Dynamic Effects of Changes in the Exchange Rate System
NAOYUKI YOSHINO, SAHOKO KAJI, AND TAMON ASONUMA∗

We propose a new dynamic transition analysis on the basis of a small open economy dynamic stochastic general equilibrium model. Our proposed analysis differs from existing static and conventional dynamic analyses in that shifts from a fixed exchange rate regime to a basket peg or a floating regime are explicitly explored. We apply quantitative analysis, using data from the People’s Republic of China and Thailand, and find that both economies would be better off shifting from a dollar peg to a basket peg or a floating regime over the long run. Furthermore, the longer the transition period, the greater the benefits of shifting to a basket peg regime from a dollar peg regime owing to limited volatility in interest rates. Regarding sudden shifts to a desired regime, the welfare gains are larger under a shift to a basket peg if the exchange rate fluctuates significantly.

Keywords: basket peg, dynamic transition analysis, East Asia, exchange rate regime, transition path
JEL codes: F33, F41, F42

I. Introduction

We have witnessed many shifts in exchange rate regimes in emerging market economies over the last 3 decades. Economies such as Chile, Israel, and Poland have undergone gradual adjustments of their exchange rate toward a free-floating regime, while others—such as the Czech Republic, Jamaica, Lithuania, and Uruguay—have chosen to make rapid exchange rate adjustments. Most economies in the Association of Southeast Asian Nations, the People’s Republic of China (PRC), Japan, and the Republic of Korea (ASEAN+3) have experienced shifts from one regime to another in the period following the 1997/98 Asian financial crisis.

∗Naoyuki Yoshino: Asian Development Bank Institute. E-mail: nyoshino@adbi.org. Sahoko Kaji: Department of Economics, Keio University. E-mail: kaji@econ.keio.ac.jp. Tamon Asonuma (corresponding author): Research Department, International Monetary Fund. E-mail: tasonuma@imf.org. The authors would like to thank the managing editor, two anonymous referees, seminar and conference participants at the Asian Economic Panel, the Asia-Pacific Economic Association, Boston University, IMF Asia and the Pacific Department, IMF Monetary and Capital Market Department, IMF Regional Office for Asia and the Pacific, Keio University, the Japanese Economic Association, the Japan Society of Monetary Economics, and the Ministry of Finance (Japan) for helpful comments and suggestions. The views expressed here are those of the authors and should not be attributed to the institutions with which they are affiliated. The usual disclaimer applies.

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Some of these economies also implemented capital account measures during the postcrisis period.

The literature on exchange rate regimes has explored only static and conventional dynamic analyses. Static analysis focusing on the 1997/98 Asian financial crisis relies on losses over a short time horizon (e.g., 1 quarter). It then compares optimality among a dollar peg, a basket peg, and a floating regime, given free capital mobility. The regime under each option in the static analysis is restricted to one type of exchange rate regime. In contrast, conventional dynamic analysis covers a longer time horizon (e.g., 10 years or an infinite time horizon). Similar to static analysis, exchange rate regimes are assumed to remain stable over the specified horizon and are compared with one another to determine the most desirable regime over the long run.

Though both static and conventional dynamic analyses were quite appropriate in the aftermath of the 1997/98 Asian financial crisis, the scope to which monetary authorities can apply these analyses has become more limited over time. Among the critical drawbacks with these types of analysis is that they do not take into consideration shifts in one exchange rate regime to another or the costs associated with such shifts. Obviously, any shift to a different regime entails costs for the monetary authorities. Equally important, all of the exchange rate regimes included in static and dynamic analyses operate under free capital mobility rather than strict or weak capital controls.

These limitations raise an important question that has not yet been answered in the literature on exchange rate policy in East Asia: can we construct a new approach to theoretical analysis in the context of East Asian economies that have experienced shifts from one regime to another?

This paper proposes a new “dynamic transition analysis” on the basis of a small open economy dynamic stochastic general equilibrium (DSGE) model. Our proposed analysis differs from existing analysis in that shifts from a fixed exchange rate regime to a basket peg or a floating regime are explicitly explored. Moreover, during the shifts, we incorporate changes in capital account restrictions. In particular, we consider five policies: (1) maintaining a dollar peg (with strict capital controls), (2) a gradual shift from a dollar peg to a basket peg without capital controls (a gradual adjustment of both capital controls and basket weight), (3) a sudden shift from a dollar peg to a basket peg without capital controls (a sudden removal of capital controls and a sudden change in basket weight), (4) a sudden shift from a dollar peg to a floating regime (a sudden removal of capital controls and a sudden increase in flexibility in the exchange rate), and (5) a sudden shift from a dollar peg to a managed-floating regime (a sudden removal of capital controls and a sudden

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2For East Asia, see Ito, Ogawa, and Sasaki (1998); Ogawa and Ito (2002); Yoshino, Kaji, and Suzuki (2004); and Yoshino, Kaji, and Asonuma (2004).

3For East Asia, see Yoshino, Kaji, and Suzuki (2002); and Shioji (2006a, 2006b).
increase in flexibility in the exchange rate with occasional interventions). For each transition policy, we obtain a theoretical expression for the cumulative loss.

On the basis of our dynamic transition analysis, we draw four conclusions. First, we find that maintaining a dollar peg is desirable only over the short run, which suggests that an economy will be better off shifting to either a basket peg or a floating regime over the long run. Second, given the choice between a gradual adjustment toward the target basket peg, policy (2), or a sudden shift to the target basket peg, policy (3), a longer transition period will deliver greater benefits to the economy than immediately implementing the desired regime.

Third, given the comparison between a sudden shift to a basket peg, policy (3), and a sudden shift to a floating regime, policy (4), the welfare gains to an economy would be higher under a shift to a basket peg if the exchange rate fluctuates significantly. The economy would be able not only to stabilize the negative impacts of exchange rate fluctuations on trade and capital inflows, but also allow the private sector to formulate exchange rate expectations by committing to a basket peg over the long run. Lastly, it is less beneficial to shift to a managed-floating regime than to a basket peg because intervening in the foreign exchange market leads to greater losses since the relevant authority lacks monetary policy autonomy. Our quantitative analysis using data from the PRC and Thailand supports these findings.\(^4\)

The rest of the paper is structured as follows. In section II, we provide an overview of the development of exchange rate regimes and capital account management in ASEAN+3 in the post-Asian financial crisis period. In section III, we explain the limitations of both static and conventional dynamic analyses with regard to exchange rate regimes. Section IV provides a DSGE model of a small open economy and analyzes how an economy reaches a state of stable equilibrium under each of the five policy regimes described above. In section V, we define in more detail these five exchange rate policies, which include four transition policies and a policy of maintaining a dollar peg. Section VI focuses on the optimal transition policy. Simulation exercises using data from the PRC and Thailand are provided in Section VII. Section VIII concludes.

A. Literature Review

Several previous studies explore desirable exchange rate regimes in East Asia in the static context. On the one hand, Ito, Ogawa, and Sasaki (1998) and Ogawa and Ito (2002) find that a basket peg is desirable in a general equilibrium model that

\(^4\)Yoshino, Kaji, and Asonuma (2012) analyze a comparison between a basket peg and a floating regime by implementing specified instrument rules for the cases of Singapore and Thailand.

\(^5\)Yoshino, Kaji, and Asonuma (2015b) explore the cases of Malaysia and Singapore, without changes in capital account management, following the PRC’s transition to a desirable regime.
similarly, yoshino, kaji, and suzuki (2004); and yoshino, kaji, and asonuma (2004) confirm the optimality of a basket peg in a general equilibrium model with capital movements across economies. on the other hand, adams and semblat (2004), sussangkarn and vichyanond (2007), and kim and lee (2008) emphasize the advantages of a floating regime by showing that exchange rate flexibility provides greater monetary policy independence, particularly with regard to inflation targeting. for an empirical analysis, mcKibbin and lee (2004) investigate which exchange rate east asian economies should peg to by using economy-specific (asymmetric) shocks and regional (symmetric) shocks.

the other stream of literature discusses conventional dynamic analyses of exchange rate regimes in the region. in this analysis, monetary authorities are assumed to maintain the current exchange rate regime over the long run. yoshino, kaji, and suzuki (2002) show that a basket peg achieves the least cumulative loss among three exchange rate regime options. shioji (2006a, 2006b) confirms the superiority of a basket peg to a dollar peg in a dynamic model using two firm-level invoicing schemes: producer currency pricing and vehicle currency pricing. yoshino, kaji, and asonuma (2012) contrast a basket peg regime with a floating regime using specified instrument rules. we have also reviewed studies on adjustments to capital account management in east asian economies. see also kawai (2004), ito and park (2003), and bird and rajan (2002) for discussions on the desirability of a basket peg. for more details on the exchange rate regimes of hong kong, china, and singapore, see devereux (2003). yoshino, kaji, and asonuma (2015a) explore whether actual policies that have been implemented by east asian economies since the 1997/98 asian financial crisis follow or deviate from theoretically desirable policies over the medium and long run.

we observe two patterns of development in exchange rate regimes. see also kawai (2004), ito and park (2003), and bird and rajan (2002) for discussions on the desirability of a basket peg.

table 1 summarizes transitions in de jure exchange rate regimes in ASEAN+3 in 1999–2008. we observe two patterns of development in exchange rate regimes. according to the IMF (2009, 2011), de jure exchange rate arrangements are those which the authorities have officially announced. on the contrary, ilzetzki, reinhart, and rogoff (unpublished) define alternative classifications

II. Exchange Rate Regimes and Capital Account Management in ASEAN+3

Table 1 summarizes transitions in de jure exchange rate regimes in ASEAN+3 in 1999–2008. We observe two patterns of development in exchange rate regimes.
Table 1. Transitions of De Jure Exchange Rate Regimes in ASEAN+3

| Economy                  | 1999a | 2002a | 2005a | 2008a |
|--------------------------|-------|-------|-------|-------|
| People’s Republic of China | Conventional pegged arrangement | Conventional pegged arrangement | Conventional pegged arrangement | Stabilized arrangement |
| Indonesia                | Independently floating          | Managed floating with no preannounced path for the exchange rate | Managed floating with no predetermined path for the exchange rate | Floating |
| Japan                    | Independently floating          | Independently floating          | Independently floating          | Free floatingb |
| Republic of Korea        | Independently floating          | Independently floating          | Independently floating          | Free floatingb |
| Malaysia                 | Conventional pegged arrangement | Conventional pegged arrangement | Managed floating with no predetermined path for the exchange rate | Floatingc |
| Philippines              | Independently floating          | Independently floating          | Independently floating          | Floating |
| Singapore                | Managed floating with no preannounced path for the exchange rate | Managed floating with no preannounced path for the exchange rate | Managed floating with no predetermined path for the exchange rate | Floatingd |
| Thailand                 | Independently floating          | Managed floating with no preannounced path for the exchange rate | Managed floating with no predetermined path for the exchange rate | Managed floating with no predetermined path for the exchange rate |

ASEAN+3 = Association of Southeast Asian Nations plus the People’s Republic of China, Japan, and the Republic of Korea.

Notes:

a. See IMF (2000, 2003, 2006) for categories of exchange rate arrangements in 1999, 2002, and 2005, respectively. See IMF (2009) for categories of exchange rate arrangements in 2008. In 2003, “the managed floating with no preannounced path for the exchange rate” was changed to the managed floating with no predetermined path for exchange rate.

b. According to IMF (2009), a floating exchange rate is largely market determined, without an ascertainable or predictable path for the rate.

c. The Malaysian ringgit is managed with reference to a currency basket. The composition of the basket is not disclosed.

d. The Singapore dollar is allowed to fluctuate within a targeted policy band and is managed against a basket of currencies of the economy’s major trading partners and competitors.

Sources: International Monetary Fund (IMF). 2000. Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Washington, DC; IMF. 2003. Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Washington, DC; IMF. 2006. Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Washington, DC; IMF. 2009. Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Washington, DC.

First, most economies in ASEAN+3 have experienced a shift from one regime to another in the post-Asian financial crisis period, or at least a small degree of change.
Some economies, such as the PRC and Malaysia, have increased the flexibility of their exchange rate regimes.\textsuperscript{11} Second, other economies, such as Japan and the Republic of Korea, have maintained their (free-floating) exchange rate regime unchanged over the period.

Table 2 reports the primary changes in capital account management measures in the Republic of Korea, Malaysia, and Thailand in 1998–2010.\textsuperscript{12} Faced with spillover effects from the 1997/98 Asian financial crisis, Malaysian authorities initially eliminated offshore ringgit activities and limited portfolio capital outflows. Later, the authorities reversed their strategy, gradually relaxing restrictions on portfolio outflows and offshore transactions. The Republic of Korea moved toward capital outflow liberalization only after the economy had recovered from the crisis. Limits on outward investment were relaxed further in the mid-2000s, leading to the elimination of most controls by 2007. In Thailand, authorities restricted baht deposits for nonresidents. In 2006, they introduced an unremunerated reserve requirement of 30% on capital inflows.

\section*{III. Limitation of Existing Static and Conventional Dynamic Analyses}

Existing static and conventional dynamic analyses are appropriate for comparing the status quo exchange rate regime with a more desirable one (e.g., a dollar peg regime that most East Asian economies had adopted prior to the onset of the 1997/98 Asian financial crisis).

