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ADB Working Paper Series

**SPILLOVER EFFECTS OF JAPAN'S
QUANTITATIVE AND QUALITATIVE EASING
ON EAST ASIAN ECONOMIES**

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Abstract

This paper explores the spillover effects of Japan's quantitative and qualitative easing (QQE) on East Asian economies. Under the new monetary policy regime, the Japanese yen depreciated substantially, raising concerns that it would have a regional beggar-thy-neighbor effect. It is thus important to see what effects the QQE had on neighboring economies. Our empirical investigation of East Asian stock markets finds that they first reacted to the yen's depreciation negatively, yet came to respond positively as the QQE progressed, implying that the QQE had a much smaller beggar-thy-neighbor effect than was originally feared. We show that the QQE benefited East Asian economies because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region.

JEL Classification: F10, F32, E52

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1. INTRODUCTION

After the 2007–2009 global financial crisis (GFC), central banks in advanced countries deployed a new set of non-standard actions that have been labeled as the zero interest rate, quantitative easing (QE), credit-easing, or forward guidance policies. These unconventional monetary policies largely achieved their domestic goals. However, they had a mixed effect on the rest of the world, both buoying asset prices globally at a time of financial turmoil, and depreciating currencies and increasing external capital flows, especially to emerging markets. With the risk of sudden reversals, excessive flows can strain policies in recipient economies.

A number of studies have suggested that of the unconventional policies in advanced countries, a highly accommodative Federal Reserve Board (FRB) monetary policy 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]; Park [2016]). Table 1 summarizes the United States (US) unconventional monetary policy timeline after the GFC. Quite a few EMEs experienced rapid capital inflows and strong currency appreciation pressures during 2010–2012 while seeing a sharp reversal in market volatility after FRB Chairman Bernanke’s tapering comments on 22 May 2013. However, Rogers et al. (2014) found that the unconventional policy spillover effects were not symmetrical across countries and that US policy shocks had larger effects on the rest of the world than the policy shocks of 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.² Table 2 summarizes Japan’s unconventional monetary policy timeline after the GFC. Like other central banks in advanced countries, the Bank of Japan (BOJ) adopted an unconventional monetary policy after the GFC. But it was only after Prime Minister Abe advocated the new policy regime that the BOJ became more aggressive in its unconventional policy. Under the new “Abenomics” regime, the Japanese government tried to revive its economy through bold policies for combatting prolonged deflation (see, for example, Fukuda [2015]). In particular, on 4 April 2013, BOJ Governor Kuroda introduced the “Quantitative and Qualitative Monetary Easing” (QQE) policy and committed to achieving a 2% inflation target in 2 years.

Figure 1 depicts the actual and predicted base money in Japan from 2007 to 2016.³ The BOJ increased its base money after the Lehman shock in September 2008. But compared with those in other advanced countries, the base money changes were modest in Japan. This was true even after the BOJ announced its “Comprehensive Monetary Easing” policy in October 2010. However, Japan’s base money started to increase dramatically in late 2012 when Abenomics started. The increases accelerated when the BOJ introduced the QQE in April 2013 and expanded it in October 2014.

¹ Dekle and Hamada (2015) showed that Japanese monetary policies have generally helped raise US gross domestic product, despite the appreciation of the dollar.

² In this paper, East Asian economies refers to seven Asian economies: the Republic of Korea; Indonesia; Malaysia; Singapore; Thailand; Taipei, China; and Hong Kong, China.

³ The predicted amounts at the end of 2016 are based on the Bank of Japan’s commitment.

Table 1: Timeline of US Unconventional Monetary Policy

Date	Description	Category
25 Nov 2008	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 2009	FOMC statement 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 2010	Completion of QE1	
10 Aug 2010	"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 2010	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 2011	Completion of QE2	
31 Aug 2012	QE3 hinted: "The Federal Reserve will provide additional policy accommodation as needed to promote a stronger economic and sustained improvement in labor market conditions in a context of price stability."	QE3
13 Sep 2012	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." "The Committee will continue to maintain interest rates extremely low until at least mid-2015."	QE3
22 May 2013	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 2013	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 2013	Tapering delayed: "decided to wait a little longer to make sure the economy is conforming to" their positive economic outlook	
18 Dec 2013	Tapering of QE3 announced.	Taper
29 Oct 2014	End of QE3 announced.	
16 Dec 2015	End of ZIRP: FOMC statement of decision to raise the target range for the federal funds rate from 0.25% to 0.5%.	

FOMC = Federal Open Market Committee, MBS = mortgage-backed securities, QE = quantitative easing, ZIRP = zero interest rate policy.

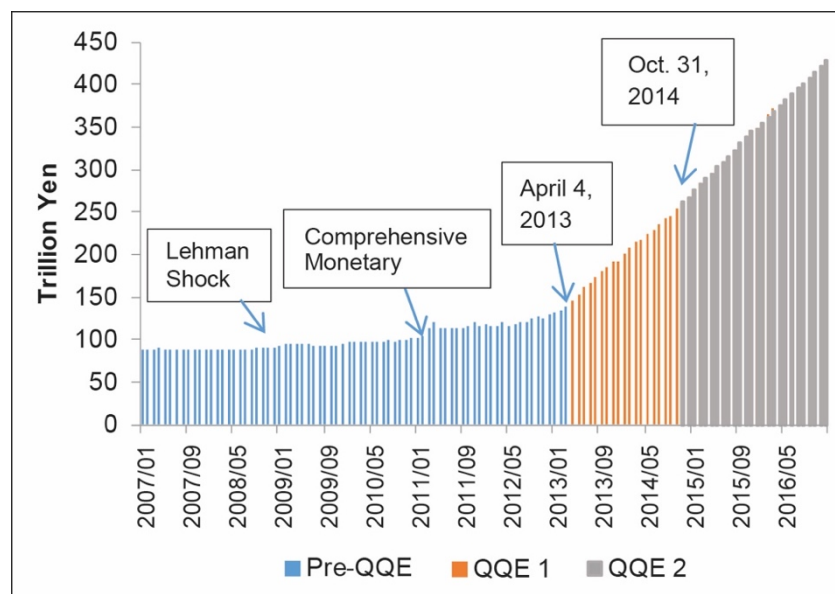
Note: In the table, we categorize US unconventional monetary policy into QE1, QE2, QE3, and taper.

