/31/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.29	2.66	***	0.39	3.43	***
$\Delta ln(Yen_{t-1})$	-0.14	-1.26		0.15	1.33	
$\Delta ln(Yen_{t-2})$	-0.25	-2.20	**	-0.01	-0.12	
$\Delta USBond(5)_{t-1}$	-0.10	-3.47	***	0.00	0.21	
$\Delta USBond(5)_{t-2}$	-0.04	-1.46		0.02	1.33	
$\Delta USBond(10)_{t-1}$	0.09	4.30	***	0.01	0.30	
$\Delta USBond(10)_{t-2}$	0.02	1.08		-0.01	-0.53	
$\Delta ln(China_t)$	0.27	7.60	***	0.08	4.35	***
$\Delta ln(China_{t-1})$	-0.02	-0.46		0.03	1.40	
$\Delta ln(China_{t-2})$	-0.05	-1.30		-0.03	-1.40	
Constant	0.00	0.86		0.00	0.06	
$\Delta ln(Stock_{t-1})$	-0.01	-0.16		-0.04	-0.83	
$\Delta ln(Stock_{t-2})$	0.02	0.42		-0.03	-0.71	
$\Delta ln(EX_{t-1})$	0.01	0.05		-0.48	-3.03	***
$\Delta ln(EX_{t-2})$	-0.17	-0.72		0.01	0.08	

(7) Hong Kong

	Estimation Period I			Estimation Period II		
	1/02/2012 - 11/24/2014			11/25/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.37	4.25	***	0.82	3.66	***
$\Delta ln(Yen_{t-1})$	-0.29	-3.21	***	-0.26	-1.14	
$\Delta ln(Yen_{t-2})$	-0.07	-0.81		-0.16	-0.70	
$\Delta USBond(5)_{t-1}$	-0.04	-2.57	**	-0.02	-0.51	
$\Delta USBond(5)_{t-2}$	0.00	-0.14		-0.01	-0.25	
$\Delta USBond(10)_{t-1}$	0.05	3.62	***	0.04	0.99	
$\Delta USBond(10)_{t-2}$	0.00	0.11		0.01	0.29	
$\Delta ln(China_t)$	0.48	16.83	***	0.25	9.24	***
$\Delta ln(China_{t-1})$	-0.08	-2.27	**	0.00	-0.03	
$\Delta ln(China_{t-2})$	0.01	0.33		-0.02	-0.70	
Constant	0.00	0.88		0.00	-0.84	
$\Delta ln(Stock_{t-1})$	0.08	1.99	**	-0.03	-0.54	
$\Delta ln(Stock_{t-2})$	-0.03	-0.93		0.07	1.22	
$\Delta ln(EX_{t-1})$	-3.76	-1.92	*	-8.17	-2.22	**
$\Delta ln(EX_{t-2})$	-2.77	-1.41		-4.87	-1.33	

Note 1: * = significant at 10%, ** = significant at 5%, and *** = significant at 1%.

Note 2: $\Delta ln(Yen_t)$ = logged difference of the yen-dollar rate, $\Delta USBond(5)_t$ = differenced 5-year US government bond yield, $\Delta USBond(10)_t$ = differenced 10-year US government bond yield, $\Delta ln(China_t)$ = logged difference of the Chinese stock price,, $\Delta ln(Stock_t)$ = logged difference of the local stock price, and $\Delta ln(EX_{t-1})$ = logged difference of the exchange rate of local currency.

Table 4. The Estimation Results with Japan's Stock Price Changes

(1) South Korea

	Estimation Period I			Estimation Period II		
	1/02/2012 - 8/01/2013			8/02/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	-0.20	-1.70	*	-0.19	-2.08	**
$\Delta ln(Yen_{t-1})$	-0.49	-4.26	***	-0.07	-0.73	
$\Delta ln(Yen_{t-2})$	-0.09	-0.78		0.07	0.72	
$\Delta ln(JSP_t)$	0.24	7.25	***	0.27	12.55	***
$\Delta ln(JSP_{t-1})$	0.04	1.05		0.01	0.45	
$\Delta ln(JSP_{t-2})$	0.02	0.58		-0.04	-1.69	*
$\Delta USBond(5)_{t-1}$	-0.09	-3.41	***	-0.02	-1.64	
$\Delta USBond(5)_{t-2}$	-0.06	-2.34	**	0.01	0.52	
$\Delta USBond(10)_{t-1}$	0.08	3.69	***	0.02	1.43	
$\Delta USBond(10)_{t-2}$	0.05	2.40	**	-0.01	-0.56	
$\Delta ln(China_t)$	0.18	5.02	***	0.04	2.82	***
$\Delta ln(China_{t-1})$	-0.01	-0.25		-0.02	-1.32	
$\Delta ln(China_{t-2})$	0.03	0.89		0.01	0.48	
Constant	0.00	-1.00		0.00	-0.37	
$\Delta ln(Stock_{t-1})$	-0.10	-1.80	*	0.02	0.44	
$\Delta ln(Stock_{t-2})$	0.02	0.36		0.01	0.17	
$\Delta ln(EX_{t-1})$	-0.13	-1.07		-0.11	-1.91	*
$\Delta ln(EX_{t-2})$	0.02	0.16		-0.04	-0.81	