However, the scope to which monetary authorities can apply these static and conventional dynamic analyses has become more limited. Specifically, these types of analyses have four drawbacks when applied to East Asian economies in the post-Asian financial crisis period.

First, and most importantly, these analyses have taken into consideration neither shifts in exchange rate regimes nor the costs associated with shifts. As discussed in section II, the majority of East Asian economies announced their departure from a de facto dollar peg at the onset of the 1997/98 Asian financial crisis and then experienced several changes to their exchange rate regime in the aftermath of the crisis. Obviously, any shift to a different regime entails costs for the relevant monetary authority.

Second, and related to the first point, these analyses do not reflect where East Asian economies currently stand (status quo regime). They rely on the assumption that these economies have implemented a regime that is more desirable than the

\footnotesize{\textsuperscript{11}Ma and McCauley (2011) find that in the 2-year period from mid-2006 to mid-2008 the Chinese renminbi strengthened gradually against trading partner currencies within a narrow band.}\n
\footnotesize{\textsuperscript{12}Yoshino, Kaji, and Ibuka (2003) analyze the effectiveness of capital controls and fixed exchange rates in the case of Malaysia.}
Table 2.  **Capital Account Management Measures, 1998–2010**

| Economy        | Period        | Major Policy Measures                                      |
|----------------|---------------|------------------------------------------------------------|
| Republic of    | 2001–2008     | Outflow liberalization<br>• Elimination of limits on deposits<br>• Relaxation of limits on lending to nonresidents |
| Korea          |               |                                                            |
| Malaysia       | 1998–2001     | Outflows controls<br>• Controls on transfers of funds from MYR-denominated accounts for nonresidents<br>• Removal of the partial and complete exit levies on repatriation of principal |
|                | 1998–2001     | Ringgit transactions<br>• Limit offshore ringgit transactions through restrictions on transfer of funds between MYR-denominated accounts of nonresidents |
|                | 2001–2008     | Ringgit transactions<br>• Abolish restriction on ringgit lending to nonresident-controlled companies onshore<br>• Liberalization of restrictions on ringgit borrowing from and lending to nonresidents |
|                | 1998–2010     | Flexibilities on outflows<br>• Gradual liberalization of restrictions on investments in foreign currency assets<br>• Liberalization to allow settlement of international trade of goods and services with nonresidents in ringgit |
| Thailand       | 2006–2008     | Unremunerated reserve requirement (URR)<br>• Introduction of a 1-year URR for capital inflows<br>• Elimination of the URR |
|                | 2003–2008     | Inflow controls<br>• Limits on short-term borrowing from nonresidents without underlying and on investments in government debt securities |
|                | 2002–2008     | Outflow liberalization<br>• Relaxation of limits on residents’ investments in foreign affiliates and lending abroad |

MYR = Malaysian ringgit.

Sources: Ariyoshi, A., K. Habermeier, B. Laurens, I. Ötker–Robe, J. I. Canales–Kriljenko, and A. Kirilenko. 2000. Capital Controls: Country Experiences with Their Use and Liberalization. IMF Occasional Paper No. 190. Washington, DC: International Monetary Fund (IMF); Baba, C., and A. Kokenyne. 2011. Effectiveness of Capital Controls in Selected Emerging Markets in the 2000s. IMF Working Paper WP/11/281. Washington, DC: IMF; IMF. 2014. Annual Report on Exchange Rate Arrangements and Exchange Restrictions. Washington, DC; Kawai, M., and S. Takagi. 2004. Rethinking Capital Controls: The Malaysian Experience. In S. Chirathivat, E. M. Claassen, and J. Schroeder, eds. East Asia’s Monetary Future: Integration in the Global Economy. Cheltenham, UK and Northampton, MA: Edward Elgar; Meesok, K., I. H. Lee, O. Liu, Y. Khatri, N. Tamirisa, M. Moor, and M. H. Krysl. 2001. Malaysia: From Crisis to Recovery. IMF Occasional Paper No. 207. Washington, DC: IMF.

previous regime. However, in reality, the current exchange rate regime is not necessarily the most desirable regime over the long run.

Third, all exchange rate regimes in the static and dynamic analyses operate under free capital mobility rather than strict or weak capital controls. However, these models are in contrast with recent developments in capital account restrictions in East Asian economies as reported in section II. For example, Malaysia and Thailand implemented capital account restrictions immediately at the onset of the 1997/98 Asian financial crisis and only relaxed these controls gradually in the aftermath
of the crisis. Changes in capital account measures, particularly the removal of capital controls, need to be considered in the context of exchange rate regimes since exchange rates and interest rates are significantly influenced by any change in capital account measures.

Lastly, not only have shifts in exchange rate regimes not been explored yet, but also the analyses have not focused on how adjustments should be implemented. Monetary authorities must choose between gradual and rapid adjustments. On the one hand, the entire transition process of increasing flexibility in the exchange rate regime includes several intermediate regimes in which exchange rates are allowed to fluctuate more than under the previous regime. On the other hand, the monetary authorities could suddenly abandon a fixed regime and adopt a new market-determined exchange rate regime.

These drawbacks in the static and conventional dynamic analyses call for a need to develop an alternative dynamic analysis that suits East Asian economies, particularly in the post-Asian financial crisis period.

IV. Macroeconomic Models and Exchange Rate Regimes

A. Dynamic Model of a Small Open Economy

This section provides a DSGE model for a small open economy. Our model closely follows Dornbusch (1976) and Yoshino, Kaji, and Suzuki (2002) as we analyze in the dynamic context. Although we do not derive equilibrium conditions directly from the optimal behavior of households and firms, our equilibrium conditions are the same as those in Yoshino, Kaji, and Asonuma (2012, 2015b), which are built on microfoundations. The main rationale of our modeling approach is rooted in it being a better fit with the data for East Asia: when we obtain estimated coefficients from regressions using macroeconomic data, our model is well specified and is a good fit with available data for East Asian economies. There are three economies in our model: the East Asian economy, Japan, and the United States (US) (Figure 1). We assume the East Asian economy to be the home economy, and Japan and the US to be the rest of the world. The yen–dollar exchange rate is exogenous to the home economy. Detailed description of variables in the model is reported in Table 3.

Domestic and foreign assets are assumed to be imperfect substitutes for domestic investors, while Japanese and US assets are perfect substitutes. An interest parity condition is shown as

$$i_{t+1} - i_t = -\lambda[i_t - \left\{i_{US} + e_{E/US}^{EA/US} - e_{E/US}^{EA/US} - \sigma(e_{E/US}^{EA/US})\right\}]$$  \hspace{1cm} (1)

Yoshino, Kaji, and Asonuma (2015c) describe examples of economies that have benefited from each of these types of adjustments.
where $\lambda$ denotes the adjustment speed of the domestic interest rate, which also captures the degree of capital controls. If $\lambda$ is close to 0, it implies that the domestic interest rate does not respond to an interest rate differential. This means that the domestic interest rate is exogenous and totally independent. We regard this as a case of strict capital controls. If $\lambda$ is between 0 and 1, the domestic interest rate responds only partially to a change in foreign interest rate. On the contrary, if $\lambda$ approaches 1, it implies that the domestic interest rate responds completely to a change in the foreign interest rate. We consider this a case of no capital controls. Moreover, in the case $0 < \lambda \leq 1$, if domestic interest rate is higher than the expected...
return on foreign assets (the foreign interest rate and expected depreciation rate), the economy receives capital inflows. Otherwise (if the domestic interest rate is lower than expected return on foreign assets), the economy experiences capital outflows. Lastly, $\sigma(e_{t+1}^{EA/US})$ denotes a risk premium that depends on the US dollar exchange rate. If $\lambda = 1$, Equation (1) can be rewritten as

$$i_{t+1} = i_t^{US} + e_{t+1}^{EA/US} - e_t^{EA/US} - \sigma(e_t^{EA/US})$$  \hspace{1cm} (1')$$

The equilibrium condition for the money market is

$$m_t - p_t = -\varepsilon i_{t+1} + \phi(y_t - \bar{y})$$  \hspace{1cm} (2)$$

The demand for goods depends on the real US dollar and yen rates, exchange rate expectations, real interest rate, and exchange rate risks. It is written as

$$y_t - \bar{y} = \delta(e_t^{EA/US} + p_t^{US} - p_t) + \delta e_{t+1}^{EA/US} + \theta(e_t^{EA/JPN} + p_t^{JPN} - p_t) + \theta e_{t+1}^{EA/US}$$  
$$- \rho \{i_{t+1} - (p_t^{e} - p_t^{e})\} - \tau \Delta e_t^{EA/US} - \varsigma \Delta e_t^{EA/JPN}$$  \hspace{1cm} (3)$$

where the term $(p_t^{e} - p_t^{e})$ shows the expected inflation rate. The last two terms correspond to exchange rate risks.

Since one of the three exchange rates is not independent, the yen rate can be expressed as

$$e_t^{EA/JPN} = e_t^{EA/US} + e_t^{US/JPN}$$  \hspace{1cm} (4)$$

The inflation rate depends on total productivity, excess demand for goods, the real US dollar rate, the real yen rate, exchange rate expectations, and the expected rate of inflation. It is shown as

$$p_{t+1} - p_t = -\alpha_t + \psi(y_t - \bar{y}) + \eta(e_t^{EA/US} + p_t^{US} - p_t) + \eta e_t^{EA/US,e}$$  
$$+ \mu(e_t^{EA/JPN} + p_t^{JPN} - p_t) + \mu e_t^{EA/JPN,e} + \left(p_t^{e} - p_t^{e}\right)$$  
$$+ \chi \Delta e_t^{EA/US} + \xi \Delta e_t^{EA/JPN}$$  \hspace{1cm} (5)$$

where the first term on the right-hand side shows the total productivity of the home economy and the last two terms denote the US dollar and yen exchange rate risks. We assume aggregate production depends on total productivity, imported materials from Japan and the US, and the expected inflation rate. The home economy is assumed to import materials from Japan and the US, and to export final goods to Japan and the US. Both aggregate demand and aggregate supply also depend on exchange rate expectations, as exporting and importing firms are concerned with significant
deviations from the current exchange rate in the future. Among the variables, $\alpha_t$, $\bar{y}$, $p_{US}^t$, $p_{JPN}^t$, $e_{US/JPN}^t$ are common exogenous variables under any exchange rate regime. We assume that all exogenous variables except $e_{EA/US}^t$, $p_{t+1}^e$, $p_t^e$, $e_{EA/JPN}^t$, $e_{EA/JPN,e}^t$, $\Delta e_{EA/JPN}^t$, and $\Delta e_{EA/JPN,e}^t$ are constant ($= 0$) in the analysis below. All of the coefficients above are positive.

B. Exchange Rate Regimes

Next, we derive the long-run equilibrium together with equilibrium values at period $t$ for the following exchange rate regimes:

(A) dollar peg with strict capital controls,

(B) basket peg with weak capital controls,

(C) basket peg without capital controls,

(D) floating regime without capital controls, and

(E) dollar peg without capital controls.

1. Dollar Peg with Strict Capital Controls (A)

Under a dollar peg, the US dollar rate becomes exogenous ($e_{EA/US}^t = 0$). Moreover, the money supply ($m_t$) becomes endogenous, implying that the money supply is adjusted whenever the monetary authority intervenes into the foreign exchange market by adjusting its holdings of foreign and domestic assets. Both the size and frequency of interventions are fully reflected through changes in the money supply. Since the monetary authority restricts domestic residents’ holdings of foreign assets, Equation (1) does not exist. The domestic interest rate ($i_{t+1}$) is a policy instrument (exogenous). As the East Asian currency–US dollar rate is fixed, Equation (4) provides:

$$e_{EA/JPN}^t = e_{US/JPN}^t$$

(4’)

Endogenous variables in this case are $m_t$, $y_t$, and $p_t$. Solving Equations (2), (3), (4’), and (5) for the price level and money supply, we obtain semireduced form equations:

$$p_{t+1} - p_t = -\alpha_t - [\psi (\delta + \theta) + (\eta + \mu)] p_t + \psi \theta e_{t}^{US/JPN} + \psi (\theta' + \mu') e_{t+1}^{US/JPN}$$

$$+ (1 + \psi \rho) \left(p_{t+1}^e - p_t^e\right) + (\xi - \psi \varsigma) \Delta e_{EA/JPN}^t - \psi \rho_i_{t+1}$$

(6)
\[ m_t = [1 - \phi (\delta + \theta) + (\eta + \mu)] p_t + \phi \theta e_t^{US/JPN} + \phi \theta e_t^{US/JPN.c} + \phi \rho (p_{t+1}^e - p_t^e) - \phi \xi \Delta e_t^{E/JPN} - (\epsilon + \phi \rho) \rho i_{t+1} \]  
(7)

The long-run equilibrium values for the price level and money supply under a dollar peg are\(^{14}\)

\[ \bar{p}_A = \frac{1}{E_1} [\psi (\theta + \theta') + \mu'] \bar{e}^{US/JPN} - \psi \bar{i} - \bar{\alpha} \]  
(8)

\[ \bar{m}_A = \left[ \frac{E'_i}{E_1} \{\psi (\theta + \theta') + \mu' + \phi (\theta + \theta')\} \bar{e}^{US/JPN} - \frac{E'_i}{E_1} \bar{\alpha} - \left[ \frac{E'_i}{E_1} \psi \rho + (\epsilon + \phi \rho) \right] i_A \right] \]  
(9)

where \( E_1 = \psi (\delta + \theta) + (\eta + \mu) \) and \( E'_1 = 1 - \phi (\delta + \theta) + (\eta + \mu) \).