Source: The Board of Governors of the Federal Reserve System.

Table 2: Timeline of Japan's Unconventional Monetary Policy

Date	Description	Governor
19 Dec 2008	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; encouraged to remain at around 0.1%.	Shirakawa
1 Dec 2009	Enhancement of easy monetary conditions. Introduction of a new funds-supplying operation: fixed loan interest rate (target for the uncollateralized overnight call rate of 0.1%).	Shirakawa
18 Dec 2009	Clarification of the understanding of medium- to long-term price stability. Midpoints of most policy board members' "understanding" of around 1% CPI inflation rate.	Shirakawa
5 Oct 2010	Comprehensive monetary easing	Shirakawa
15 Nov 2012	Abe's announcement to conduct unlimited quantitative easing.	Shirakawa
20 Dec 2012	Enhancement of monetary easing	Shirakawa
22 Jan 2013	A 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 2013	Introduction of "Quantitative and Qualitative Monetary Easing" (QQE).	Kuroda
31 Oct 2014	Expansion of QQE.	Kuroda
29 Jan 2016	Introduction of "QQE with a Negative Interest Rate".	Kuroda

Source: Bank of Japan.

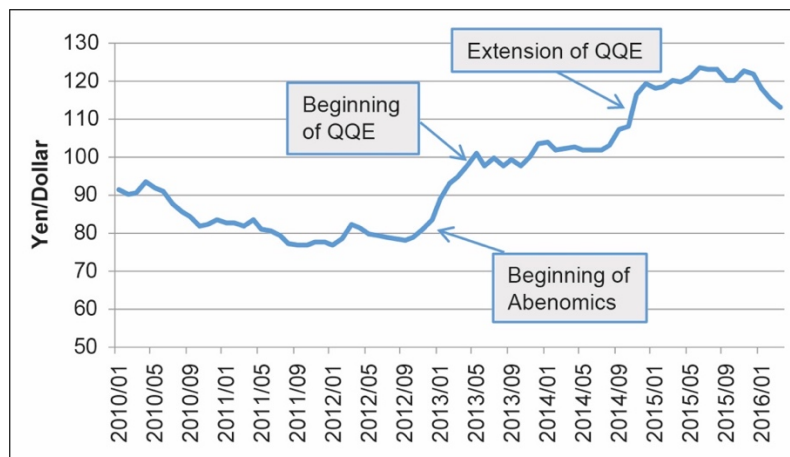
Figure 1: Base Money in Japan

QQE = quantitative and qualitative monetary easing.

Source: Bank of Japan.

The foreign exchange market reacted sensitively to the new policy regime (see, for example, Kano [2015]). As Figure 2 shows, the yen-dollar rate, which had been around ¥80 = \$1 in 2012, depreciated to ¥88 = \$1 at the beginning of January 2013 and ¥102 = \$1 on 15 May 2013. The expansion of QQE on 31 October 2014 led to a further depreciation of the yen, which had positive effects on the Japanese economy (see, for example, Shioji [2015]). However, in the early phase of Abenomics, several Asian EMEs showed serious concern about the yen's depreciation because of a potential beggar-thy-neighbor effect, resulting in regional competitive devaluation.

Figure 2: The Yen-dollar Exchange Rate Before and After Abenomics



QQE = quantitative and qualitative monetary easing.

Source: Time Series Data Search, Bank of Japan.

For example, an article in the *International Business Times* on 1 March 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.”⁴ It then cited a remark by Republic of Korea 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 [Republic of Korea’s] firms.” An article in the *Wall Street Journal* on 7 March 2013 also reported a concern by the president of the People’s Republic of China’s (PRC) giant sovereign-wealth fund China Investment Corp. 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.”⁵

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 East Asian stock prices. We find that the East Asian stock markets, which had first reacted to the yen’s depreciation negatively, came to respond positively as QQE progressed. This implies that Japan’s QQE had much smaller beggar-thy-neighbor effects than what was

⁴ Available at <http://www.ibtimes.com/currency-wars-2013-japans-weak-yen-strikes-big-blow-us-dollar-south-korean-won-euro-1109062> (accessed 1 March 2013).

⁵ Available at <http://www.wsj.com/articles/SB10001424127887324034804578343913944378132> (accessed 7 March 2013).

originally feared. We also find that this happened because the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect as QQE progressed.

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

2. THE ESTIMATION

In the following analysis, we examine how the stock price in a given East Asian economy changes when the yen depreciates. Specifically, we estimate the following equation with a constant term:

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

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

Since Yen_t increases when the yen depreciates against the US dollar, its coefficient, α_j , takes a negative (positive) sign if the yen's depreciation has a negative (positive) spillover effect on country j 's stock price. The focus of the following empirical analysis is on which sign the coefficient α_j takes in East Asian economies. The yen's exchange rate is, however, affected by various exogenous factors. Since our focus is on 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 from 9 a.m. Tokyo time to 5 p.m. Tokyo time.⁶ To the extent that the exchange rate responds instantaneously to unanticipated news, it is natural that Japan's unconventional monetary policy should reflect the intra-daily change of the yen-dollar rate because the BOJ announces its policy in Tokyo during the daytime.⁷

In equation (1), we include various control variables to avoid spurious correlation caused by other external shocks. The first group includes US government bond yields, that is, $USBond5_t$ and $USBond10_t$. Due to the FRB's QE policy, US short-term interest rates hit the zero bound after the GFC. But US long-term interest rates remained positive even under the QE policy. It is thus likely that declines in $USBond5_t$ and $USBond10_t$ reflect the expansion of US unconventional monetary policy. Their coefficients take a positive (negative) sign if the expansion of the US QE policy had a negative (positive) spillover effect on country j 's stock price. The second control

⁶ Fukuda (2016) showed that the nighttime yen-dollar rate in Tokyo had very different features from that in the daytime.