(2) Indonesia

	Estimation Period I			Estimation Period II		
	1/02/2012 - 1/13/2014			1/14/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	-0.13	-0.99		0.03	0.17	
$\Delta ln(Yen_{t-1})$	-0.20	-1.51		0.00	-0.03	
$\Delta ln(Yen_{t-2})$	-0.09	-0.69		0.07	0.44	
$\Delta ln(JSP_t)$	0.24	6.58	***	0.20	5.51	***
$\Delta ln(JSP_{t-1})$	-0.06	-1.45		0.03	0.80	
$\Delta ln(JSP_{t-2})$	0.02	0.44		-0.04	-1.18	
$\Delta USBond(5)_{t-1}$	-0.11	-4.07	***	-0.03	-1.51	
$\Delta USBond(5)_{t-2}$	-0.02	-0.87		-0.06	-2.58	***
$\Delta USBond(10)_{t-1}$	0.05	2.17	**	0.03	1.47	
$\Delta USBond(10)_{t-2}$	0.01	0.59		0.05	2.38	**
$\Delta ln(China_t)$	0.21	5.02	***	0.04	2.01	**
$\Delta ln(China_{t-1})$	-0.02	-0.43		0.01	0.59	
$\Delta ln(China_{t-2})$	-0.01	-0.15		-0.03	-1.44	
Constant	0.00	0.20		0.00	0.37	
$\Delta ln(Stock_{t-1})$	0.12	2.68	**	-0.02	-0.48	
$\Delta ln(Stock_{t-2})$	-0.05	-1.00		-0.04	-0.76	
$\Delta ln(EX_{t-1})$	-0.23	-1.71	*	-0.04	-0.43	
$\Delta ln(EX_{t-2})$	0.15	1.16		-0.06	-0.66	

(3) Malaysia

	Estimation Period I			Estimation Period II		
	1/02/2012 - 12/11/2014			12/12/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	-0.06	-1.13		0.11	0.69	
$\Delta ln(Yen_{t-1})$	-0.11	-2.01	**	-0.01	-0.07	
$\Delta ln(Yen_{t-2})$	-0.08	-1.46		-0.23	-1.49	
$\Delta ln(JSP_t)$	0.10	7.21	***	0.19	5.51	***
$\Delta ln(JSP_{t-1})$	0.00	-0.07		0.03	0.67	
$\Delta ln(JSP_{t-2})$	0.00	-0.19		-0.09	-2.44	**
$\Delta USBond(5)_{t-1}$	-0.02	-1.97	**	-0.04	-1.54	
$\Delta USBond(5)_{t-2}$	-0.01	-0.54		-0.03	-1.15	
$\Delta USBond(10)_{t-1}$	0.02	2.28	**	0.03	1.40	
$\Delta USBond(10)_{t-2}$	0.00	0.26		0.03	1.26	
$\Delta ln(China_t)$	0.07	4.69	***	-0.04	-2.12	**
$\Delta ln(China_{t-1})$	-0.04	-2.64	***	0.02	0.90	
$\Delta ln(China_{t-2})$	0.02	1.01		-0.02	-1.35	
Constant	0.00	0.33		0.00	-0.06	
$\Delta ln(Stock_{t-1})$	0.08	1.99	**	0.12	1.75	*
$\Delta ln(Stock_{t-2})$	-0.01	-0.17		0.11	1.71	*
$\Delta ln(EX_{t-1})$	-0.14	-2.94	***	-0.01	-0.13	
$\Delta ln(EX_{t-2})$	0.01	0.26		-0.08	-1.24	

(4) Singapore

	Estimation Period I			Estimation Period II		
	1/02/2012 - 7/23/2013			7/24/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	-0.14	-1.61		0.11	1.19	
$\Delta ln(Yen_{t-1})$	-0.15	-1.70	*	-0.06	-0.61	
$\Delta ln(Yen_{t-2})$	-0.24	-2.77	***	-0.24	-2.66	***
$\Delta ln(JSP_t)$	0.19	7.81	***	0.20	9.66	***
$\Delta ln(JSP_{t-1})$	0.05	1.88	*	0.03	1.34	
$\Delta ln(JSP_{t-2})$	0.04	1.47		-0.01	-0.38	
$\Delta USBond(5)_{t-1}$	-0.07	-3.20	***	0.00	-0.21	
$\Delta USBond(5)_{t-2}$	-0.02	-0.80		0.00	0.20	
$\Delta USBond(10)_{t-1}$	0.05	3.04	***	0.00	0.28	
$\Delta USBond(10)_{t-2}$	0.01	0.32		0.00	0.29	
$\Delta ln(China_t)$	0.14	5.30	***	0.06	4.14	***
$\Delta ln(China_{t-1})$	-0.07	-2.32	**	-0.02	-1.22	
$\Delta ln(China_{t-2})$	0.02	0.64		-0.02	-1.22	
Constant	0.00	0.25		0.00	-1.19	
$\Delta ln(Stock_{t-1})$	-0.09	-1.68	*	-0.04	-0.97	
$\Delta ln(Stock_{t-2})$	-0.06	-1.12		0.04	0.91	
$\Delta ln(EX_{t-1})$	-0.21	-2.22	**	-0.22	-2.86	***
$\Delta ln(EX_{t-2})$	-0.07	-0.81		0.08	1.10	