\( \bar{X}_i = X_i - \bar{X} \) expresses the deviation from the long-run equilibrium value.

We assume that the US dollar–yen rate moves from its initial equilibrium value (\( = 0 \)) to \( \bar{e}^{US/JPN} \) at time \( t \) and remains at the new equilibrium after time \( t + 1 \) (\( = e_t^{US/JPN} \)). As the price level is sticky over the short run, \( p_0 = 0 \) at time 0. We assume the initial equilibrium values \( \bar{p}_0 = \bar{e}_0 = 0 \). The new equilibrium value after the US dollar–yen rate change is

\[ \bar{p}_A = \frac{1}{E_1} \left[ \psi \theta \bar{e}_t^{US/JPN} + \psi (\theta' + \mu') \bar{e}_t^{US/JPN.c} + (1 + \psi \rho) \left( \bar{p}_{t+1}^e - \bar{p}_t^e \right) + (\xi - \psi \xi) \Delta \bar{e}_t^{E/JPN} - \psi \bar{i}_A \right] \]  
(10)

where we assume that total productivity remains unchanged by exchange rate shocks (i.e., \( \bar{\alpha}_i = 0 \)). We solve for the rational expectation and obtain expressions for \( y_t - \bar{y}'_t \) and \( p_t - \bar{p}_A' \) such that\(^{15}\)

\[ y_t - \bar{y}'_t = A_1(t) \bar{e}_t^{US/JPN} + A_2(t) \Delta \bar{e}_t^{E/A/JPN} + A_3(t) \bar{i}_{t+1} \]  
(11)

\[ p_t - \bar{p}_A' = A_4^p(t) \bar{e}_t^{US/JPN} + A_5^p(t) \Delta \bar{e}_t^{E/A/JPN} + A_6^p(t) \bar{i}_{t+1} \]  
(11a)

A major cost of a dollar peg under strict capital controls is that long-run output might be negatively influenced due to limited capital flows. In this regard, we express the deviation of output and the price level from the new long-run equilibrium value under a basket peg without capital controls (C) (\( \bar{y}'_A = \bar{y}'_C \)) as

\(^{14}\)We assume that \( p_{t+1}^e = p_t^e \) and \( \Delta \bar{e}^{E/A/JPN} = 0 \) at the long-run equilibrium.

\(^{15}\)Expressions \( A_1(t), A_2(t), A_3(t), A_4^p(t), A_5^p(t), A_6^p(t) \) are shown in Appendix 2.A.
Note that $\bar{y}'_A \equiv \bar{y}'_C$ and $\bar{p}'_A \equiv \bar{p}'_C$. A clear shortcoming of a dollar peg with capital controls is that capital inflows are restricted, which leads to a lower long-run equilibrium value compared with that under a basket peg without capital controls.

2. Basket Peg with Weak Capital Controls (B)

As a basket peg is an exceptional case of a fixed regime, endogenous variables are the same as those under a dollar peg. In this case, the monetary authority adjusts the money supply by intervening in the foreign exchange market in order to maintain the value of the basket at a constant level. The impacts of foreign exchange market intervention have been captured in the model as well. The basket is a weighted average of the US dollar rate and yen rate, which is shown as

$$\nu \epsilon_{EA/US}^t + (1 - \nu) \epsilon_{EA/JPN}^t = \Gamma$$

where $\Gamma$ is the value of the basket. With Equations (4) and (12), we have

$$\epsilon_{EA/US}^t = - (1 - \nu) \epsilon_{US/JPN}^t, \quad \epsilon_{EA/JPN}^t = \nu \epsilon_{US/JPN}^t \quad (12a)$$

Solving Equations (1), (3), (5), and (12a) for the price level and interest rate, the following semireduced form equations are obtained:

$$p_{t+1} - p_t = - \alpha_t + E_1 p_t + \left[ \psi \theta \nu - \delta (1 - \nu) \right] \epsilon_{US/JPN}^t + \mu \nu - \eta (1 - \nu) \psi \rho_{t+1}$$
$$+ (1 + \psi \rho) (p_{t+1}^c - p_t^c) + \left[ \psi \theta' \nu - \delta' (1 - \nu) \right] \epsilon_{US/JPN,e}^t$$
$$+ (\chi - \psi \tau) \Delta \epsilon_{EA/US}^t + (\xi - \psi \xi) \Delta \epsilon_{EA/JPN}^t \quad (13)$$
$$i_{t+1} - i_t = - \lambda i_t - \lambda (1 - \nu) \epsilon_{US/JPN,e}^{t+1} + \lambda (1 + \sigma) (1 - \nu) \epsilon_{US/JPN}^t \quad (14)$$
As in the previous case, we assume the same exogenous US dollar–yen rate change. The new equilibrium value after the US dollar–yen rate change is

\[ \tilde{p}'_B = \frac{1}{E_1} \left\{ \left[ \psi \{ \theta \nu - (\delta + \rho + \rho \sigma)(1 - \nu) \} \right] \hat{e}_{t}^{US/JPN} + (\chi - \psi \tau) \Delta \hat{e}_{t}^{EA/US} \right. \]

\[ + (\xi - \psi \varsigma) \Delta \hat{e}^{E/A/JP}_{t} - \psi \rho \tilde{i}'_B + (1 + \psi \rho) \left( \hat{p}_{t+1}^e - \hat{p}_{t}^e \right) \]

\[ + \left[ \psi \{ \theta' \nu + (1 - \nu) (\rho - \delta') \} \right] \hat{e}_{t}^{US/JPN,e} \right\} \]

\[ \tilde{i}'_B = (1 - \nu) \left[ (1 + \sigma) \hat{e}_{t}^{US/JPN} - \hat{e}_{t+1}^{US/JPN,e} \right] \]  

We solve for the rational expectation and obtain expressions for \( y_t - \tilde{y}'_B \), \( p_t - \tilde{p}'_B \), and \( i_t - \tilde{i}'_B \):

\[ y_t - \tilde{y}'_B = B_1(t) \nu \hat{e}_{t}^{US/JPN} + B_2(t) \hat{e}_{t}^{US/JPN} + B_3(t) \hat{z}_t \]  

\[ p_t - \tilde{p}'_B = B_1^p(t) \nu \hat{e}_{t}^{US/JPN} + B_2^p(t) \hat{e}_{t}^{US/JPN} + B_3^p(t) \hat{z}_t \]  

\[ i_t - \tilde{i}'_B = -(1 - \nu) [(1 + \sigma) (1 - b_4)] (1 - \lambda') \hat{e}_{t}^{US/JPN} \]

where \( B_3(t) \hat{z}_t \) and \( B_3^p(t) \hat{z}_t \) comprise both \( \Delta \hat{e}^{E/A/US}_{t} \) and \( \Delta \hat{e}^{E/A/JP}_{t} \).

3. Basket Peg without Capital Controls (C)

Similar to the case of a basket peg with weak capital controls, we have Equation (12a). Since we assume no capital controls, we use Equation (1') with \( \lambda = 1 \). Solving Equations (2), (3), (5), and (12a) for the price level and money supply, we have the same semireduced form as in Equation (13) and the following equation (\( \lambda = 1 \)):

\[ i_{t+1} = -(1 - \nu) \hat{e}_{t+1}^{US/JPN,e} + (1 + \sigma) (1 - \nu) \hat{e}^{US/JPN}_{t} \]

As in previous cases, we assume the same exogenous US dollar–yen rate change. The new equilibrium value after the US dollar–yen rate change is \( \tilde{y}'_C = \tilde{y}'_B \) and \( \tilde{p}'_C = \tilde{p}'_B \). We solve for the rational expectation and obtain expressions for \( y_t - \tilde{y}'_C \) and \( p_t - \tilde{p}'_C \).

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16 We show how to solve for the rational expectation and derive Equations (17), (17a), and (17b), and expressions \( B_1(t), B_2(t), B_3(t), B_1^p(t), B_2^p(t), \) and \( B_3^p(t) \) in Appendix 2.B.

17 We show how to solve for the rational expectation and derive Equations (18) and (18a), and expressions \( C_1(t), C_2(t), C_3(t), C_1^p(t), C_2^p(t), \) and \( C_3^p(t) \) in Appendix 2.C.
Dynamic Effects of Changes in the Exchange Rate System

\[ y_t - y_C^t = C_1(t)\hat{e}_{US/JPN}^t + C_2(t)\hat{e}_{US/JPN}^t + C_3(t)\hat{z}_t \]  

(18)

\[ p_t - \hat{p}_C^t = C_1^p(t)\hat{e}_{US/JPN}^t + C_2^p(t)\hat{e}_{US/JPN}^t + C_3^p(t)\hat{z}_t \]  

(18a)

4. Floating Regime without Capital Controls (D)

Under a floating regime, we assume that the monetary authority chooses the desirable level for the money supply. Therefore, the money supply \((m_t)\) becomes exogenous and the interest rate becomes endogenous. Solving Equations (1'), (3), and (5), we obtain the following two equations:

\[ \begin{align*}
&\hat{e}_{t}^{EA/US} = \frac{1}{E_2} \left[ -m_t - (\varepsilon + \phi(\delta + \theta))p_t + \phi\theta e_t^{EA/JPN} + \phi\rho(p_{t+1} - \hat{p}_t^e) \\
&\quad + \phi\theta e_{t+1}^{EA/JPN,e} + (\varepsilon + \phi\rho + \phi(\delta' + \theta'))e_{t+1}^{EA/US,e} \\
&\quad - \phi\tau\hat{e}_t^{EA/US} - \phi\xi\hat{e}_t^{EA/JPN} \right] \\
&\quad + \phi\tau\Delta e_{t}^{EA/US} - \phi\xi\Delta e_{t}^{EA/JPN}
\end{align*} \]

(19)

\[ p_{t+1} - p_t = -\alpha_t - E3m_t + E4m_{t+1} + E5e_t^{US/JPN} + E6(p_{t+1} - p_t) + E7e_{t+1}^{EA/US,e} \]

\[ + E8e_{t+1}^{EA/JPN,e} + E9\Delta e_{t}^{EA/US} + E10\Delta e_{t}^{EA/JPN} \]

(20)

where \(E_2 = (1 + \sigma)(\varepsilon + \phi\rho) - \phi(\delta + \theta)\).

Long-run equilibrium values can be obtained from the equations below:

\[ \hat{e}_{t}^{EA/US} = -\frac{1}{f_4} \hat{m}_t - \frac{\varepsilon - \phi(\delta + \theta)}{f_4} \hat{p}_D \]  

(21)

\[ \hat{p}_D = \frac{f_6}{f_5} \hat{m}_t + \frac{f_7}{f_5} \hat{e}_{t}^{EA/JPN} - \frac{1}{f_5} \hat{\alpha} \]  

(22)

where \(f_4 = \sigma(\varepsilon + \phi\rho) - 2\phi(\delta + \theta)\).

As in previous cases, we assume the same exogenous US dollar–yen rate shock. The new equilibrium values after the shock are

\[ \hat{p}_D' = \frac{f_3 + \psi\rho f_1}{E(\varepsilon + \phi\rho)} \hat{m}_t + \frac{\phi\theta f_3 + \psi\theta f_1}{E(\varepsilon + \phi\rho)} \hat{e}_{t}^{EA/JPN} + g_1(\hat{p}_{t+1} - \hat{p}_t^e) \]

\[ + g_2\Delta \hat{e}_{t}^{EA/US} + g_3\Delta \hat{e}_{t}^{EA/JPN} \]  

(23)

\[ \hat{e}_{t}^{EA/US} = -\frac{f_4 + \psi\rho f_2}{E(\varepsilon + \phi\rho)} \hat{m}_t + \frac{\phi\theta f_3 + \psi\theta f_1}{E(\varepsilon + \phi\rho)} \hat{e}_{t}^{EA/JPN} + g_1'(\hat{p}_{t+1} - \hat{p}_t^e) \]

\[ + g_2'\Delta \hat{e}_{t}^{EA/US} + g_3'\Delta \hat{e}_{t}^{EA/JPN} \]  

(24)

\[ ^{18} \text{An alternative is to assume that the monetary authority sets an optimal interest rate under a floating regime. In this case, the interest rate becomes exogenous and the money supply becomes endogenous. Our theoretical and quantitative results remain unchanged.} \]
Solving for the rational expectation yields expressions for $y_t - \bar{y}_D$ and $p_t - \bar{p}_D$:

$$y_t - \bar{y}_D = D_1(t)\hat{e}_t^{US/JPN} + D_2(t)\hat{z}_t + D_3(t)m_t$$

$$p_t - \bar{p}_D = D_1^p(t)\hat{e}_t^{US/JPN} + D_2^p(t)\hat{z}_t + D_3^p(t)m_t$$

5. Dollar Peg without Capital Controls (E)

As with a dollar peg with strict capital controls, the East Asian currency–US dollar rate ($e_{EA/US}$) is totally exogenous ($e_{EA/US} = 0$) and the money supply is endogenous. Without capital controls, we have Equation (1') and the domestic interest rate ($i_{t+1}$) is fixed at the level of the US interest rate (endogenous) (i.e., $i_{t+1} = i_{US}$). This drives high interest rate volatility due to changes in the US interest rate and results in more volatile output and price levels.