⁷ From January 2010 to December 2015, the BOJ announced all of its statements on monetary policy and other important policy decisions between 10 a.m. and 3 p.m. Tokyo time.

variable is the PRC stock price index (i.e., Shanghai SSEC), which is denoted by $China_t$. In the 2000s, most of the East Asian economies dramatically tightened linkages with the PRC. It is thus likely that the spillover effects of the PRC stock market on East Asian stock markets were substantial. The coefficient δ_j should take a positive sign if the PRC stock market boom had a positive spillover effect on country j 's stock price. The third group of control variables is the lagged values of country j 's stock price, $SP_{j,t}$, and exchange rate, $EX_{j,t}$, both of which reflect local shocks.⁸ In particular, country j 's exchange rate removes any spurious stock price correlation with the yen that may have arisen when both were synchronized. To the extent that the currency devaluation has a positive effect on the local economy, the coefficient φ_j should take a positive sign.

We took two-business-day lags for all the explanatory variables and estimated equation (1) with a constant term. The sample period of the estimation is from 2 January 2012 to 31 December 2015. However, it is likely that equation (1) had some structural break(s) in the sample period. Thus, we estimate equation (1) and allow for structural break(s). To identify them, we apply the test provided by Bai and Perron (2003). Unlike the Chow regime change test at a prior known date, the Bai-Perron test identifies multiple unknown break dates. Assuming 15% trimming and allowing the error distributions to differ across breaks, we use it to explore multiple unknown break dates and their significance at the 1% level.

All data in the estimation are daily. Local exchange rates were downloaded from *Datastream*. All 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: the Republic of Korea; Indonesia; Malaysia; Singapore; Thailand; Taipei,China; and Hong Kong, China.⁹ The stock price indexes used in the following analysis are the Seoul Composite Index; Indonesia Jakarta Composite Index; Malaysia KLSE Composite Index; Singapore (SES) Strait Times Index; Thailand SET-Index; Taipei,China Weighted Price; and Hong Kong, China Hang Seng Stock Index.

3. ESTIMATION RESULTS

3.1 Structural Breaks

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

The identified structural break dates vary across the economies. However, except for Indonesia; Malaysia; and Hong Kong, China, the test identifies a structural break between late May in 2013 and August in 2013. The sub-sample period before late May in 2013 includes the early Abenomics phase during which the BOJ announced the 2% inflation target on 22 January and started QQE on 4 April. This implies that in most of the East Asian stock markets, early-phase Abenomics responses differed from those in the subsequent phases.

⁸ In the Appendix, we estimate equation (1), including other local variables such as local interest rates and country j 's Credit Default Swap (CDS). However, our main results did not change even if we include the additional local variables in the estimation.

⁹ We excluded the PRC from the sampled economies because the reverse causality from its economy to the Japanese economy is more likely to happen in equation (1).

Table 3: Basic Estimation Results**Republic of Korea**

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–1 August 2013		2 August 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Indonesia

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–13 January 2014		14 January 2014–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

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Table 3 *continued***Malaysia**

Variable	Estimation Period I		Estimation Period II	
	2 January 2012– 11 December 2014		12 December 2014– 13 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Singapore

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–23 July 2013		24 July 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

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Table 3 *continued*

Thailand

Variable	Estimation Period I		Estimation Period II		Estimation Period II	
	2 January 2012– 15 May 2013		16 May 2013– 15 January 2014		16 January 2014– 31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Taipei, China

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–31 July 2013		31 July 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

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Table 3 *continued*

Hong Kong, China

Variable	Estimation Period I		Estimation Period II	
	2 January 2012– 24 November 2014		25 November 2014– 31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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: * = significant at 10%; ** = significant at 5%; and *** = significant at 1%.

$\Delta \ln(Yen_t)$ = 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 PRC 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 the local currency.

Source: Author's estimation.

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

3.2 Effects of the Yen's Depreciation

Since the yen depreciated dramatically when Abenomics introduced the new policy regime, it is important to see which sign the coefficient of $\Delta \ln(Yen_{t-j})$ takes in equation (1) and how it evolves over time for various East Asian indexes. Table 3 indicates a marked contrast in the coefficient of $\Delta \ln(Yen_{t-j})$ after the first structural break in the East Asian economies. That is, in 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 for Hong Kong, China: −0.29 in the Republic of Korea; −0.05 in Indonesia; −0.07 in Malaysia; −0.08 in Singapore; −0.10 in Thailand; −0.10 in Taipei, China; and 0.01 in Hong Kong, China. Although most of the coefficients were statistically insignificant, one was significantly negative in the Republic of Korea; Singapore; Taipei, China; and Hong Kong, China.

However, in estimation period II, the sum of the coefficients took large positive values in all East Asian stock markets: 0.37 in the Republic of Korea; 0.52 in Indonesia; 0.30 in Malaysia; 0.27 in Singapore; 0.59 in Thailand; 0.53 in Taipei, China; and 0.40 in Hong Kong, China. None of the coefficients were significantly negative, except for Malaysia and Singapore. This implies that the yen's depreciation, which had weak negative spillover effects during the early phase of Abenomics, came to have large positive spillover effects on East Asian stock markets in the subsequent phases.

The estimation results before the first structural break may have reflected several Asian EMEs' serious concerns about the yen's depreciation because of the possible regional beggar-thy-neighbor effect. However, our results indicate that such concerns disappeared as Abenomics progressed, and most East Asian stock markets came to welcome the subsequent positive spillover effects of Japan's unprecedented, unconventional monetary policy.

3.3 Effects of the United States Quantitative Easing

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 the East Asian stock markets.