(5) Thailand

	Estimation Period I			Estimation Period II+III		
	1/02/2012 - 5/15/2013			5/16/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.02	0.13		0.08	0.66	
$\Delta ln(Yen_{t-1})$	-0.32	-2.26	**	-0.14	-1.09	
$\Delta ln(Yen_{t-2})$	-0.29	-2.04	**	0.12	0.88	
$\Delta ln(JSP_t)$	0.21	4.78	***	0.17	5.75	***
$\Delta ln(JSP_{t-1})$	0.07	1.50		-0.02	-0.57	
$\Delta ln(JSP_{t-2})$	0.06	1.53		0.00	-0.11	
$\Delta USBond(5)_{t-1}$	0.01	0.38		-0.02	-0.90	
$\Delta USBond(5)_{t-2}$	-0.02	-0.78		-0.01	-0.48	
$\Delta USBond(10)_{t-1}$	0.00	-0.12		-0.01	-0.31	
$\Delta USBond(10)_{t-2}$	0.02	1.06		0.00	0.00	
$\Delta ln(China_t)$	0.10	2.51	**	0.07	3.26	***
$\Delta ln(China_{t-1})$	-0.03	-0.74		-0.01	-0.59	
$\Delta ln(China_{t-2})$	-0.02	-0.40		0.03	1.13	
Constant	0.00	1.40		0.00	-1.01	
$\Delta ln(Stock_{t-1})$	-0.03	-0.60		-0.01	-0.21	
$\Delta ln(Stock_{t-2})$	0.08	1.35		-0.08	-1.84	*
$\Delta ln(EX_{t-1})$	-0.03	-0.18		-0.12	-0.89	
$\Delta ln(EX_{t-2})$	0.32	2.10	**	-0.10	-0.78	

(6) Taiwan

	Estimation Period I			Estimation Period II		
	1/02/2012 - 7/30/2013			7/31/2013 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	-0.04	-0.32		0.07	0.59	
$\Delta ln(Yen_{t-1})$	-0.29	-2.57	**	0.01	0.09	
$\Delta ln(Yen_{t-2})$	-0.23	-2.00	**	-0.07	-0.61	
$\Delta ln(JSP_t)$	0.23	7.26	***	0.22	8.43	***
$\Delta ln(JSP_{t-1})$	0.06	1.88	*	0.03	1.14	
$\Delta ln(JSP_{t-2})$	-0.04	-1.09		0.00	0.04	
$\Delta USBond(5)_{t-1}$	-0.07	-2.48	**	0.00	0.10	
$\Delta USBond(5)_{t-2}$	-0.02	-0.70		0.02	1.22	
$\Delta USBond(10)_{t-1}$	0.06	2.74	***	-0.01	-0.36	
$\Delta USBond(10)_{t-2}$	0.00	0.23		-0.01	-0.80	
$\Delta ln(China_t)$	0.21	6.10	***	0.06	3.17	***
$\Delta ln(China_{t-1})$	-0.03	-0.81		0.02	0.84	
$\Delta ln(China_{t-2})$	-0.02	-0.58		-0.02	-1.05	
Constant	0.00	-0.15		0.00	-0.34	
$\Delta ln(Stock_{t-1})$	-0.01	-0.11		-0.05	-1.21	
$\Delta ln(Stock_{t-2})$	0.02	0.40		-0.05	-1.07	
$\Delta ln(EX_{t-1})$	-0.02	-0.09		-0.38	-2.53	**
$\Delta ln(EX_{t-2})$	-0.15	-0.65		-0.04	-0.25	