The long-run equilibrium values for the price level and the money supply under this regime are the same as in Equations (8) and (9): $\bar{y}_E = \bar{y}_A$ and $\bar{p}_E = \bar{p}_D$, respectively. As in previous cases, we assume the same exogenous US dollar–yen rate shock. New equilibrium values after the shock are the same under a US dollar peg with capital controls: $\bar{p}_E' = \bar{p}_A'$.

Solving for the rational expectation yields expressions for $y_t - \bar{y}_E$ and $p_t - \bar{p}_E$:

$$y_t - \bar{y}_E = A_1(t)\hat{e}_t^{EA/JPN} + A_2(t)\Delta \hat{e}_t^{EA/JPN}$$

$$p_t - \bar{p}_E = A_1^p(t)\hat{e}_t^{EA/JPN} + A_2^p(t)\Delta \hat{e}_t^{EA/JPN}$$

V. Transition Paths to Other Exchange Rate Regimes

In this section, we define four transition policies and a policy of maintaining the current regime. Yoshino, Kaji, and Suzuki (2004) find that when evaluated with a one-period loss, it would be desirable for a small open economy like Thailand to adopt a basket peg or a floating regime rather than a dollar peg. In the current context, this implies that the desirable regime over the long run is either a basket peg without capital controls or a floating regime without capital controls. We consider four transition paths to the preferred regime, as well as maintaining the status quo.
Figure 2. Transition Policies toward the Desired Regime

| (1) | Dollar peg (A) | Dollar peg (A) | Dollar peg (A) |
|-----|----------------|----------------|----------------|
|     | $T_0$          | $T_1$          | $T_2$          |

| (2) | Dollar peg (A) | Basket peg (B) | Basket peg (C) |
|-----|----------------|----------------|----------------|
|     | $T_0$          | $T_1$          | $T_1$          |

| (3) | Dollar peg (A) | Basket peg (C) |
|-----|----------------|----------------|
|     | $T_0$          | $T_1+T_2$      |

| (4) | Dollar peg (A) | Floating (D) |
|-----|----------------|--------------|
|     | $T_0$          | $T_1+T_2$    |

| (5) | Dollar peg (A) | Floating (D) | Dollar peg (E) | Floating (D) |
|-----|----------------|--------------|----------------|--------------|
|     | $T_0$          | $T_0$        | $T_0$          | $T_0$        |

Notes:
(A) dollar peg with strict capital controls
(B) basket peg with weak capital controls
(C) basket peg without capital controls
(D) floating regime without capital controls
(E) dollar peg without capital controls
Source: Authors’ compilation.

(e.g., dollar peg with capital controls), using the (A)–(E) categorization of each exchange rate policy described in section IV (Figure 2):

1. maintaining a dollar peg (with strict capital controls): (A),

2. gradual shift from a dollar peg to a basket peg without capital controls (gradual adjustments of both capital controls and basket weights): (A) $\Rightarrow$ (B) $\Rightarrow$ (C),

3. sudden shift from a dollar peg to a basket peg without capital controls (sudden removal of capital controls and sudden shift of basket weights): (A) $\Rightarrow$ (C) $\Rightarrow$ (C),

4. sudden shift from a dollar peg to a floating regime (sudden removal of capital controls and sudden increase in flexibility of the exchange rate): (A) $\Rightarrow$ (D) $\Rightarrow$ (D), and
(5) sudden shift from a dollar peg to a managed-floating regime (sudden removal of capital controls and sudden increase in flexibility of the exchange rate with occasional interventions): (A) $\Rightarrow$ (D) $\Rightarrow$ (E) $\Rightarrow$ (D).

The first policy is maintaining a dollar peg (A). The monetary authority imposes capital controls and fixes a weight on the dollar rate at 1. The second policy includes a transition period (B), which reflects an adjustment period of capital controls and basket weights. This policy starts with a dollar peg and undergoes a transition period (B) and arrives at a basket peg without capital controls (C). The third policy does not include a transition period (B); therefore, the monetary authority shifts from a dollar peg to a basket peg without any interim period, implying the economy will suddenly jump to the desired basket peg (C). The fourth is that the monetary authority shifts from a dollar peg to a floating regime without a transition period (D), implying that the economy will suddenly jump to a floating regime. The fifth policy is that the monetary authority shifts from a dollar peg to a managed-floating regime without a transition period. Under a managed-floating regime, if the exchange rate fluctuation is significant, the monetary authority intervenes in the foreign exchange market to maintain the exchange rate at a constant rate (E). Otherwise, the monetary authority allows the exchange rate to fluctuate as long as the exchange rate does not deviate substantially from its desired level.

We assume that the time interval for the initial dollar peg is $T_0$. Furthermore, we regard the transition period as $T_1$ and the time interval after the authority reaches the target regime as $T_2$. We set a discount factor as $\beta$.

Throughout this section, we consider the case of the monetary authority aiming to minimize output fluctuations, which is shown as

$$L(T_1, T_2) = \sum_{t=1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y})^2$$ (27)

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21Current loss function (i.e., output stability or price level stability) is one of the conventional loss functions commonly used in the literature on monetary policy and exchange rate regimes. See Woodford (1999); Clarida, Gali, and Gertler (2001, 2002); Svensson (2000); and Walsh (2003) for more details. In the literature, none of the existing studies define stabilizing export growth as a policy objective for monetary authorities since exports are one component of gross domestic product (output). The recent literature (see, for example, Woodford 2003) derives a conventional loss function from optimization of the representative household. The traditional loss function is found to be an approximation of the level of expected utility of the representative household. An emerging stream of studies explores the welfare consequences of using a conventional loss function versus the microfounded loss function (see, for example, Paez-Farrell 2014). In the context of our analysis, the main benefit of using the microfounded loss function would be a potentially better measurement of welfare. But this comes at the cost of making it much harder and less precise to obtain measurements due to setting less established parameter values. Both 1 percentage point positive and negative deviations from potential output are treated symmetrically in the model, given that we measure the loss function in terms of the sum of squares of the deviations of output from potential output. This is because a positive deviation is also negatively influencing the economy as it often triggers high rates of consumer and asset price inflation.
Note that a reduced form $y_t - \bar{y}'$ varies depending on the exchange rate regime, as explained in section IV.B. Appendix 4 discusses the case of price stability.

**A. Maintaining a Dollar Peg (1)**

The economy continues with a dollar peg for the entire time period $T_0 + T_1 + T_2$. Its cumulative loss, given optimal interest rate $i^*$, is expressed as follows:

$$L_1(i^*, T_1 + T_2) = \sum_{t=1}^{T_0} \beta^{t-1}(y_t - \bar{y}'_A)^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y}'_A)^2$$

$$= \sum_{t=1}^{T_0} \beta^{t-1}(y_t - \bar{y}'_A)^2$$

$$+ \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} \left[ \left( A_1(t) + A'_1(t) \right) \hat{\epsilon}^{E_A/JPN} + A_2(t) \Delta \hat{\epsilon}_t^{E_A/JPN} + A_2'(t) \Delta \hat{\epsilon}^{E_A/US} + A_3(t) \hat{\epsilon}_{t+1} \right]^2$$

(28)

$$i^* = \arg\min_{\sum_{t=1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y}'_A)^2}$$

(28')

Note that $i^*$ is chosen to minimize the cumulative loss in terms of deviation from its stable equilibrium value under a dollar peg.

**B. Gradual Adjustment to a Basket Peg without Capital Controls (2)**

First, we denote an optimal basket weight as $v^*$, assuming $0 \leq v^* \leq 1$. As explained above, the monetary authority starts by adopting a dollar peg with capital controls (A), indicating that its basket weight is equal to 1. Then, it shifts to a basket peg and gradually loses a degree of capital control under regime (B). Simultaneously, the monetary authority decreases its basket weight by $(1 - v^*)/T_1$ each period during the transition in order to arrive at a basket peg without capital controls. Once the monetary authority adopts the targeted basket peg, it maintains its optimal basket weight $v^*$. The cumulative loss of transition policy (2) with an optimal basket weight $v^*$ can be expressed as

$$L_2(v^*, T_1, T_2) = \sum_{t=1}^{T_0} \beta^{t-1}(y_t - \bar{y}'_A)^2 + \sum_{t=T_0+1}^{T_0+T_1} \beta^{t-1}(y_t - \bar{y}'_B)^2 + \sum_{t=T_0+T_1+1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y}'_C)^2$$
\[ L_3(\nu^*, T_1 + T_2, \hat{e}_t^{E/A/US, 2}) = \sum_{t=1}^{T_0} \beta^{t-1}(y_t - \bar{y}_A')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y}_A')^2 \]

\[ = \sum_{t=1}^{T_0} \beta^{t-1}(y_t - \bar{y}_A')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(y_t - \bar{y}_C')^2 \]

\[ + C_2(t)\hat{e}_t^{US/JPN} + C_3(t)\hat{z}_t^2 \]  

(30)
\[ u^{**} = -\frac{1}{H_2} \left[ \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} C_1(t) \hat{e}_t^{US/JPN} \left( C_2(t) \hat{e}_t^{US/JPN} + C_3(t) \hat{z}_t \right) \right] \] (30')

where \( (y_t - \bar{y}_t) = A_1(t) \hat{e}_t^{US/JPN} + A_2(t) \Delta \hat{e}_t^{EA/JPN} + A_3(t) i^* \), \( H_2 = \left[ \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} \left( C(t) \hat{e}_t^{US/JPN} \right)^2 \right] \), \( \hat{e}_t^{EA/US,2} = \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} \left( \hat{e}_t^{US/JPN} \right)^2 \) denotes a sum of discounted squares of the US dollar rate. The impacts of exchange rate volatility after the shift are included in the second term on the right-hand side of Equation (30). When compared with the basket weight obtained in section VB, \( u^{**} \) is different from \( u^* \) for as long as the transition period exists \( (T_1 \neq 0) \).

D. Sudden Shift from a Dollar Peg to a Floating Regime (4)

The monetary authority starts by adopting a dollar peg with capital controls \( (A) \) and it suddenly jumps to a floating regime without capital controls. The cumulative loss under policy \( (4) \) with an optimal money supply \( m^* \) and the target regime period \( T_1 + T_2 \) is shown as follows:

\[ L_4(m^*, T_1 + T_2, \hat{e}_t^{EA/US,2}) = \sum_{t=1}^{T_0} \beta^{t-1} (y_t - \bar{y}_d')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} (y_t - \bar{y}_D')^2 \]

\[ = \sum_{t=1}^{T_0} \beta^{t-1} (y_t - \bar{y}_d')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} \left[ D_1(t) \hat{e}_t^{US/JPN} \right] \]

\[ + D_2(t) \tilde{z}_t + D_3(t) m^* \] (31)

\[ m^* = -\frac{1}{H_3} \left[ \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} D_3(t) \hat{e}_t^{US/JPN} \left( D_1(t) \hat{e}_t^{US/JPN} + D_2(t) \tilde{z}_t \right) \right] \] (31')

where \( (y_t - \bar{y}_d') = A_1(t) \hat{e}_t^{US/JPN} + A_2(t) \Delta \hat{e}_t^{EA/JPN} + A_3(t) i^* \) and \( H_3 = \left[ \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1} (D_3(t))^2 \right] \).

The impacts of exchange rate volatility associated with the shift are included in the second term on the right-hand side of Equation (31).

E. Sudden Shift from a Dollar Peg to a Managed-Floating Regime (5)

Following the previous case, we denote the optimal money supply under the floating regime as \( m^{**} \). The monetary authority starts by adopting a dollar peg
with capital controls (A) and it suddenly shifts to a floating regime without capital controls. Occasionally, when the US dollar rate fluctuates significantly, it intervenes in the foreign exchange market to maintain the rate at a constant level under perfect capital mobility (E). After the volatility of the US dollar rate moderates, it reverts to a free-floating regime. These interventions are implemented only temporarily to avoid large fluctuations in the exchange rate. The cumulative loss under policy (5) with whole period $T_1 + T_2$, period of floating $T_D$, and temporal period of a dollar peg (intervention period) $T_E$ is shown as:

$$L_5(m^{**}, T_1 + T_2, T_D, T_E, \varepsilon^{R/S,2}_{t, E})$$

$$= \frac{1}{H_4} \left[ \sum_{t=T_0+1}^{T_0+T_D} \beta^{t-1}(y_t - \bar{y}_t^*)^2 + \sum_{t=T_0+1}^{T_0+T_D} \beta^{t-1}(y_D^* - \bar{y}_D^*)^2 + \sum_{t=T_0+T_D+1}^{T_0+T_D+T_E} \beta^{t-1}(y_t - \bar{y}_t^*)^2 \right]$$

$$+ \frac{1}{T_0+T_D+T_E+1} \sum_{t=T_0+T_D+T_E+1}^{T_0+T_D+T_E+1} \beta^{t-1}(y_t - \bar{y}_t^*)^2$$

$$= \frac{1}{H_4} \left[ \sum_{t=T_0+1}^{T_0+T_D} \beta^{t-1}D_3(t)(D_1(t)\varepsilon^{US/JPN}_{t} + D_2(t)\hat{z}_t) \right]$$

$$+ \frac{1}{T_0+T_D+T_E+1} \sum_{t=T_0+T_D+T_E+1}^{T_0+T_D+T_E+1} \beta^{t-1}D_3(t)(D_1(t)\varepsilon^{US/JPN}_{t} + D_2(t)\hat{z}_t)$$

(32)

where $(y_t - \bar{y}_t^*) = A_1(t)\varepsilon^{E_A/JPN}_{t} + A_2(t)\Delta\varepsilon^{E_A/JPN}_{t} + A_3(t)i^*$, $(y_D^* - \bar{y}_D^*) = A_1(t)\varepsilon^{E_A/JPN}_{t} + A_2(t)\Delta\varepsilon^{E_A/JPN}_{t} + A_3(t)i_{t+1}$ and $H_4 = \left[ \sum_{t=T_0+T_D}^{T_0+T_D} \beta^{t-1}(D_3(t))^2 \right]$

$$+ \frac{1}{T_0+T_D+T_E+1} \sum_{t=T_0+T_D+T_E+1}^{T_0+T_D+T_E+1} \beta^{t-1}(D_3(t))^2$$

$\varepsilon^{E_A/JPN,2}_{t, E}$ is defined as a sum of discounted squares of the US dollar rate during intervention periods. The impacts of the exchange rate volatility associated with the shift are included in the second term on the right-hand side of Equation (32). When compared with the optimal money supply obtained in section V.D, $m^{**}$ is different from $m^*$ for as long as the intervention period exists ($T_E \neq 0$).