Under conventional monetary policy where short-term interest rates are positive, it is likely that $USBond5_t$ will decline more than $USBond10_t$ when the FRB loosens monetary policy. The negative sign of $\Delta USBond5_{t-j}$ thus implies that the FRB's expansion of 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 the FRB expanded its QE policy. The positive sign of $\Delta USBond10_{t-j}$ thus implies that expansion of the FRB's unconventional QE policy might have a negative spillover effect on East Asian stock markets.

3.4 Other Effects

Except in estimation period II in Malaysia, the effect of the current PRC stock price, i.e., $\Delta \ln(China_t)$, was significantly positive in all East Asian stock markets throughout the whole sample period. This reflects the strong instantaneous linkages of the East Asian economies with the PRC. 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 PRC stock price volatility accompanied by a subsequent growth rate slowdown.

Regarding the effects of the lagged dependent variables, they were significantly positive in Indonesia; Malaysia; and Hong Kong, China, suggesting some stock price persistence. However, 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 controlling for external shocks.

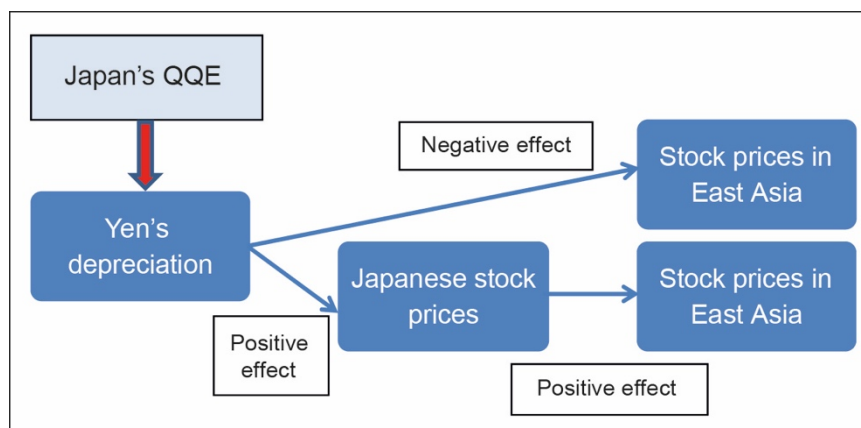
More interestingly, the coefficients of $\Delta \ln(EX_{j,t-j})$ take a negative sign in many of the East Asian economies. In particular, the coefficient of $\Delta \ln(EX_{j,t-j})$ was significantly negative in Indonesia; Malaysia; Singapore; and Hong Kong, China before the structural break and in the Republic of Korea; Singapore; Taipei, China; and Hong Kong, China after the structural break. This implies that contrary to 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 incorporating extra variables.

4. WHY DID JAPAN'S QQE HAVE A SMALLER BEGGAR-THY-NEIGHBOR EFFECT?

In the previous section, we found that stock markets in East Asia, which initially showed weakly negative responses to the yen's depreciation, came to respond positively as QQE progressed. The purpose of this section is to investigate why Japan's QQE had a smaller beggar-thy-neighbor effect in seven Asian economies: the Republic of Korea; Indonesia; Malaysia; Singapore; Thailand; Taipei, China; and Hong Kong, China.

The hypothesis we explore in this section is that Japan's QQE had no beggar-thy-neighbor effect because the positive spillover effect of Japan's stock market recovery superseded the yen's depreciation. QQE caused not only substantial 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 effect of QQE would have benefited neighboring economies, even in the event of the yen's depreciation (Figure 3).

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



QQE = quantitative and qualitative easing.

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

Source: Author's illustration.

The following analysis tests this hypothesis using the same data set from Section 3. To examine the spillover effect of Japan's stock market recovery, we estimate the following equation with a constant term:

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

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

Although we add current and lagged values of 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 should take a positive sign if Japan's stock market recovery has a 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 for 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 3.¹⁰ The daily Nikkei 225 data were downloaded from *Nikkei Financial Quest*. Table 4, which summarizes the estimation results for the seven Asian economies, shows that the US government bond yields (i.e., $\Delta USBond5_{t-j}$ and $\Delta USBond10_{t-j}$), the PRC 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 stocks as those in Table 3, even when adding current and lagged values of Japan's stock price index as explanatory variables.

However, the coefficients of the Japanese yen (i.e., $\Delta \ln(Yen_{t-j})$) have very different features from those in Table 3. First, in estimation period I, the sum of the coefficients, that is, $\sum_{j=0}^2 \alpha_j$, has large negative values in all East Asian economies: -0.78 in the Republic of Korea; -0.42 in Indonesia; -0.25 in Malaysia; -0.53 in Singapore; -0.58 in Thailand; -0.55 in Taipei, China; and -0.47 in Hong Kong, China. In Table 3, the sum of the coefficients is negative in estimation period I. However, its magnitude becomes much larger when we add current and lagged values of Japan's stock price index. Secondly, in estimation period II, the sum of the coefficients turns negative in most of the East Asian economies: -0.20 in the Republic of Korea; -0.13 in Malaysia; -0.19 in Singapore; and -0.57 in Hong Kong, China. Even in Indonesia; Thailand; and Taipei, China; where the sum of the coefficients is positive, the absolute value is much smaller in Table 4 than in Table 3. This implies that when we allow for the effects of Japan's stock market recovery, the yen's depreciation no longer has large positive spillover effects on East Asian stock markets, even in the subsequent Abenomics periods.

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

¹⁰ In the case of Thailand, we consolidated estimation periods II and III.

Table 4: Estimation Results with Japan's Stock Price Changes**Republic of Korea**

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–1 August 2013		2 August 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	-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

Indonesia

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–13 January 2014		14 January 2014–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	-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

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Table 4 *continued***Malaysia**

Variable	Estimation Period I		Estimation Period II	
	2 January 2012– 11 December 2014		12 December 2014– 31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	-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

Singapore

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–23 July 2013		24 July 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	-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

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Table 4 continued

Thailand

Variable	Estimation Period I		Estimation Period II+III	
	2 January 2012–15 May 2013		16 May 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Taipei, China

Variable	Estimation Period I		Estimation Period II	
	2 January 2012–30 July 2013		31 July 2013–31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	-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

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Table 4 *continued*

Hong Kong, China

Variable	Estimation Period I		Estimation Period II	
	2 January 2012– 24 November 2014		25 November 2014– 31 December 2015	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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: * = significant at 10%; ** = significant at 5%; and *** = significant at 1%.