(7) Hong Kong

	Estimation Period I			Estimation Period II		
	1/02/2012 - 11/24/2014			11/25/2014 - 12/31/2015		
Variables	Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.04	0.40		0.42	1.76	*
$\Delta ln(Yen_{t-1})$	-0.41	-4.56	***	-0.52	-2.15	**
$\Delta ln(Yen_{t-2})$	-0.10	-1.05		-0.47	-1.93	*
$\Delta ln(JSP_t)$	0.22	9.64	***	0.40	6.85	***
$\Delta ln(JSP_{t-1})$	0.05	2.10	**	0.12	1.85	*
$\Delta ln(JSP_{t-2})$	0.00	-0.04		-0.06	-0.90	
$\Delta USBond(5)_{t-1}$	-0.03	-1.93	*	-0.06	-1.51	
$\Delta USBond(5)_{t-2}$	0.00	-0.24		0.02	0.52	
$\Delta USBond(10)_{t-1}$	0.03	2.08	**	0.05	1.50	
$\Delta USBond(10)_{t-2}$	0.00	-0.26		-0.02	-0.62	
$\Delta ln(China_t)$	0.42	15.30	***	0.21	7.77	***
$\Delta ln(China_{t-1})$	-0.08	-2.41	**	-0.01	-0.31	
$\Delta ln(China_{t-2})$	0.04	1.23		-0.01	-0.37	
Constant	0.00	-0.09		0.00	-1.40	
$\Delta ln(Stock_{t-1})$	0.05	1.38		-0.13	-1.94	*
$\Delta ln(Stock_{t-2})$	-0.06	-1.67	*	0.13	1.94	*
$\Delta ln(EX_{t-1})$	-3.69	-2.00	**	-8.23	-2.37	**
$\Delta ln(EX_{t-2})$	-2.53	-1.38		-8.39	-2.41	**

Note 1: * = significant at 10%, ** = significant at 5%, and *** = significant at 1%.

Note 2: $\Delta ln(JSP_t)$ = logged difference of the Japan's stock price index. The other explanatory variables are the same as those in Table 4.

Table 5. The Estimation Results with Local Exchange Rates

(1) South Korea

	Estimation Period I						Estimation Period II					
	1/02/2012 - 8/01/2013						8/02/2013 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.12	1.20		-0.07	-0.62		0.24	2.65	***	-0.12	-1.22	
$\Delta ln(Yen_{t-1})$	-0.30	-3.01	***	-0.39	-3.60	***	-0.08	-0.80		-0.15	-1.54	
$\Delta ln(Yen_{t-2})$	-0.09	-0.86		-0.14	-1.26		0.08	0.82		0.10	1.02	
$\Delta ln(JSP_t)$				0.13	3.95	***				0.22	8.88	***
$\Delta ln(JSP_{t-1})$				0.03	0.86					0.01	0.54	
$\Delta ln(JSP_{t-2})$				0.04	1.16					-0.03	-1.27	
$\Delta USBond(5)_{t-1}$	-0.05	-2.03	**	-0.05	-1.80	*	-0.01	-0.83		-0.02	-1.27	
$\Delta USBond(5)_{t-2}$	-0.04	-1.51		-0.03	-1.33		0.01	0.35		0.01	0.40	
$\Delta USBond(10)_{t-1}$	0.04	1.99	**	0.03	1.65	*	0.01	0.65		0.01	0.61	
$\Delta USBond(10)_{t-2}$	0.02	1.05		0.02	0.91		0.00	-0.04		0.00	-0.33	
$\Delta ln(China_t)$	0.15	4.37	***	0.13	3.73	***	0.04	2.35	**	0.03	2.21	**
$\Delta ln(China_{t-1})$	-0.02	-0.50		-0.02	-0.54		-0.02	-0.98		-0.02	-1.34	
$\Delta ln(China_{t-2})$	0.04	1.28		0.04	1.30		0.00	-0.14		0.01	0.59	
ΔVIX_{t-1}	-0.12	-3.02	***	-0.08	-2.18	**	-0.14	-6.51	***	-0.06	-2.91	***
ΔVIX_{t-2}	-0.09	-2.28	**	-0.06	-1.66	*	0.03	1.40		0.05	2.19	**
Constant	0.01	1.05		0.00	0.90		0.00	-0.98		0.00	-1.41	
$\Delta ln(Stock_{t-1})$	-0.15	-2.81	***	-0.15	-2.76	***	-0.02	-0.39		0.01	0.17	
$\Delta ln(Stock_{t-2})$	0.02	0.40		0.01	0.09		-0.01	-0.23		0.01	0.21	
$\Delta ln(EX_{t-1})$	0.12	1.09		0.07	0.65		-0.10	-1.69	*	-0.08	-1.38	
$\Delta ln(EX_{t-2})$	0.05	0.46		0.06	0.52		-0.01	-0.11		-0.02	-0.39	
$\Delta ln(CDS_t)$	0.00	-7.94	***	0.00	-6.62	***	0.00	-5.61	***	0.00	-3.19	***
$\Delta ln(CDS_{t-1})$	0.00	3.21	***	0.00	2.55	**	0.00	2.66	***	0.00	0.68	
$\Delta ln(CDS_{t-2})$	0.00	2.99	***	0.00	2.77	***	0.00	2.16	**	0.00	2.56	**
$\Delta ln(ONRate_t)$	0.03	1.85	*	0.02	1.75	*	0.02	1.52		0.02	2.12	**
$\Delta ln(ONRate_{t-1})$	0.00	-0.12		0.00	0.04		-0.01	-0.36		-0.02	-1.03	
$\Delta ln(ONRate_{t-2})$	-0.03	-1.87	*	-0.03	-1.99	**	-0.01	-1.04		-0.01	-0.71	