**VI. Comparison of Transition Policies**

In this section, we consider the optimal policy for a monetary authority seeking to stabilize output fluctuations. As mentioned earlier, Appendix 4 provides a similar discussion with regard to price stability. Our discussion in this section centers on two questions: Is it desirable for the monetary authority to maintain a dollar peg over the long run? And, what would be an optimal policy if the authority
decides to deviate from the status quo? We advance our argument in three steps. First, we apply some implications from static analysis into this dynamic context. Then, we compare the cumulative loss of the current policy, (1), with other transition policies. After we find that maintaining a dollar peg is not the appropriate solution over the long run, we look for an optimal outcome for the monetary authority among the four transition policies.

A. Implications of Static Analysis

First, we reflect on some implications derived from static analysis. Using a static small open economy general equilibrium model, Yoshino, Kaji, and Suzuki (2004) show that it is less desirable for an economy to adopt a dollar peg than a basket peg or floating regime; the value of the welfare loss under a dollar peg is higher than under a basket peg or a floating regime at the steady state for one period. We can express these implications by using a one-period loss in this model as follows:

\[(y_t - \bar{y}_A) > (y_t - \bar{y}_C)\] (33)

\[(y_t - \bar{y}_A) > (y_t - \bar{y}_D)\] (33’)

Note that these results hold under regimes that have been maintained for several periods.

B. Comparisons of Policy (1) and Other Transition Policies

We discuss the desirability of a dollar peg over the long run by comparing policy (1) and other transition policies to a basket peg and a floating regime. We start with a comparison between maintaining a dollar peg, policy (1), and a sudden shift to a basket peg without capital controls, policy (3). We define a threshold time period \(T^*_C\) such that

\[L_1(i^*, t) < L_3(u^{**}, T^*_C, \epsilon_t^{E/A/US,2})\]

expressing a time interval under which the cumulative loss of maintaining a dollar peg is equal to that of shifting suddenly to a basket peg. Taking into account that the above equation holds under the target regime period, we obtain the following statements:

\[L_1(i^*, t) < L_3(u^{**}, t, \epsilon_t^{E/A/US,2}) \quad \text{if } t < T^*_C\] (34)

\[L_1(i^*, t) > L_3(u^{**}, t, \epsilon_t^{E/A/US,2}) \quad \text{if } t > T^*_C\] (34’)

\(^{22}\)Yoshino, Kaji, and Asonuma (2004) find that this is also the case for two small open economies, which are mutually dependent in a static analysis.
This means that if $t$ is shorter than the threshold time period $T^*_C$, then the cumulative loss of maintaining a dollar peg is smaller than that of transitioning to a basket peg. This could happen only if the exchange rate volatility negatively affects the economy. If $t$ is longer than the threshold time period $T^*_C$, then a cumulative loss of maintaining a dollar peg is higher than a sudden shift to a desired basket peg. The longer the time period for adopting a basket peg, the more benefits the economy will obtain from shifting to a basket peg, as shown in Equation (34').

Next, we compare the losses under maintaining a dollar peg, policy (1) to shifting to a floating regime, policy (4). We define a threshold time period $T^*_D$ such that

$$L_1(i^*, T^*_D) = L_4(m^*, T^*_D, \tilde{e}_{t_EA/US}^t)$$

denoting the time interval under which the cumulative loss of maintaining a dollar peg is equal to that of shifting to a floating regime. Reflecting that the above equation holds under the target regime period after the shift, the following conditions hold:

$$L_1(i^*, t) < L_4(m^*, t, \tilde{e}_{t_EA/US}^t) \quad \text{if } t < T^*_D \quad (35)$$

$$L_1(i^*, t) > L_4(m^*, t, \tilde{e}_{t_EA/US}^t) \quad \text{if } t > T^*_D \quad (35')$$

These findings imply that the longer the period of adopting a floating regime, the greater the benefits to the economy from shifting to a floating regime as shown in Equation (35'). Summarizing the above results, maintaining a dollar peg is desirable only in the short-term (i.e., $t < \min [T^*_C, T^*_D]$). As the target time period is extended, the economy can realize greater benefits from shifting to either a basket peg or a floating regime.

C. Comparisons among Transition Policies

We then identify an optimal policy among the four transition policies. There are benefits and costs for each of the four transition policies (2), (3), (4), and (5) as shown in Table 4. These benefits and costs are taken into account by evaluating the cumulative losses expressed by Equations (29), (30), and (31). By comparing cumulative losses, we can analyze an optimal transition policy if the monetary authority should decide to shift from a dollar peg.

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23 As explained in section V.C, the effect of exchange rate volatility due to the shift is included in the expression of the cumulative loss under policy (3). Therefore, when the length of time under the target regime is short, the loss of maintaining the current regime is smaller than that of policy (3) because the monetary authority can avoid the negative effects of exchange rate volatility associated with the shift.

24 For components of costs, estimates based on numerical analysis for the PRC and Thailand are provided in Appendix 5.
Table 4. Benefits and Costs of Transition Policies

| Policy | Benefits | Costs |
|--------|----------|-------|
| (1) Maintaining a dollar peg | No volatility of $e^{EA/US}$ | Limited capital inflows |
| (2) Gradually shifting to a basket peg | Small volatility of $i$, Small volatility of $e^{EA/US}$, $e^{EA/JPN}$, Small deviations of $e^{EA/US}$, $e^{EA/JPN}$, $e^{EA/JPN}$, $e^{EA/JPN}$ | Time required to reach stable regime, Adjustment costs |
| (3) Suddenly shifting to a basket peg | Stable regime achieved immediately (higher benefits under stable regime), No adjustment costs | High volatility of $i$, High volatility of $e^{EA/US}$, $e^{EA/JPN}$ |
| (4) Suddenly shifting to a free-floating regime | Stable regime achieved immediately (higher benefits under desirable regime), No adjustment costs | High volatility of $i$, High volatility of $e^{EA/US}$, $e^{EA/JPN}$, Large deviations of $e^{EA/JPN}$, $e^{EA/JPN}$, $e^{EA/JPN}$, $e^{EA/JPN}$ |
| (5) Suddenly shifting to a managed-floating regime | Stable regime achieved immediately (higher benefits under desirable regime), No adjustment costs | High volatility of $i$, No monetary policy autonomy during interventions |
| | | Limited exchange rate fluctuations |

Source: Authors’ compilation.

We start by comparing a gradual adjustment to a basket peg, policy (2), and a sudden shift to a basket peg, policy (3). Given time period $T_2$, we define $T_1^*$ such that

$$L_2(\nu^*, T_1, T_2) = L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US, 2}_{T_1})$$

reflecting a time interval for the transition period under which the cumulative loss of a gradual adjustment policy is equal to a sudden shift to a basket peg.

Based on the fact that terms in $L_3(\nu^{**}, T_1^* + T_2)$ include highly volatile exchange rates and interest rates due to the shift, it is apparent that the following results will hold:

$$L_2(\nu^*, T_1, T_2) < L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US, 2}_{T_1}) \quad \text{if } T_1 < T_1^* \quad (36)$$
$$L_2(\nu^*, T_1, T_2) > L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US, 2}_{T_1}) \quad \text{if } T_1 > T_1^* \quad (36')$$

This implies that the longer the transition period of adjustment, the more benefits will accrue from reaching the target regime suddenly. However, as long as the interval for the transition period is in the range, $T_1 < T_1^*$, the monetary authority will benefit from avoiding large exchange rate fluctuations.
Next, we consider a contrast between policy (3) and policy (4). Instead of explicit conditions for the time intervals, we obtain theoretical conditions on exchange rate volatility. Given time periods $T_1$ and $T_2$, the optimal basket weight $\nu^{**}$, and money supply $m^*$, we define $\tilde{e}^{EA/US,2}_t$ such that

$$L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US,2}_t) = L_4(m^*, T_1 + T_2, \tilde{e}^{EA/US,2}_t)$$

reflecting a sum of discounted squares of the US dollar rate in which the cumulative loss of shifting to a basket peg is equal to that of a sudden shift to a floating regime. If the US dollar rate fluctuates significantly, the economy benefits from committing to a basket peg by stabilizing the negative impacts of exchange rate fluctuations on trade and capital flows, and minimizing unexpected deviations from exchange rate expectations. Thus, the following statements hold:

$$L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US,2}_t) < L_4(m^*, T_1 + T_2, \tilde{e}^{EA/US,2}_t) \quad \text{if} \quad \tilde{e}^{EA/US,2}_t > \tilde{e}^{EA/US,2}_t$$

(37)

$$L_3(\nu^{**}, T_1 + T_2, \tilde{e}^{EA/US,2}_t) > L_4(m^*, T_1 + T_2, \tilde{e}^{EA/US,2}_t) \quad \text{if} \quad \tilde{e}^{EA/US,2}_t < \tilde{e}^{EA/US,2}_t$$

(37')

These statements show that the economy will be better off choosing a sudden shift to a basket peg rather than to a floating regime, given the large exchange rate fluctuations. However, if the magnitude of the exchange rate fluctuations is relatively modest, the monetary authority would be better off adopting a floating regime.

Finally, we consider whether it is desirable to shift to a managed-floating regime, policy (5), rather than a free-floating regime, policy (4). Given time period $T_1 + T_2, T_D, T_E$, money supply $m^*$ and $m^{**}$, and exchange rate volatility for the whole period $\tilde{e}^{EA/US,2}_{t,E}$, we define the exchange rate volatility for intervention periods $\tilde{e}^{EA/US,2*}_{t,E}$:

$$L_5(m^{**}, T_1 + T_2, T_D, T_E, \tilde{e}^{EA/US,2*}_{t,E}) = L_4(m^*, T_1 + T_2, \tilde{e}^{EA/US,2*}_{t,E})$$

reflecting a sum of discounted squares of the US dollar rate during intervention periods in which the cumulative loss of shifting to a managed-floating regime is equal to that of a shift to a free-floating regime. If the exchange rate fluctuates significantly during the short periods, the economy will be better off intervening to avoid the negative impacts of the exchange rate swing on trade and capital flows. This can be expressed as

$$L_5(m^{**}, T_1 + T_2, T_D, T_E, \tilde{e}^{EA/US,2*}_{t,E}) < L_4(m^*, T_1 + T_2, \tilde{e}^{EA/US,2*}_{t,E}) \quad \text{if} \quad \tilde{e}^{EA/US,2*}_{t,E} > \tilde{e}^{EA/US,2*}_{t,E}$$

(38)
Dynamic Effects of Changes in the Exchange Rate System

Thus, it is desirable for the economy to shift to a managed-floating rather than to a free-floating regime, given the large exchange rate fluctuations during the short periods of interventions. However, if the magnitude of the exchange rate fluctuations during these intervention periods is relatively small, the economy would be better off shifting to a free-floating regime to take advantage of having monetary policy autonomy for the whole period. When comparing shifts to a basket peg or a managed-floating regime, we are not able to derive explicit theoretical conditions on time intervals. Instead, we rely on the quantitative estimates explained in section VII.

Summarizing these results, when choosing between policy (2) and policy (3), the longer the transition period of the adjustment, the more benefits the monetary authority will gain from immediately implementing a basket peg. When comparing sudden shifts to either a basket peg, policy (3), or a free-floating regime, policy (4), the welfare gains to the economy are greater under a shift to a basket peg if the exchange rate fluctuations are large. Similarly, if we compare between a sudden shift to a managed-floating regime, policy (5), and a free-floating regime, policy (4), the economy would be better off shifting to a managed-floating regime, given the large exchange rate fluctuations during the short intervention periods.

VII. Simulation Exercises for the People’s Republic of China and Thailand

In this section, we report simulation exercises using data for the PRC and Thailand. To accurately determine cumulative losses over specified periods, we use both estimated coefficients and actual exchange rate and exchange rate risk shocks specific to the PRC and Thailand. We quantify cumulative losses for the four transition policies and maintaining the status quo. Our quantitative results support the theoretical findings explained in sections VI.B and VI.C. First, among the five policies, maintaining a dollar peg, policy (1), leads to the greatest losses, i.e., the least desirable policy in both the PRC and Thai cases. Second, when contrasting two transition policies to a basket-peg regime, a gradual adjustment rather than a sudden shift is desirable in both economies. Finally, when comparing a shift to a basket peg with a shift to a floating regime, it is better to shift to a basket peg in Thailand for both output and price level stability. In contrast, the optimal policy is dependent upon policy objective in the PRC.