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

Source: Author's estimation.

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

5. ROBUSTNESS

In previous sections, we found that stock markets in East Asia came to respond positively as QQE progressed because the spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect in the region. The purpose of this section is to investigate the robustness when we include global market risk and extra local variables as explanatory variables. The global risk variable 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 are the “10-year sovereign CDS” and the “overnight interest rate”. Including many explanatory variables may raise the concern of 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 the daily data are sticky for long periods. Nonetheless, the VIX, which is often referred to as the fear index, represents a measure of the global market’s expectation of volatility over the next 30-day period. In addition, the 10-year sovereign CDS may reflect long-run risk in each economy, while the overnight interest rate may reflect monetary policy in each economy.

By reusing the previous sections’ data, the following analysis estimates equations (1) and (2) with these extra variables for six Asian economies: the Republic of Korea; Indonesia; Malaysia; Singapore; Thailand; and Taipei,China.¹¹ Specifically, we estimate the following equation with a constant term:

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

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 CDSs, and overnight interest rates were downloaded from *Datastream*.¹² Table 5, which summarizes the estimation results for the six Asian economies, reports the estimation results with and without current and lagged values of Japan’s stock price (i.e., $\Delta \ln(JSP_{t-j})$).

Because of possible multicollinearity, some of the control variables become less significant when we add 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, becomes statistically insignificant in most of the East Asian economies. The overnight interest rate is not significant in most of the regressions, while the 10-year sovereign CDS is not significant in Singapore and Taipei,China. However, VIX is significantly negative in almost all the regressions. More importantly, most of the explanatory variables, especially the key variables, $\Delta \ln(Yen_{t-j})$ and $\Delta \ln(JSP_{t-j})$, have essentially similar impacts on the East Asian stock prices to those in Tables 3 and 4, even when adding the extra explanatory variables.

¹¹ To save space, we drop Hong Kong, China from the sample in this section.

¹² In Singapore, the 10-year sovereign CDS did not change in estimation period II. We thus use the sovereign CDSs of Singapore Power Ltd.

Table 5: Estimation Results with Local Exchange Rates

Republic of Korea

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–1 August 2012				2 August 2013–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Indonesia

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–13 January 2014				14 January 2014–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

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Table 5 *continued*

Malaysia

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–11 December 2014				12 December 2014–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Singapore

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–23 July 2013				24 July 2013–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

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Table 5 continued

Thailand

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–15 May 2013				16 May 2013–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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

Taipei, China

Variable	Estimation Period I				Estimation Period II			
	2 January 2012–31 July 2013				31 July 2013–31 December 2015			
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
$\Delta \ln(Yen_t)$	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: * = significant at 10%; ** = significant at 5%; and *** = significant at 1%.

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 in Tables 4 and 5.

The coefficients of ΔVIX_{t-2} are multiplied by 100.

Source: Author's estimation.

Without the current and lagged values of $\Delta \ln(JSP_{t-j})$ as explanatory variables, Table 5 replicates the estimation results in Section 3. That is, in all East Asian stock markets, the sum of the coefficients of $\Delta \ln(Yen_{t-j})$ is negative in estimation period I, while it takes a large positive value in estimation period II. This implies that we can see that even if we allow for the effect of VIX and two extra local variables, the stock markets in East Asia, which had first reacted negatively to the yen's depreciation, came to respond positively as the QQE progressed, when we do not allow for the positive spillover effect of Japan's stock price recovery.

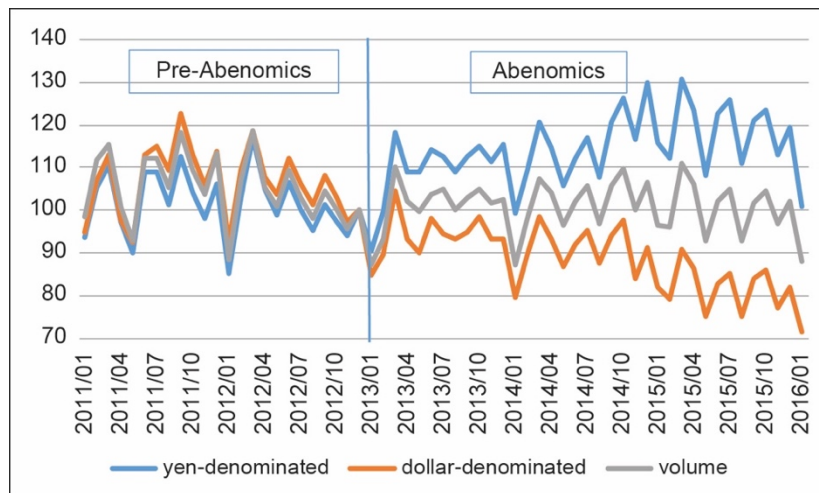
Even when we include current and lagged values of $\Delta \ln(JSP_{t-j})$ as explanatory variables, Table 5 replicates the results in Section 3 for estimation period I. That is, in estimation period I with current and lagged values of $\Delta \ln(JSP_{t-j})$, the sum of the coefficients of $\Delta \ln(Yen_{t-j})$ takes a large negative value, while that of $\Delta \ln(JSP_{t-j})$ takes a positive value in all of the East Asian stock markets. This implies that Japan's QQE had both negative and positive spillover effects on neighboring economies. However, in estimation period II, that of $\Delta \ln(Yen_{t-j})$ was (except in Singapore) positive, even when we include current and lagged values of $\Delta \ln(JSP_{t-j})$, although the sum of the coefficients of $\Delta \ln(JSP_{t-j})$ is positive in all economies except Thailand. This is in marked contrast to Table 4. The result strongly supports our view that stock markets in East Asia came to respond positively as QQE progressed. But it is not consistent with our hypothesis that Japan's QQE had no beggar-thy-neighbor effect. This may be because including many extra explanatory variables caused multicollinearity and made the estimation results unstable in the regressions. Unlike in estimation period I, most of the coefficients of $\Delta \ln(Yen_{t-j})$ were not statistically significant in estimation period II when we included the 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 demonstrated that QQE could have benefitted the East Asian economies if the positive spillover effect of Japan's stock market recovery dominated the beggar-thy-neighbor effect of the yen's depreciation in the region. However, even if we allow for the positive spillover effect, the yen's depreciation had very limited beggar-thy-neighbor effects on East Asian stock markets as QQE progressed. The purpose of this section is to explore the other reasons why QQE had much smaller beggar-thy-neighbor effects than were originally feared. Specifically, this section reports two types of stylized facts that may explain this.