(2) Indonesia

	Estimation Period I						Estimation Period II					
	1/02/2012 - 1/13/2014						1/14/2014 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.23	2.11	**	0.04	0.32		0.33	2.29	**	0.21	1.30	
$\Delta ln(Yen_{t-1})$	-0.14	-1.28		-0.15	-1.21		-0.01	-0.09		-0.04	-0.25	
$\Delta ln(Yen_{t-2})$	-0.11	-1.00		-0.08	-0.72		0.12	0.80		0.13	0.81	
$\Delta ln(JSP_t)$				0.12	3.46	***				0.08	1.91	*
$\Delta ln(JSP_{t-1})$				-0.03	-0.90					0.02	0.39	
$\Delta ln(JSP_{t-2})$				-0.01	-0.30					-0.02	-0.47	
$\Delta USBond(5)_{t-1}$	-0.07	-2.90	***	-0.06	-2.63	***	-0.01	-0.60		-0.02	-0.81	
$\Delta USBond(5)_{t-2}$	-0.02	-0.66		-0.02	-0.64		-0.07	-3.02	***	-0.07	-3.06	***
$\Delta USBond(10)_{t-1}$	0.03	1.67	*	0.02	1.25		0.01	0.28		0.01	0.38	
$\Delta USBond(10)_{t-2}$	0.00	0.17		0.01	0.26		0.07	3.03	***	0.06	2.99	***
$\Delta ln(China_t)$	0.16	4.33	***	0.14	3.71	***	0.02	1.13		0.02	1.12	
$\Delta ln(China_{t-1})$	-0.01	-0.16		0.00	0.08		0.02	1.07		0.02	0.98	
$\Delta ln(China_{t-2})$	-0.02	-0.51		-0.01	-0.24		-0.03	-1.31		-0.02	-1.10	
ΔVIX_{t-1}	-0.08	-2.07	**	-0.05	-1.19		-0.10	-3.08	***	-0.07	-2.10	**
ΔVIX_{t-2}	0.02	0.39		0.02	0.55		0.03	1.09		0.04	1.20	
Constant	0.00	1.49		0.00	1.33		-0.02	-1.98	**	-0.02	-1.99	**
$\Delta ln(Stock_{t-1})$	-0.07	-1.64		-0.05	-1.10		-0.05	-0.99		-0.05	-1.06	
$\Delta ln(Stock_{t-2})$	-0.07	-1.69	*	-0.07	-1.70	*	-0.03	-0.73		-0.03	-0.58	
$\Delta ln(EX_{t-1})$	-0.03	-0.27		-0.05	-0.42		0.01	0.12		0.01	0.12	
$\Delta ln(EX_{t-2})$	0.08	0.65		0.08	0.64		-0.01	-0.12		-0.01	-0.15	
$\Delta ln(CDS_t)$	0.00	-12.53	***	0.00	-11.36	***	0.00	-7.03	***	0.00	-6.29	***
$\Delta ln(CDS_{t-1})$	0.00	5.85	***	0.00	5.23	***	0.00	4.14	***	0.00	3.68	***
$\Delta ln(CDS_{t-2})$	0.00	2.78	***	0.00	2.76	***	0.00	0.87		0.00	0.87	
$\Delta ln(ONRate_t)$	0.03	3.61	***	0.03	3.60	***	0.00	1.85	*	0.00	1.88	*
$\Delta ln(ONRate_{t-1})$	-0.03	-2.38	**	-0.03	-2.35	**	0.00	-1.35		0.00	-1.33	
$\Delta ln(ONRate_{t-2})$	0.00	-0.17		0.00	-0.22		0.00	1.54		0.00	1.45	