25 An alternative method is to take commonly used parameters that are not specific to the PRC and Thailand and draw shocks from specified distributions. Then, for robustness, we apply sensitivity analysis. The cases of Malaysia and Singapore are discussed in Yoshino, Kaji, and Asonuma (2015b).
A. Data and Regression Results

We use Chinese and Thai quarterly data from the IMF’s *International Financial Statistics*. All variables except interest rates are defined in natural logs. For exchange rate risk, we use the variance of monthly exchange rate data as a proxy. Applying the Dicky–Fuller generalized least squares (DF-GLS) unit root tests, we find some variables have unit roots. Then we move onto Johansen cointegration tests (Johansen 1992, 1995) and prove that all variables in both the Chinese and Thai samples are stationary. We apply the instrumental variable method to estimate coefficients of the model simultaneously with instruments of lagged variables, which are predetermined. We differentiate between two sample periods in each economy based on the exchange rate regime. For the PRC, the two periods are Q1 1999–Q2 2005 for a dollar peg and Q3 2005–Q4 2010 for a floating regime. As the PRC has never adopted a de facto floating regime, we use estimated coefficients obtained for a de facto basket-peg period. For Thailand, we set Q1 1993–Q2 1997 as the period for both a dollar peg and a basket peg, and Q3 1997–Q1 2006 for a floating regime. A dummy variable is used to exclude impacts of the 1997/98 Asian financial crisis (Q3 1997–Q2 1998) for the Thai case (floating regime). Table 5 reports the estimation results on the basis of the macroeconomic model explained in section IV.A.

B. Simulation Results Using Estimated Coefficients for the People’s Republic of China and Thailand

Our simulation algorithm is reported in Appendix 7. We quantify optimal values of instruments and of cumulative losses according to the transition policies. For the exchange rates and exchange rate risks, we use the actual data for Q1 1999–Q4 2010 for the PRC and Q1 1993–Q1 2006 for Thailand. As we define exogenous shocks and other variables as deviations from the long-run values, we use the deviation from the Hodrick–Prescott filtered trend values. We assume the time period for the dollar peg as 1 quarter ($T_0 = 1$), the interval for the transition period as 18 quarters ($T_1 = 18$), and the period for the target regime as 18 quarters ($T_2 = 18$). Tables 6 and 7 report the values for cumulative losses and optimal instruments for stabilizing output and price levels, respectively, for each of the five policies for both the PRC and Thailand. The optimal instrument values correspond to what we obtained theoretically in section VI.A–VI.E. Cumulative losses are reported

26 For more details on the data, see Appendix 6.
27 Results of unit root tests and cointegration tests are reported in Appendix 6.
28 Yoshino, Kaji, and Asonuma (2014) find empirically that the estimated weight of the US dollar rate in the currency basket of the PRC decreased from 1.0 to 0.82 over the sample period.
29 The sample of observations under a dollar peg and a basket peg is slightly limited due to a de facto dollar peg in Thailand.
30 Appendix 8 explores the optimal basket weights under different time intervals for policies (2) and (3).
Table 5. Estimation Results for the People’s Republic of China and Thailand

| Coefficients | People’s Republic of China | Thailand |
|--------------|-----------------------------|----------|
|              | Fixed (basket peg) Q1 1999–Q2 2005 | Floating a Q3 2005–Q4 2010 | Fixed (basket peg) Q1 1993–Q2 1997 | Floating Q3 1997–Q1 2006 |
| λ            | N.A.                        | 0.26*** (0.09) | N.A.                        | 0.51** (0.07) |
| σ            | N.A.                        | 0.05** (0.03) | N.A.                        | 0.006 (0.02) |
| ε            | 3.20*** (0.89)             | 10.13*** (1.89) | 0.05 (0.08)                | 1.70*** (0.82) |
| φ            | 0.23*** (0.05)             | 0.50*** (0.10) | 0.94*** (0.19)             | 0.44 (0.36)   |
| δ, δ’        | -1.20 (2.51)               | 1.27* (0.69)  | -0.73*** (0.08)            | 0.01 (0.10)   |
| ρ, ρ’        | 0.70** (0.33)              | -0.007 (0.42) | 0.27*** (0.07)             | -0.005 (0.08) |
| τ            | -0.52 (0.38)               | 0.63** (0.25) | -3.73*** (0.50)            | 1.13*** (0.34) |
| ω            | -36.11 (46.78)             | -0.14 (0.77)  | 0.05 (0.22)                | 0.002 (0.009) |
| γ            | 0.40 (1.50)                | 8.66 (15.91)  | -2.00 (2.55)               | 0.53 (0.94)   |
| θ, θ’        | 0.16*** (0.02)             | 0.13*** (0.04) | 0.01*** (0.003)            | 0.007*** (0.001) |
| υ, υ’        | -0.04* (0.02)              | 0.12** (0.005) | -0.25*** (0.04)            | 0.20*** (0.05) |
| μ, μ’        | -0.06* (0.03)              | -0.15** (0.07) | -0.19*** (0.03)            | 0.02 (0.02)   |
| ξ            | -1.32*** (0.26)            | -0.35*** (0.11) | 0.07*** (0.02)             | 0.02 (0.02)   |
| ξ            | -7.28*** (3.13)            | -0.001 (0.14)  | 0.01 (0.06)                | 0.002 (0.002) |
| ξ            | -5.87*** (0.88)            | -7.80*** (2.80) | -0.55 (0.66)               | -0.30 (0.23)  |

N.A. = not applicable.

Notes:
aAs the PRC has never adopted a de facto floating regime, we use estimated coefficients for a de facto basket-peg period.

*** = 10% level of statistical significance, ** = 5% level of statistical significance, * = 1% level of statistical significance.

Source: Authors’ calculations.

Table 6. Cumulative Losses—Output Stability

A. People’s Republic of China

| Policy (1) | Policy (2) | Policy (3) | Policy (4) | Policy (5) (T_E = 5)a |
|------------|------------|------------|------------|-----------------------|
| Stable regime | Dollar peg | Basket peg | Basket peg | Floating | Managed floating |
| Adjustment | Gradual | Gradual | Sudden | Sudden | Sudden |
| Optimal instrument value | i* = 4.34 | v* = 0.58 | v** = 0.68 | m* = 0.016 | m** = 0.017 |
| Cumulative loss (value) | 17.04 | 1.80 | 1.91 | 2.67 | 2.31 |
| Cumulative loss (% of y^2)b | 23.4 | 2.4 | 2.6 | 3.7 | 3.2 |

B. Thailand

| Policy (1) | Policy (2) | Policy (3) | Policy (4) | Policy (5) (T_E = 5)c |
|------------|------------|------------|------------|-----------------------|
| Stable regime | Dollar peg | Basket peg | Basket peg | Floating | Managed floating |
| Adjustment | Gradual | Gradual | Sudden | Sudden | Sudden |
| Optimal instrument value | i* = 0.003 | v* = 0.68 | v** = 0.62 | m* = 0.082 | m** = 0.082 |
| Cumulative loss (value) | 0.0069 | 0.0006 | 0.0026 | 0.0052 | 0.0053 |
| Cumulative loss (% of y^2)d | 15.0 | 1.3 | 5.7 | 11.3 | 11.5 |

N.A. = not applicable.

Notes:
aIf T_E = 7, the cumulative loss is 3.54 (m** = 0.017).
bWe calculate the value of y^2 and obtain y^2 = 72.8.
cIf T_E = 5, the cumulative loss is 3.54 (m** = 0.082).
dWe calculate the value of y^2 and obtain y^2 = 0.046.

Source: Authors’ calculations.
Table 7. Cumulative Losses—Price Stability

A. People’s Republic of China

| Policy (1) | Policy (2) | Policy (3) | Policy (4) | Managed floating |
|------------|------------|------------|------------|------------------|
| Stable regime | Dollar peg | Basket peg | Basket peg | Floating | Sudden |
| Adjustment | N.A. | Gradual | Sudden | Sudden | Sudden |
| Optimal instrument value | $i^* = 1.14$ | $\nu^* = 0.65$ | $\nu^{**} = 0.78$ | $m^* = 0.11$ | $m^{**} = 0.01$ |
| Cumulative loss (value) | 0.30 | 0.020 | 0.021 | 0.013 | 0.033 |
| Cumulative loss (% of $\bar{p}^2$) | 33.0 | 2.2 | 2.3 | 1.4 | 3.3 |

B. Thailand

| Policy (1) | Policy (2) | Policy (3) | Policy (4) | Managed floating |
|------------|------------|------------|------------|------------------|
| Stable regime | Dollar peg | Basket peg | Basket peg | Floating | Sudden |
| Adjustment | N.A. | Gradual | Sudden | Sudden | Sudden |
| Optimal instrument value | $i^* = 0.00005$ | $\nu^* = 0.14$ | $\nu^{**} = 0.59$ | $m^* = 0.0011$ | $m^{**} = 0.0019$ |
| Cumulative loss (value) | 0.0044 | 0.0022 | 0.0028 | 0.0038 | 0.0033 |
| Cumulative loss (% of $\bar{p}^2$) | 5.6 | 2.8 | 3.6 | 4.8 | 4.2 |

Notes:

a If $T_E = 7$, the cumulative loss is 3.54 ($m^{*} = 0.015$).
b We calculate the value of $\bar{p}^2$ and obtain $\bar{p}^2 = 0.91$.
c If $T_E = 5$, the cumulative loss is 0.0033 ($m^{**} = 0.0024$).
d We calculate the value of $\bar{p}^2$ and obtain $\bar{p}^2 = 0.079$.

Source: Authors’ calculations.

in both absolute terms and as a percentage of squared steady-state values ($\bar{y}^2$ and $\bar{p}^2$).

Tables 6 and 7 confirm the theoretical findings discussed in section VI.B–VI.C. First, among the five policies, maintaining the dollar peg, policy (1), leads to the greatest loss in terms of both stabilizing output and the price level in the PRC and Thailand. This is because capital controls limit capital inflows and hinder successful growth over the medium and long run. The results imply that these economies would be better off shifting to a target basket peg or a floating regime.

Second, comparing the two transition policies to a basket peg, it is desirable in terms of stabilizing output and the price level for both the PRC and Thailand to pursue a gradual adjustment rather than a sudden shift. Volatility in interest rates associated with a sudden shift is substantially high and dampens output. On the contrary, setting the interval of transition that is long enough helps mitigate the volatility of interest rates associated with a gradual shift. Moreover, the optimal weights of policy (2) and policy (3) are different, as explained in section VI.B–VI.C.31

Third, when comparing shifting to a basket peg with shifting to a floating regime in Thailand, shifting to a floating regime leads to greater losses, suggesting that the economy would be better off shifting to the desired basket peg for both stabilizing

31The optimal basket weights that we identify for the PRC and Thailand are different from those in Ogawa and Shimizu (2006), which were calculated based on shares of regional gross domestic product (measured at purchasing power parity) and trade volume shares.
output and the price level. As mentioned in section VI.C, this is a case in which the economy can experience the benefits of committing to a basket peg by smoothing the negative impacts of exchange rate fluctuations and following exchange rate expectations. In the case of the PRC, the results are mixed and depend on policy goals. If the monetary authority prefers to stabilize output, it would be better off shifting to the desired basket peg. However, if the monetary authority chooses price level stability, its decision should be to shift to a floating regime. This is because unlike the choice to stabilize output, there are fewer negative impacts on domestic prices associated with exchange rate fluctuations.

Finally, a shift to a managed-floating regime is less desirable than a move to a basket peg. For Thailand, this is true in terms of both output and price level stability. This is the case for the PRC as well since shifting to a managed-floating regime results in greater losses than shifting to a basket peg. A basket peg is preferable because interventions in the foreign exchange market under a managed-floating regime lead to greater losses resulting from the lack of monetary policy autonomy for the monetary authorities during intervention periods.

VIII. Conclusions

Given observed shifts in exchange rate regimes in emerging market economies, particularly in East Asia, we attempt to overcome the limitations in static and conventional dynamic analyses. Our paper proposes a new dynamic transition analysis on the basis of a small open economy DSGE model. Our proposed analysis differs from existing analyses in that it explicitly explores shifts from a fixed exchange rate regime to a basket peg or a floating rate. We consider four transition policies, as well as maintaining the status quo, and obtain theoretical expressions for the cumulative loss and optimal instrument for each policy.

Our dynamic transition analysis using data for the PRC and Thailand draws the following findings. First, maintaining a dollar peg is found to be desirable only over the short run, indicating that an economy will be better off shifting to either a basket peg or a floating regime over the long run. Second, given the choice between a gradual adjustment, policy (2), toward the target basket peg or a sudden shift to the target basket peg, policy (3), greater benefits accrue to the economy from a gradual adjustment over a longer transition period. Third, given the comparison between sudden shifts to a basket peg, policy (3), or to a floating regime, policy (4), the welfare gains to the economy are maximized under a shift to a basket peg if the exchange rate fluctuates significantly. Finally, it is less desirable to adopt a shift to a managed-floating regime than to move to a free-floating regime as the monetary authority lacks monetary policy autonomy during interventions periods.