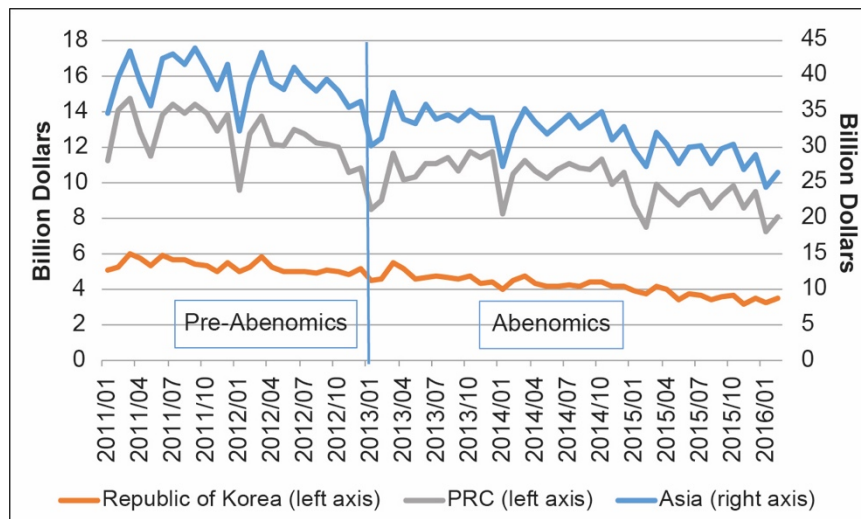
The first is how Japan's exports changed when the yen depreciated under Abenomics. Figure 4 depicts Japan's exports in terms of their yen-denominated amount, their dollar-denominated amount, and their volume from January 2011 to January 2016. Soon after the new regime started, Japan's exports made a modest improvement from January 2013 to March 2013. However, after March 2013, the improvement did not persist, even when the Japanese yen remained weak. The amount of yen-denominated exports increased on average, but there were no significant increases in volume. More importantly, the amount of dollar-denominated exports shows significant declines on average after Abenomics started.

Figure 4: Japan's Exports, January 2011–December 2014

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

Source: Ministry of Finance, *Trade Statistics of Japan*. International Monetary Fund, *International Financial Statistics*.

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, the Republic of Korea, and the PRC from January 2011 to February 2016. The exports increased soon after Abenomics started in December 2012 and after the BOJ expanded QQE at the end of October 2014. But the improvement was modest. More importantly, the improvement did not persist even when the yen depreciated substantially. The dollar-denominated amount of Japan's exports to Asia on average rather declined after Abenomics started.

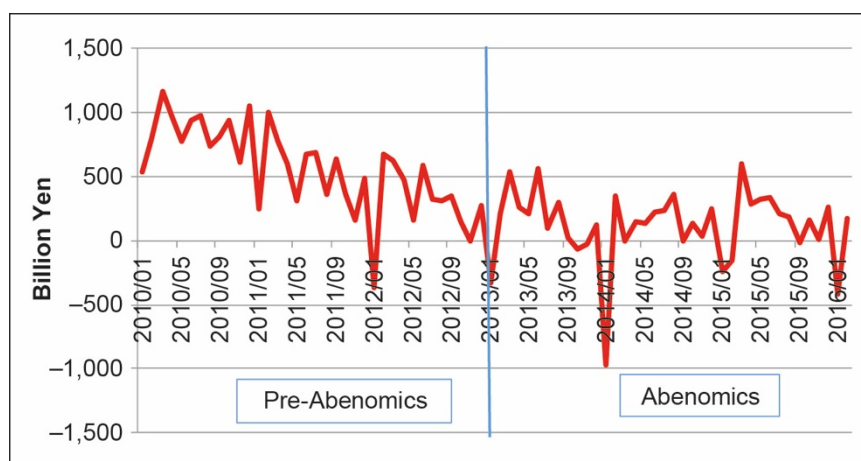
Figure 5: Japan's Exports to Asia, the Republic of Korea, and the PRC

PRC = People's Republic of China.

Source: Ministry of Finance, *Trade Statistics of Japan*.

The decline in exports accompanied by increased imports deteriorated Japan's current account surplus in the same period. This was especially true for international trade with Asian economies. Figure 6 depicts Japan's yen-denominated trade balance with Asia from January 2010 to February 2016. In the pre-Abenomics period, Japan had a large trade surplus against Asian economies, except in February 2012. But the trade account against Asian economies 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 serious concerns, the trade balance statistics show that the yen's depreciation did not have a regional beggar-thy-neighbor effect. It is likely that this reduced concern for the yen's depreciation in East Asia as QQE progressed.