(3) Malaysia

	Estimation Period I						Estimation Period II					
	1/02/2012 - 12/11/2014						12/12/2014 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.11	2.18	**	0.01	0.25		0.42	2.94	***	0.22	1.40	
$\Delta ln(Yen_{t-1})$	-0.10	-1.96	*	-0.10	-1.89	*	0.07	0.46		0.05	0.31	
$\Delta ln(Yen_{t-2})$	-0.06	-1.25		-0.06	-1.05		-0.29	-1.89	*	-0.22	-1.44	
$\Delta ln(JSP_t)$				0.06	3.93	***				0.11	2.53	**
$\Delta ln(JSP_{t-1})$				-0.01	-0.46					0.01	0.12	
$\Delta ln(JSP_{t-2})$				-0.01	-0.50					-0.08	-2.16	**
$\Delta USBond(5)_{t-1}$	-0.01	-1.18		-0.01	-1.03		0.00	0.11		-0.01	-0.48	
$\Delta USBond(5)_{t-2}$	0.00	-0.02		0.00	-0.26		-0.03	-1.44		-0.03	-1.24	
$\Delta USBond(10)_{t-1}$	0.01	1.60		0.01	1.24		-0.01	-0.33		0.00	0.15	
$\Delta USBond(10)_{t-2}$	0.00	-0.20		0.00	-0.01		0.03	1.32		0.03	1.19	
$\Delta ln(China_t)$	0.07	4.39	***	0.06	3.89	***	-0.05	-2.63	***	-0.04	-2.56	**
$\Delta ln(China_{t-1})$	-0.04	-2.82	***	-0.04	-2.78	***	0.02	0.92		0.02	0.97	
$\Delta ln(China_{t-2})$	0.01	0.83		0.02	1.09		-0.03	-1.84	*	-0.02	-1.25	
ΔVIX_{t-1}	-0.06	-3.48	***	-0.04	-2.16	**	-0.07	-2.41	**	-0.03	-1.13	
ΔVIX_{t-2}	0.01	0.50		0.01	0.71		-0.04	-1.34		-0.03	-1.03	
Constant	0.01	2.15	**	0.01	2.04	**	0.07	1.41		0.06	1.16	
$\Delta ln(Stock_{t-1})$	0.07	2.00	**	0.07	2.01	**	0.07	1.07		0.08	1.16	
$\Delta ln(Stock_{t-2})$	-0.01	-0.33		0.00	-0.13		0.06	0.98		0.09	1.40	
$\Delta ln(EX_{t-1})$	-0.04	-0.83		-0.05	-1.02		-0.01	-0.19		0.00	-0.04	
$\Delta ln(EX_{t-2})$	0.06	1.29		0.06	1.40		-0.04	-0.54		-0.06	-0.97	
$\Delta ln(CDS_t)$	0.00	-7.38	***	0.00	-6.21	***	0.00	-5.27	***	0.00	-3.85	***
$\Delta ln(CDS_{t-1})$	0.00	3.41	***	0.00	2.54	**	0.00	3.98	***	0.00	2.90	***
$\Delta ln(CDS_{t-2})$	0.00	2.03	**	0.00	2.21	**	0.00	-0.21		0.00	-0.10	
$\Delta ln(ONRate_t)$	-0.02	-0.92		-0.02	-0.92		-0.01	-0.29		-0.01	-0.20	
$\Delta ln(ONRate_{t-1})$	0.02	0.65		0.01	0.61		-0.07	-1.04		-0.09	-1.31	
$\Delta ln(ONRate_{t-2})$	0.00	-0.25		0.00	-0.18		0.06	1.26		0.08	1.62	

(4) Singapore

	Estimation Period I						Estimation Period II					
	1/02/2012 - 7/23/2013						7/24/2013 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.20	2.34	**	-0.06	-0.64		0.49	5.69	***	0.20	2.22	**
$\Delta ln(Yen_{t-1})$	-0.06	-0.68		-0.16	-1.76	*	-0.04	-0.44		-0.09	-0.90	
$\Delta ln(Yen_{t-2})$	-0.17	-1.94	*	-0.24	-2.76	***	-0.25	-2.74	***	-0.25	-2.73	***
$\Delta ln(JSP_t)$				0.17	6.53	***				0.16	7.06	***
$\Delta ln(JSP_{t-1})$				0.05	1.81	*				0.02	0.85	
$\Delta ln(JSP_{t-2})$				0.05	1.76	*				-0.01	-0.46	
$\Delta USBond(5)_{t-1}$	-0.07	-3.42	***	-0.06	-2.77	***	0.00	0.19		0.00	0.01	
$\Delta USBond(5)_{t-2}$	-0.01	-0.57		0.00	-0.22		0.00	-0.02		0.00	0.01	
$\Delta USBond(10)_{t-1}$	0.05	3.13	***	0.04	2.22	**	0.00	0.06		0.00	-0.15	
$\Delta USBond(10)_{t-2}$	0.00	-0.08		-0.01	-0.54		0.01	0.69		0.01	0.48	
$\Delta ln(China_t)$	0.18	6.38	***	0.14	5.10	***	0.06	4.15	***	0.05	3.72	***
$\Delta ln(China_{t-1})$	-0.07	-2.37	**	-0.07	-2.37	**	-0.02	-1.06		-0.02	-1.33	
$\Delta ln(China_{t-2})$	0.02	0.54		0.02	0.63		-0.03	-1.95	*	-0.02	-1.50	
ΔVIX_{t-1}	-0.16	-5.10	***	-0.10	-3.32	***	-0.14	-6.99	***	-0.07	-3.53	***
ΔVIX_{t-2}	-0.09	-2.87	***	-0.06	-1.98	**	-0.02	-0.80		-0.01	-0.30	
Constant	-19.18	-1.30		-25.60	-1.84	*	0.00	-0.90		0.00	-0.99	
$\Delta ln(Stock_{t-1})$	-0.09	-1.71	*	-0.11	-2.06	**	-0.06	-1.35		-0.08	-1.77	*
$\Delta ln(Stock_{t-2})$	-0.04	-0.73		-0.07	-1.28		0.05	1.21		0.04	0.93	
$\Delta ln(EX_{t-1})$	-0.09	-0.88		-0.11	-1.20		-0.17	-2.15	**	-0.17	-2.20	**
$\Delta ln(EX_{t-2})$	-0.03	-0.27		-0.03	-0.36		0.17	2.15	**	0.12	1.59	
$\Delta ln(CDS_t)$	0.00	-0.03		-0.04	-0.25		0.00	-2.74	***	0.00	-2.31	**
$\Delta ln(CDS_{t-1})$	-0.13	-0.80		-0.03	-0.21		0.00	0.90		0.00	0.74	
$\Delta ln(CDS_{t-2})$	0.34	2.18	**	0.34	2.31	**	0.00	1.56		0.00	1.37	
$\Delta ln(ONRate_t)$	0.01	0.49		0.01	0.51		0.00	0.70		0.00	0.36	
$\Delta ln(ONRate_{t-1})$	-0.01	-0.76		-0.01	-0.63		0.00	-0.82		0.00	-0.90	
$\Delta ln(ONRate_{t-2})$	0.00	-0.16		0.00	-0.15		0.00	0.41		0.00	0.73	