However, current analysis is still limited to a medium-run perspective rather than a long-run perspective of 20 years or more. There is a possibility that an
economy would be better off adopting a floating regime over the longer horizon (20–40 years). If this were the case, the question of whether an economy opts to take a one-stage shift (directly to a floating rate) or a two-stage shift (with a basket peg as an intermediate regime) will remain a future research topic.

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*ADB recognizes “China” as the People’s Republic of China and “Hong Kong” as Hong Kong, China.
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APPENDIX

Appendix 1. De Jure Exchange Rate Regime and Capital Account Measures

Figure A1. Nominal Exchange Rates of ASEAN+3 Currencies against the US Dollar
(January 1997 = 1, excluding Indonesia)

ASEAN+3 = Association of Southeast Asian Nations plus the People’s Republic of China; Japan; and the Republic of Korea; PRC = People’s Republic of China; US = United States.
Source: International Monetary Fund. 2015. International Financial Statistics. Washington, DC.

Table A.1. Transition of De Facto Exchange Rate Regimes in ASEAN+3a,b

| Economy                  | 1999         | 2002         | 2005                                      | 2008                                      |
|--------------------------|--------------|--------------|------------------------------------------|------------------------------------------|
| People’s Republic of China | De facto peg | De facto peg | Moving band that is narrower than or equal to +/-2% | De facto peg |
| Indonesia                | Managed floating | Managed floating | De facto crawling band that is narrower than or equal to +/-5% | De facto crawling band that is narrower than or equal to +/-5% |
| Japan                    | Free floating | Managed floating | Free floating | Free floating |
| Republic of Korea        | Managed floating | Managed floating | Managed floating |
| Malaysia                 | Preannounced peg or currency board arrangement | Preannounced peg or currency board arrangement | De facto peg | De facto crawling band that is narrower than or equal to +/-5% |

Continued.
Table A.1. Continued.

| Economy  | 1999 | 2002 | 2005 | 2008 |
|----------|------|------|------|------|
| Philippines | De facto crawling band that is narrower than or equal to +/-2% | De facto crawling band that is narrower than or equal to +/-2% | De facto crawling band that is narrower than or equal to +/-2% | De facto crawling band that is narrower than or equal to +/-5% |
| Singapore | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% |
| Thailand | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% | Moving band that is narrower than or equal to +/-2% |

**ASEAN+3** = Association of Southeast Asian Nations plus the People’s Republic of China; Japan; and the Republic of Korea.

*a* The categories of de facto exchange rate arrangements are (1) no separate legal tender, (2) preannounced peg or currency board arrangement, (3) preannounced horizontal band that is narrower than or equal to +/-2%, (4) de facto peg, (5) preannounced crawling peg, (6) preannounced crawling band that is narrower than or equal to +/-2%, (7) de facto crawling peg, (8) de facto crawling band that is narrower than or equal to +/-2%, (9) preannounced crawling band that is wider than or equal to +/-2%, (10) de facto crawling band that is narrower than or equal to +/-5%, (11) moving band that is narrower than or equal to +/-2%, (12) managed-floating regime, (13) free-floating regime, (14) free falling, and (15) dual market in which parallel market data is missing.

*b* According to Ilzetzki, Reinhart, and Rogoff (Unpublished), if the exchange rate has no drift, it is classified as a fixed parity; if a positive drift is present, it is labeled a crawling peg; and, if the exchange rate also goes through periods of both appreciation and depreciation it is a moving peg. If a band is explicitly announced and the chronologies show a unified exchange market, we label the episode as a band. By computing the probability that the monthly exchange rate change remains within a +/-2% band over a rolling 5-year period, the regime is classified as a de facto narrow band, a narrow crawling or a moving band over the period through which it remains continuously above the 80% threshold.

Source: Ilzetzki, E., C. Reinhart, and K. Rogoff. Exchange Rate Arrangements Entering the 21st Century: Which Anchor Will Hold? London: London School of Economics. Unpublished.

### Appendix 2. Solving for Rational Expectations

**A. Dollar-Peg Regime (A)**

Substituting Equation (10) into Equation (3), we obtain the following equation such that

\[
y_t - \bar{y}_A = \frac{-(\delta + \theta)}{D} \left[ \psi \theta \epsilon^{US/JPN}_t + (1 + \psi \rho)(\hat{p}^{e}_{t+1} - \hat{p}^{e}_t) \right] \left[ 1 - \left( 1 - \psi(\delta + \theta) - \eta \right) \frac{T_e^{E/US}}{\Delta \epsilon^{E/US}} \right] + \theta \epsilon^{US/JPN}_t + \rho \left( \hat{p}^{e}_{t+1} - \hat{p}^{e}_t \right) - \xi \epsilon^{E/JP/N} + \rho_i \epsilon^{E/JP/N} - \rho \epsilon^{E/JP/N}
\]

(A1)

We take the expectation for both sides of Equation (6) and solve for \( \hat{p}^{e}_{t+1} \).

\[
\hat{p}^{e}_{t+1} = a_1 \epsilon^{US/JPN}_t + a_2 \hat{p}^{e}_t
\]

(A2)

\[\text{We assume that exchange rate risk terms have a mean of zero, implying } E(\Delta \epsilon^{E/US}) = 0 \text{ and } E(\Delta \epsilon^{E/JP/N}) = 0.\]
Then, we substitute for $\hat{p}^e_{t+1}$ in Equation (6) and obtain an expression for $\hat{p}^e_t$ such that

$$\hat{p}^e_t = a_3 \hat{e}^{US/JPN}_t$$

(A3)

Substituting Equations (A2) and (A3) into Equations (A1) and (10), respectively, we obtain

$$y_t - \bar{y}_B = A_1(t) \hat{e}^{EA/JPN}_t + A_2(t) \Delta \hat{e}^{EA/JPN}_t + A_3(t)i_{t+1}$$

(11)

and

$$p_t - \bar{p}_B = A_1^p(t) \hat{e}^{EA/JPN}_t + A_2^p(t) \Delta \hat{e}^{EA/JPN}_t + A_3^p(t)i_{t+1}$$

(11a)

where

$$A_1(t) = -\frac{- (\delta + \theta)[\psi \theta + (1 + \psi \rho)(a_1 + a_2 a_3 - a_2)]}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}]$$

$$A_2(t) = -\frac{-\psi \varsigma(\delta + \theta)}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}] - \varsigma$$

$$A_3(t) = -\frac{-\psi \rho(\delta + \theta)}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}] - \rho$$

$$A_1^p(t) = -\frac{- \psi \theta + (1 + \psi \rho)(a_1 + a_2 a_3 - a_2)}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}]$$

$$A_2^p(t) = -\frac{-\psi \varsigma}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}]$$

$$A_3^p(t) = -\frac{-\psi \rho}{D}[1 - \{1 - \psi(\delta + \theta) - \eta\}]$$

B. Basket-Peg Regime with Weak Capital Controls (B)

Substituting Equation (13) into Equation (3), we obtain the following equation:

$$y_t - \bar{y}_B = \frac{- (\delta + \theta)}{D} \left[ \tilde{G} \hat{e}^{US/JPN}_t + (1 + \psi \rho)(\hat{p}^e_{t+1} - \hat{p}^e_t) \right]$$

$$- (\psi \tau - \chi) \Delta \hat{e}^{EA/US}_t - \psi \varsigma \Delta \hat{e}^{EA/JPN}_t$$

$$\times [1 - \{1 - \psi(\delta + \theta) - \eta\}] + \{-(\delta - 1 - \psi(\delta + \theta) - \eta)\} \hat{e}^{US/JPN}_t$$

$$- \rho [1 - (1 - \lambda \tau)(1 - \psi(\delta + \theta) - \eta)\sigma] \hat{e}^{US/JPN}_t + \rho (\hat{p}^e_{t+1} - \hat{p}^e_t) - \tau \Delta \hat{e}^{EA/US}_t$$

$$- \varsigma \Delta \hat{e}^{EA/JPN}_t$$

(A4)

where $\tilde{G} = [\psi(\theta - 1 - \psi(\delta + \theta) - \eta)\rho(1 + \sigma)(1 - \psi(\delta + \theta) - \eta)].$
We take the expectation for both sides of Equation (13) and solve for \( \hat{p}^e_{t+1} \):

\[
\hat{p}^e_{t+1} = (b_1 v + b_1') e^t_{US/JPN} + b_2 \hat{p}^e_t
\]

(A5)

Then, we substitute for \( \hat{p}^e_{t+1} \) in Equation (13) and obtain an expression for \( \hat{p}^e_t \) such that

\[
\hat{p}^e_t = (b_3 v + b_3') e^t_{US/JPN}
\]

(A6)

Substituting Equations (A5) and (A6) into Equations (A4) and (13), we obtain

\[
(y_t - \bar{y}_B^t) = B_1(t) v e^t_{US/JPN} + B_2(t) e^t_{US/JPN} + B_3(t) \hat{z}_t
\]

(17)

\[
(p_t - \bar{p}_B^t) = B^p_1(t) v e^t_{US/JPN} + B^p_2(t) e^t_{US/JPN} + B^p_3(t) \hat{z}_t
\]

(17a)

where

\[
B_1(t) = \frac{-(\delta + \theta)}{D} \left[ \frac{\eta + \psi(\theta + \delta + \rho \lambda (1 + \sigma))}{\eta + \psi \rho (b_1 + b_2 b_3 - b_3)} \right] [1 - \{ 1 - \psi (\delta + \theta) - \eta \}^t]
\]

\[
+ (\delta + \theta) + \rho \sigma [1 - (1 - \lambda)^t] + \rho (b_1 + b_2 b_3 - b_2)
\]

\[
B_2(t) = \frac{-(\delta + \theta)}{D} \left[ \frac{-\eta + \psi (-\delta - \rho \lambda (1 + \sigma))}{\eta + \psi \rho (b_1' + b_2 b_3' - b_3')} \right] [1 - \{ 1 - \psi (\delta + \theta) - \eta \}^t]
\]

\[
- \delta - \rho \sigma [1 - (1 - \lambda)^t] + \rho (b_1' + b_2 b_3' - b_3')
\]

\[
B_3(t) \hat{z}_t = \frac{(\delta + \theta)}{D} \left[ \frac{(\psi t - \chi) \Delta \hat{e}^t_{\sigma/\Delta t}}{\eta + \psi \Delta \hat{e}^t_{\sigma/\Delta t}} \right] [1 - \{ 1 - \psi (\delta + \theta) - \eta \}^t] - \hat{\Delta} \hat{e}^t_{\sigma/\Delta t} - \zeta \hat{\Delta} \hat{e}^t_{\sigma/\Delta t}
\]

\[
B^p_1(t) = \frac{1}{D} \left[ \frac{\eta + \psi(\theta + \delta + \rho \lambda (1 + \sigma))}{\eta + \psi \rho (b_1 + b_2 b_3 - b_3)} \right] [1 - \psi (\delta + \theta) - \eta]^t
\]

\[
B^p_2(t) = \frac{1}{D} \left[ \frac{-\eta + \psi (-\delta - \rho \lambda (1 + \sigma))}{\eta + \psi \rho (b_1' + b_2 b_3' - b_3')} \right] [1 - \psi (\delta + \theta) - \eta]^t
\]

\[
B^p_3(t) \hat{z}_t = \frac{1}{D} \left[ \frac{-(\psi t - \chi) \Delta \hat{e}^t_{\sigma/\Delta t} - \psi \zeta \Delta \hat{e}^t_{\sigma/\Delta t}}{\eta + \psi \Delta \hat{e}^t_{\sigma/\Delta t}} \right] [1 - \{ 1 - \psi (\delta + \theta) - \eta \}^t]
\]

C. Basket-Peg Regime without Capital Controls (C)

Similar to Appendix 2.B., substituting Equation (13) into Equation (3), we obtain the following equation such that
\[ y_t - \tilde{y}_C = \frac{- (\delta + \theta)}{D} \left[ \tilde{\delta}_t + \tilde{e}_t^{US/JPN} + (1 + \psi \rho) \left( \tilde{\rho}_{t+1}^e - \tilde{\rho}_t^e \right) \right] \]

\[ \times \left[ 1 - \{1 - \psi (\delta + \theta) - \eta \} \right] \left[ - \psi \chi \Delta \tilde{e}_t^{E/AUS} - \psi \zeta \Delta \tilde{e}_t^{E/AJPN} \right] \]

\[ - \rho (1 + \sigma)(1 - \psi) \tilde{e}_t^{US/JPN} + \rho \left( \tilde{\rho}_{t+1}^e - \tilde{\rho}_t^e \right) - \tau \Delta \tilde{e}_t^{E/AUS} \]

where \( \tilde{G}' = [\psi \{ \theta - \delta (1 - \psi) - \rho (1 + \sigma)(1 - \psi) \} - \eta (1 - \psi)]. \)

We take the expectation for both sides of Equation (13) and solve for \( \tilde{\rho}_{t+1}^e: \)

\[ \tilde{\rho}_{t+1}^e = (c_1 \nu + c_1') \tilde{e}_t^{US/JPN} + c_2 \tilde{\rho}_t^e \] (A8)

Then, we substitute for \( \tilde{\rho}_{t+1}^e \) in Equation (13) and obtain an expression for \( \tilde{\rho}_t^e \) such that

\[ \tilde{\rho}_t^e = (c_3 \nu + c_3') \tilde{e}_t^{US/JPN} \] (A9)