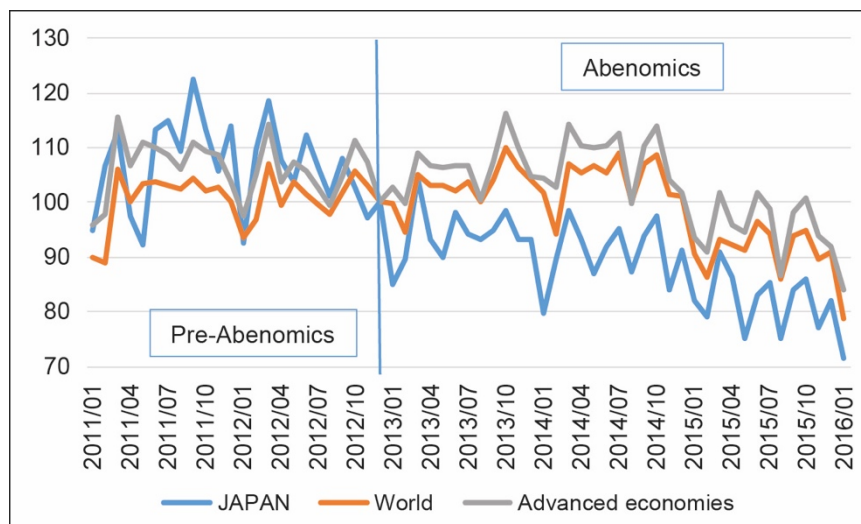
Figure 6: Japan's Trade Balance with Asian Economies



Source: Ministry of Finance, *Trade Statistics of Japan*.

One may argue that weak external demand in the world economy may explain why Japan's exports did not increase even when the yen depreciated substantially. The US economy accomplished a relatively fast recovery from the GFC. But European economies remained weak after the euro crisis, while EMEs, especially the PRC, grew slower from 2012. Thus, weak overall demand in the world economy had an equivalent effect for Japanese exports.¹³ However, even comparing exports in other economies, Japan's exports declined more substantially after the new policy regime started. Figure 7 depicts Japan's exports, world total exports, and aggregate exports in advanced economies from January 2011 to January 2016 (all denominated in US dollars). In the 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 aggregate exports in advanced economies only showed a limited decline, while Japan's exports declined significantly.

¹³ The world growth rate, which was around 5% in 2010, declined to around 2.5% in 2013. In particular, the PRC growth rate, which was over 10% in 2010, decreased to less than 8% in 2012.

Figure 7: Dollar-denominated Exports in Japan and Other Economies

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

Source: International Monetary Fund, *International Financial Statistics*.

6.2 Exchange Rates in East Asian Economies

The second stylized fact is how exchange rates in East Asian economies changed after the yen-dollar rate depreciated. As shown in Figure 2, the yen-dollar rate, which had been around ¥80 = \$1 in 2012, depreciated to ¥102 = \$1 on 15 May 2013. The expansion of QQE led to further depreciation. The purpose of this sub-section is to explore how East Asian exchange rates responded to the yen's dramatic depreciation under Japan's unconventional monetary.

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

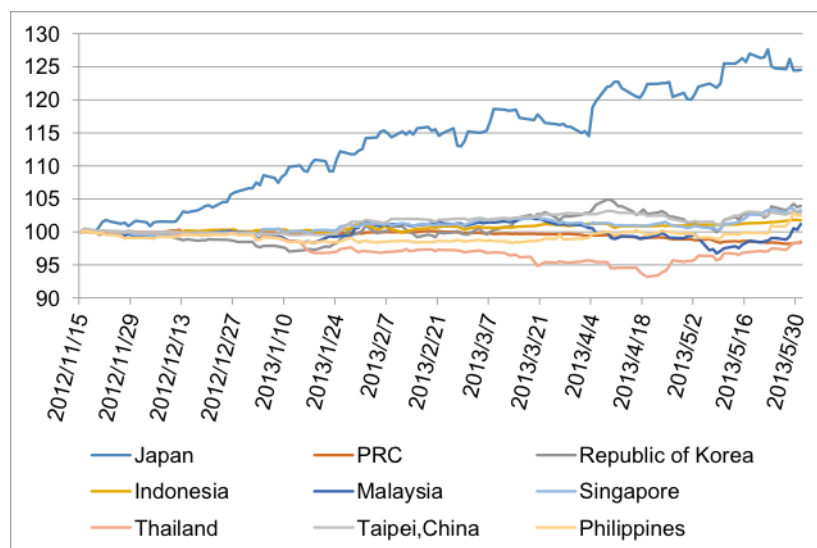
The first sub-period (i) is the early phase of Abenomics, when the introduction of unprecedented unconventional policy was announced. In the figure, we find remarkable asymmetry between the yen and other East Asian currencies. That is, the yen depreciated by nearly 25%, while the other East Asian currencies depreciated only modestly. Consequently, the yen depreciated not only against the US dollar, but also against the other East Asian currencies. Before Abenomics started, the yen had remained very strong against the other East Asian currencies.¹⁴ We may interpret that the early-phase depreciation was an adjustment process of such excess appreciation of the yen that had occurred in the pre-Abenomics period.

¹⁴ For example, from 2 July 2007 to 30 December 2011, the yen appreciated against the US dollar by 37%, while the Korean won depreciated against the US dollar by 24%.

The second sub-sample period (ii) corresponds to when the yen remained relatively stable against the US dollar because the BOJ released no additional news on its unconventional policy. Among the East Asian currencies, the Indonesian rupiah depreciated by 20%, while the Korean won appreciated by 10%. However, the other East Asian currencies were relatively stable against the US dollar. Consequently, the yen was relatively stable against most of the other East Asian currencies for the sub-sample period. After the excess appreciation was adjusted for, the yen was stable until the BOJ took additional policy action.