(5) Thailand

	Estimation Period I						Estimation Period II					
	1/02/2012 - 5/15/2013						5/16/2013 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.21	1.55		0.06	0.43		0.38	3.37	***	0.32	2.50	**
$\Delta ln(Yen_{t-1})$	-0.13	-0.96		-0.23	-1.65	*	-0.09	-0.74		0.01	0.06	
$\Delta ln(Yen_{t-2})$	-0.19	-1.41		-0.29	-2.11	**	0.18	1.51		0.19	1.52	
$\Delta ln(JSP_t)$				0.15	3.28	***				0.05	1.44	
$\Delta ln(JSP_{t-1})$				0.05	1.14					-0.07	-1.94	*
$\Delta ln(JSP_{t-2})$				0.06	1.47					0.00	-0.08	
$\Delta USBond(5)_{t-1}$	0.01	0.38		0.02	0.64		0.00	-0.09		0.00	-0.16	
$\Delta USBond(5)_{t-2}$	-0.02	-0.52		-0.01	-0.41		-0.01	-0.62		-0.01	-0.55	
$\Delta USBond(10)_{t-1}$	-0.01	-0.26		-0.02	-0.93		-0.03	-1.34		-0.02	-1.26	
$\Delta USBond(10)_{t-2}$	0.01	0.45		0.00	0.19		0.00	-0.22		0.00	-0.26	
$\Delta ln(China_t)$	0.10	2.49	**	0.08	2.12	**	0.05	2.53	**	0.05	2.40	**
$\Delta ln(China_{t-1})$	-0.04	-0.98		-0.04	-0.97		-0.01	-0.66		-0.01	-0.54	
$\Delta ln(China_{t-2})$	-0.02	-0.54		-0.02	-0.55		0.03	1.19		0.03	1.33	
ΔVIX_{t-1}	-0.07	-1.65	*	-0.05	-1.21		-0.10	-3.39	***	-0.08	-2.62	***
ΔVIX_{t-2}	-0.10	-2.33	**	-0.09	-2.06	**	-0.03	-0.90		-0.05	-1.46	
Constant	0.01	0.75		0.00	0.21		-0.01	-1.93	*	-0.01	-1.92	*
$\Delta ln(Stock_{t-1})$	-0.05	-0.97		-0.06	-1.00		-0.10	-2.44	**	-0.09	-2.27	**
$\Delta ln(Stock_{t-2})$	0.09	1.70	*	0.08	1.46		-0.10	-2.54	**	-0.10	-2.59	***
$\Delta ln(EX_{t-1})$	0.00	0.00		0.00	-0.02		0.03	0.24		0.02	0.19	
$\Delta ln(EX_{t-2})$	0.40	2.58	**	0.40	2.67	***	-0.03	-0.22		-0.03	-0.23	
$\Delta ln(CDS_t)$	0.00	-4.11	***	0.00	-3.25	***	0.00	-8.61	***	0.00	-7.89	***
$\Delta ln(CDS_{t-1})$	0.00	2.59	**	0.00	1.96	*	0.00	4.34	***	0.00	3.62	***
$\Delta ln(CDS_{t-2})$	0.00	0.30		0.00	0.34		0.00	2.59	***	0.00	2.95	***
$\Delta ln(ONRate_t)$	-0.01	-1.01		0.00	-0.60		0.00	0.34		0.00	0.26	
$\Delta ln(ONRate_{t-1})$	0.00	-0.52		0.00	-0.47		-0.01	-0.82		-0.01	-0.90	
$\Delta ln(ONRate_{t-2})$	0.01	1.13		0.01	1.01		0.01	0.69		0.01	0.87	