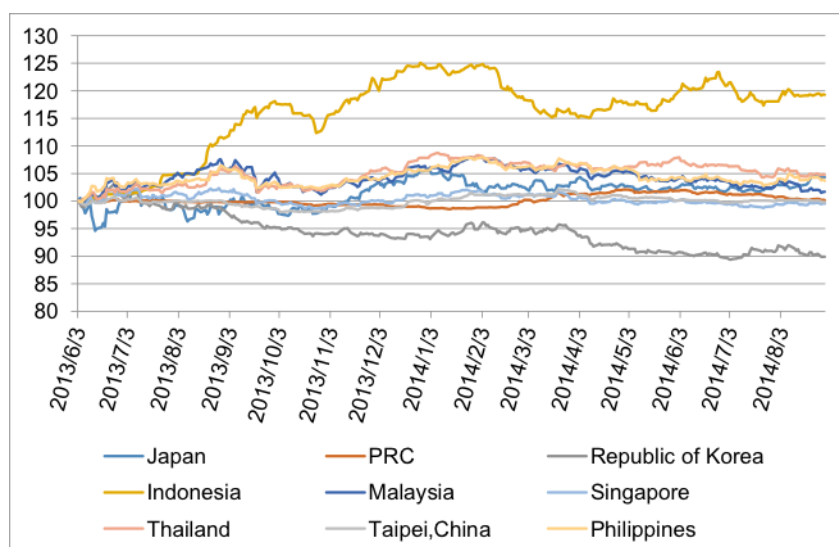
Figure 8: Accumulated Exchange Rate Changes in East Asia Currencies

(i) 15 November 2012–31 May 2013



Note: The values on 15 November 2012 are normalized to 100.

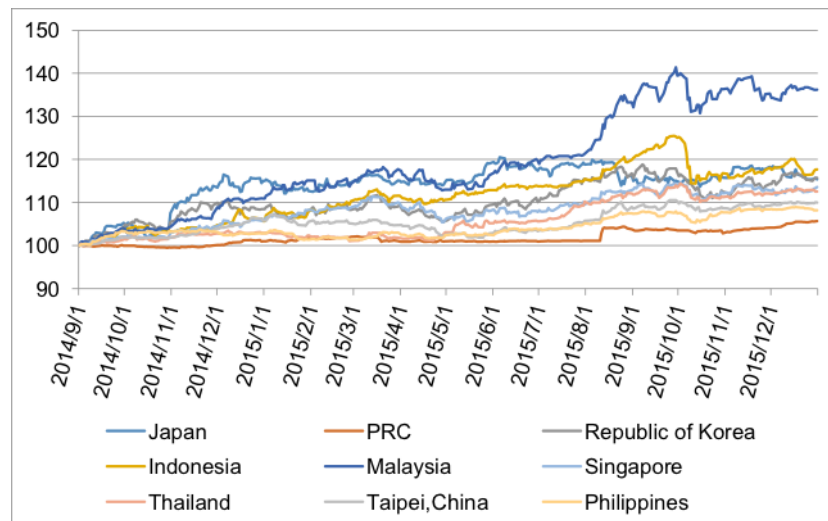
(ii) 1 June 2013–29 August 2014



Note: The values on 1 June 2013 are normalized to 100.

Figure 8 continued

(iii) 1 September 2014–31 December 2015



Note: The values on 1 September 2014 are normalized to 100.

PRC = People's Republic of China.

Source: Datastream.

The third sub-sample period (iii) corresponds to when the yen showed another substantial depreciation against the US dollar. At the beginning of the period, the BOJ expanded QQE. But unlike for the first sub-sample period, there were no conspicuous asymmetric changes between the yen and the other East Asian currencies. Depreciation was modest in the yuan, but the other East Asian currencies depreciated substantially. In particular, the Indonesian rupiah depreciated by more than 30%, and the Malaysian ringgit depreciated by nearly 20%. On 18 December 2013, the FRB announced its 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 shows normalized values on 2 July 2007 to 100 and shows the yen's value on three specific dates in the Abenomics period: 31 December 2013; 31 December 2014; and 31 December 2015. Noting that a smaller value means a depreciation of the yen against the East Asian currency, we can see that after the GFC, the yuan appreciated against the yen by more than 10%, and the Singapore dollar appreciated against the yen by nearly 5%. However, no other East Asian currency showed such significant appreciation against the yen after the GFC. This implies that once we allow for the fact that the yen was strong against the other East Asian currencies in the pre-Abenomics period, the yen's depreciation in the Abenomics period did not necessarily weaken the yen against East Asian currencies. This may also explain why the yen's depreciation had limited regional beggar-thy-neighbor effects.

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

	2 July 2007	31 December 2013	31 December 2014	31 December 2015
People's Republic of China	100	92.6	83.2	86.8
Republic of 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
Taipei, China	100	105.8	98.4	101.9
Philippines	100	112.5	99.4	104.2

Note: The yen's value on 2 July 2007 is normalized to 100. A larger value means that the yen is stronger against the East Asian currency.

Source: Author's calculation.

7. CONCLUDING REMARKS

In this paper, we explored the spillover effects of QQE on East Asian economies. After Prime Minister Abe advocated the new policy regime, the substantial depreciation of the yen raised concerns that there would be a beggar-thy-neighbor effect in the region. However, our empirical results indicate that contrary to initial concerns, stock markets in East Asia, which had first reacted to the yen's depreciation negatively, came to respond positively as QQE progressed. This implies that Japan's QQE had much smaller beggar-thy-neighbor effects than were originally feared. Our empirical results also support that this happened because the positive spillover effect of Japan's stock market recovery dominated the regional beggar-thy-neighbor effect as QQE progressed.

However, it is worthwhile to note 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 QQE progressed. Section 6 discussed two stylized facts that may explain the reasons, but we may also point out two other reasons: one is the increased role of the supply chain in East Asia. In the 2000s, a number of Japanese corporations shifted their plants to East Asia. It is likely that a beggar-thy-neighbor effect was very small under increasing overseas production of Japanese corporations. In the literature, Fukuda and Doita (2016) show 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 has no effect on exports because of fixed costs for shifting the plant to the different location. Their paper confirms that the model could track Japan's exports reasonably well, especially after the new policy regime started.

The other reason is the limited role of the yen as an international currency. In East Asia, the US dollar is the dominant international currency. Thus, highly accommodative US monetary policy could have a large impact on the rest of the world, including Asian EMEs. In contrast, the internationalization of the Japanese yen has been limited, even regionally. This may imply that, unlike US unconventional policy, Japan's unconventional monetary policy had a limited negative spillover effect on Asian economies.

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