(6) Taiwan

	Estimation Period I						Estimation Period II					
	1/02/2012 - 7/30/2013						7/31/2013 - 12/31/2015					
Variables	Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.		Coef.	t-Stat.	
$\Delta ln(Yen_t)$	0.33	3.09	***	0.01	0.11		0.52	4.70	***	0.23	1.98	**
$\Delta ln(Yen_{t-1})$	-0.12	-1.07		-0.26	-2.28	**	0.03	0.28		0.00	-0.01	
$\Delta ln(Yen_{t-2})$	-0.26	-2.37	**	-0.23	-2.05	**	-0.08	-0.69		-0.10	-0.82	
$\Delta ln(JSP_t)$				0.21	6.16	***				0.17	5.68	***
$\Delta ln(JSP_{t-1})$				0.06	1.56					0.01	0.33	
$\Delta ln(JSP_{t-2})$				-0.04	-1.08					0.00	0.07	
$\Delta USBond(5)_{t-1}$	-0.08	-2.76	***	-0.06	-2.16	**	0.01	0.41		0.00	0.20	
$\Delta USBond(5)_{t-2}$	-0.03	-0.89		-0.01	-0.48		0.03	1.54		0.02	1.44	
$\Delta USBond(10)_{t-1}$	0.07	2.99	***	0.05	2.16	**	-0.01	-0.63		-0.01	-0.71	
$\Delta USBond(10)_{t-2}$	0.00	0.07		0.00	-0.19		-0.02	-0.95		-0.02	-1.04	
$\Delta ln(China_t)$	0.25	7.04	***	0.21	6.03	***	0.05	2.85	***	0.05	2.60	***
$\Delta ln(China_{t-1})$	-0.02	-0.64		-0.03	-0.83		0.02	1.16		0.02	0.89	
$\Delta ln(China_{t-2})$	-0.05	-1.32		-0.02	-0.66		-0.03	-1.52		-0.02	-1.19	
ΔVIX_{t-1}	-0.13	-3.40	***	-0.06	-1.58		-0.16	-6.50	***	-0.09	-3.31	***
ΔVIX_{t-2}	-0.11	-2.64	***	-0.05	-1.17		-0.04	-1.75	*	-0.03	-1.26	
Constant	0.01	0.74		0.00	0.09		0.06	1.08		0.06	1.04	
$\Delta ln(Stock_{t-1})$	-0.02	-0.40		-0.01	-0.14		-0.11	-2.43	**	-0.08	-1.86	*
$\Delta ln(Stock_{t-2})$	0.03	0.53		0.03	0.47		-0.05	-1.11		-0.06	-1.33	
$\Delta ln(EX_{t-1})$	0.13	0.53		0.04	0.17		-0.32	-2.06	**	-0.30	-1.96	*
$\Delta ln(EX_{t-2})$	-0.14	-0.59		-0.13	-0.60		0.00	0.02		-0.04	-0.29	
$\Delta ln(CDS_t)$	0.00	1.15		0.00	0.85		0.00	-0.87		0.00	-0.56	
$\Delta ln(CDS_{t-1})$	0.00	-0.37		0.00	-0.38		0.00	-0.44		0.00	-0.61	
$\Delta ln(CDS_{t-2})$	0.00	-0.72		0.00	-0.28		0.00	1.19		0.00	1.07	
$\Delta ln(ONRate_t)$	-0.05	-0.46		-0.09	-0.98		-0.01	-0.44		-0.01	-0.49	
$\Delta ln(ONRate_{t-1})$	-0.05	-0.32		0.00	-0.01		-0.03	-2.58	**	-0.03	-2.31	**
$\Delta ln(ONRate_{t-2})$	0.08	0.84		0.08	0.91		0.03	2.53	**	0.03	2.27	**

Note 1: * = significant at 10%, ** = significant at 5%, and *** = significant at 1%.

Note 2: ΔVIX_t = difference of the VIX, $\Delta ln(CDS_t)$ = logged difference of the local sovereign CDS and $\Delta ln(ONRate_t)$ = logged difference of the local overnight interest rate. The other explanatory variables are the same as those in Tables 4 and 5.

Note 3: The coefficients of ΔVIX_{t-j} were multiplied by 100.

Table 6. The Value of the Yen against Eight East Asian Currencies

	2007/7/2	2013/12/31	2014/12/31	2015/12/31
China	100	92.6	83.2	86.8
South Korea	100	133.1	121.6	129.2
Indonesia	100	157.1	140.2	155.5
Malaysia	100	111.0	103.9	127.1
Singapore	100	96.4	88.7	94.7
Thailand	100	111.0	97.4	106.2
Taiwan	100	105.8	98.4	101.9
Philippines	100	112.5	99.4	104.2

Note: We normalized the yen's value on July 2, 2007 to be 100. Larger value means that the yen is stronger against the East Asian currency.