Substituting Equations (A8) and (A9) into Equations (A7) and (13), respectively, we obtain

\[ y_t - \tilde{y}_C = C_1(t)\nu \tilde{e}_t^{US/JPN} + C_2(t) \tilde{e}_t^{US/JPN} + C_3(t) \tilde{z}_t \] (18)

\[ p_t - \tilde{p}_C = C_1^p(t) \nu \tilde{e}_t^{US/JPN} + C_2^p(t) \tilde{e}_t^{US/JPN} + C_3^p(t) \tilde{z}_t \] (18a)

where

\[ C_1(t) = \frac{- (\delta + \theta)}{D} \left[ \left\{ \eta + \psi (\rho \sigma + \rho + \theta + \delta) \right\} + (1 + \psi \rho)(c_1 + c_2 c_3 - c_3) \right] - \{1 - \psi (\delta + \theta) - \eta \} ] \]

and

\[ C_2(t) = \frac{- (\delta + \theta)}{D} \left[ \left\{ - \eta - \psi (\rho \sigma + \rho + \delta) \right\} + (1 + \psi \rho)(c_1' + c_2 c_3' - c_3') \right] - \{1 - \psi (\delta + \theta) - \eta \} ] \]

\[ C_3(t) \tilde{z}_t = \frac{(\delta + \theta)}{D} \left[ \left\{ \psi \tau - \chi \Delta \tilde{e}_t^{E/AUS} \right\} + \psi \zeta \Delta \tilde{e}_t^{E/AJPN} \right] \left[ 1 - \psi \{ \theta - \delta (1 - \psi) - \rho (1 + \sigma)(1 - \psi) \} - \eta (1 - \psi) \right]

\[ C_1^p(t) = \frac{- 1}{D} \left[ \left\{ \eta - \psi (\theta + \delta + \rho (1 + \sigma)) \right\} + (1 + \psi \rho)(c_1 + c_2 c_3 - c_3) \right] - \{1 - \psi (\delta + \theta) - \eta \} ] \]
\[ C_2^p(t) = \frac{-1}{D} \begin{bmatrix} \eta - \psi(\delta + \rho(1 + \sigma)) \\ + (1 + \psi \rho)(c_1' + c_2c_3' - c_3') \end{bmatrix} \{1 - \psi(\delta + \theta) - \eta\}' \]

\[ C_3^p(t) \dot{\hat{z}}_i = \frac{(\delta + \theta)}{D} \left\{ (\psi \tau - \chi) \Delta \hat{e}_i^{\psi \tau} + \psi \xi \Delta \hat{e}_i^{\psi \xi} \right\} \{1 - \psi(\delta + \theta) - \eta\}' \]

**D. Floating Regime without Capital Controls (D)**

New equilibrium value after the dollar–yen rate change is

\[ \begin{align*}
\dot{p}_D' &= \frac{\rho f_1 + \psi \rho f_1}{E(\epsilon + \phi \rho)} m_t + \frac{\phi \theta f_3 + \psi \theta \xi f_1}{E(\epsilon + \phi \rho)} c_i^{E_A} + g_1(\dot{\hat{p}}_t' - \hat{p}_t') \\
+ g_2' \Delta \hat{e}_i^{E_A} + g_3' \Delta \hat{e}_i^{E_A} \\
\dot{\hat{e}}^{E_A}_{US}_i &= - \frac{\rho f_1 + \psi \rho f_1}{E(\epsilon + \phi \rho)} m_t - \frac{\phi \theta f_4 + \psi \theta \xi f_2}{E(\epsilon + \phi \rho)} c_i^{E_A} + g_1'(\dot{\hat{p}}_t' - \hat{p}_t') \\
+ g_2' \Delta \hat{e}_i^{E_A} + g_3' \Delta \hat{e}_i^{E_A} 
\end{align*} \] (23)

where

\[ g_1 = \frac{\phi \rho f_3 + (1 + \psi \rho \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right))}{E(\epsilon + \phi \rho)} f_1, \quad g_2 = \frac{-\phi \xi f_3 + \left(\chi - \psi \tau \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right)\right)}{E(\epsilon + \phi \rho)} f_1 \\
g_3 = \frac{-\phi \xi f_3 - \left(\psi \xi \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right)\right)}{E(\epsilon + \phi \rho)} f_1, \quad g_1' = \frac{\phi \rho f_4 + (1 + \psi \rho \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right))}{E(\epsilon + \phi \rho)} f_2 \\
g_2' = \frac{-\phi \xi f_4 + \left(\chi - \psi \tau \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right)\right)}{E(\epsilon + \phi \rho)} f_2, \quad g_3' = \frac{-\phi \xi f_4 - \left(\psi \xi \left(1 + \frac{\phi \rho}{\epsilon + \phi \rho}\right)\right)}{E(\epsilon + \phi \rho)} f_2
\]

Substituting Equations (23) and (24) into Equation (3), we obtain the following equation such that

\[ y_t - \dot{y}'_D = H \dot{p}' + (\delta + \theta) h_1 \dot{\hat{e}}^{E_A}_{US}_D + \frac{1}{E(\epsilon + \phi \rho)} m_t + \theta h_2 \Delta \hat{e}_i^{E_A} + \psi \xi \Delta \hat{e}_i^{E_A} \]

\[ + \rho h_2 (\dot{\hat{p}}_t - \hat{p}_t) - \tau \Delta \hat{e}_i^{E_A} - \xi h_2 \Delta \hat{e}_i^{E_A} \] \quad (A10)

where \[ H = \left[-(\delta + \theta)\left(1 - \omega_2\right) + \frac{1 + \phi(\delta + \theta)}{\epsilon + \phi \rho} - (\delta + \theta) h_1 \kappa \omega_2\right], \quad h_1 = 1 - \frac{\phi \rho}{\epsilon + \phi \rho}, \quad \text{and} \quad h_2 = 1 + \frac{\phi \rho}{\epsilon + \phi \rho}. \]
We take the expectation for both sides of Equation (20) and solve for $\hat{p}_{i+1}^e$:

$$\hat{p}_{i+1}^e = d_1 e_{i}^{US/JPN} + d_2 \hat{p}_{i}^e$$  \hfill (A11)

Then, we substitute for $\hat{p}_{i+1}^e$ in Equation (20) and obtain an expression for $\hat{p}_{i}^e$ such that

$$\hat{p}_{i}^e = d_3 e_{i}^{US/JPN}$$  \hfill (A12)

Substituting Equations (A11) and (A12) into Equations (A10) and (20), respectively, we obtain

$$y_{t} - \bar{y}' = D_1(t) e_{i}^{US/JPN} + D_2(t) \hat{z}_{t} + D_3(t) m_{t}$$  \hfill (25)

$$p_{t} - \bar{p}' = D_1^p(t) e_{i}^{US/JPN} + D_2^p(t) \hat{z}_{t} + D_3^p(t) m_{t}$$  \hfill (25a)

where

$$D_1(t) = H \frac{\phi \theta f_3 + \psi \varepsilon \phi f_1}{E(\varepsilon + \phi \rho)} - (\delta + \theta) \frac{\phi \theta f_4 + \psi \varepsilon \phi f_2}{E(\varepsilon + \phi \rho)} h_1$$
$$+ [H g_1 + h_1 g'_1 (\delta + \theta) + \rho h_2](d_1 + d_2 d_3 - d_3) + h_2 \theta$$
$$D_2(t) \hat{z}_{t} = \left\{ H g_2 + h_1 g'_2 (\delta + \theta) - \tau h_2 \right\} \Delta \hat{e}_{i}^{E/A/US}$$
$$+ \left\{ H g_3 + h_1 g'_3 (\delta + \theta) - \varsigma h_2 \right\} \Delta \hat{e}_{i}^{E/A/JPN},$$

$$D_3(t) = H f_3 + \psi \rho f_1 \overline{E(\varepsilon + \phi \rho)} - (\delta + \theta) h_1 \frac{f_4 + \psi \rho f_2}{E(\varepsilon + \phi \rho)} + \frac{\rho}{\varepsilon + \phi \rho},$$

$$D_1^p(t) = -\omega_2 \left[ \frac{\phi \theta f_3 + \psi \varepsilon \phi f_1}{E(\varepsilon + \phi \rho)} + g_1 (d_1 + d_2 d_3 - d_3) \right],$$

$$D_2^p(t) = -\omega_2 \left[ g_2 \Delta \hat{e}_{i}^{E/A/US} + g_3 \Delta \hat{e}_{i}^{E/A/JPN} \right],$$

and $$D_3^p(t) = -\omega_2 \left( \frac{f_3 + \psi \rho f_1}{E(\varepsilon + \phi \rho)} \right).$$

Appendix 3. Saddle Path Stability under a Floating Regime

Characteristic roots of difference Equations (19) and (20) can be derived by solving the equation below:

$$\omega^2 - (2 + f_1 + f_4) \omega + (1 + f_1 + f_4 + E) = 0$$  \hfill (A13)
Solving this equation,
\[ \omega_1, \omega_2 = \frac{1}{2} (2 + f_1 + f_4) \pm \sqrt{(2 + f_1 + f_4)^2 - 4 (1 + f_1 + f_4 + E)} \]  
(A14)

Now we assume some assumptions to satisfy saddle path stability, such as
(a) \((2 + f_1 + f_4)^2 - 4 (1 + f_1 + f_4 + E) > 0\),
(b) \(1 + f_1 + f_4 + E > 0\), and
(c) \(2 + f_1 + f_4 - \sqrt{(2 + f_1 + f_4)^2 - 4 (1 + f_1 + f_4 + E)} < 2\)

First, under (a), both \(\omega_1, \omega_2\) are real and distinct. It is found that \(\omega_1 > 1\). Now under (b),
\[ \omega_1 \omega_2 = 1 + f_1 + f_4 + E > 0 \]

Therefore, \(\omega_2 > 0\). Lastly, (c) implies that \(\omega_2 < 1\). The system is described by the unique stable saddle path. We can express the solution for the original variables as
\[ e^{E/A}_{D-US} - \bar{e}^{E/A}_{D-US} = \kappa (p_0 - \bar{p}) \omega_2 \]  
(A15)
\[ p_t - \bar{p}_D = (p_0 - \bar{p}_D) \omega_2 \]  
(A16)

From these equations above, the saddle path is
\[ e^{E/A}_{D-US} - \bar{e}^{E/A}_{D-US} = \kappa (p_t - \bar{p}) \]  
(A17)

where \(\kappa = \frac{\omega_2 - 1 - f_3}{f_3}\).

Appendix 4. Price Level Stability

In the case of the price level stability, the cumulative loss can be shown as
\[ L_p(T_1, T_2) = \sum_{t=1}^{T_0+T_1+T_2} \beta^{t-1} (p_t - \bar{p})^2 \]  
(27a)
A. Maintaining a Dollar-Peg Regime (1)

The cumulative loss evaluated in terms of deviation of the price level from the steady state for maintaining a dollar-peg regime is shown as follows:

\[
L_p^P(i^*, T_1 + T_2) = \sum_{t=1}^{T_0} \beta^{t-1}(p_t - \bar{p}_A')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(p_t - \bar{p}_A')^2
\]

where \( (p_t - \bar{p}_A') = A_1^p(t)\tilde{e}_{tUS/JPN} + A_2^p(t)\Delta \tilde{e}_{tEA/JPN} + A_3^p(t)i^*_p \).

B. Gradual Adjustment to a Basket Peg without Capital Controls (2)

The cumulative loss for a gradual shift to a basket peg without capital controls is defined as follows:

\[
L_p^P(\nu^*_p, T_1 + T_2) = \sum_{t=1}^{T_0} \beta^{t-1}(p_t - \bar{p}_B')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(p_t - \bar{p}_B')^2
\]

where \( (p_t - \bar{p}_B') = A_1^p(t)\tilde{e}_{tUS/JPN} + A_2^p(t)\Delta \tilde{e}_{tEA/JPN} + A_3^p(t)i^*_p \) and \( \nu^*_p \) is an optimal basket weight for stabilizing the price level.

C. Sudden Shift to a Basket Peg without Capital Controls (3)

The cumulative loss for a sudden shift to a basket peg without capital controls is shown as follows:

\[
L_p^P(\nu^{**}_p, T_1 + T_2, \tilde{e}_{tEA/JPN, 2}) = \sum_{t=1}^{T_0} \beta^{t-1}(p_t - \bar{p}_C')^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(p_t - \bar{p}_C')^2
\]

where \( (p_t - \bar{p}_C') = A_1^p(t)\tilde{e}_{tUS/JPN} + A_2^p(t)\Delta \tilde{e}_{tEA/JPN} + A_3^p(t)i^*_p \) and \( \nu^{**}_p \) is an optimal weight for stabilizing the price level.
D. Sudden Shift from a Dollar-Peg to a Floating Regime (4)

The cumulative loss for a sudden shift from a dollar-peg to a floating regime is defined as follows:

\[
L_p^4(m^*_p, T_1 + T_2, \tilde{e}_{t}^{EA/US,2}) = \sum_{t=1}^{T_0} \beta^{t-1}(p_t - \tilde{p}'_A)^2 + \sum_{t=T_0+1}^{T_0+T_1+T_2} \beta^{t-1}(p_t - \tilde{p}'_D)^2 \tag{31a}
\]

where \((p_t - \tilde{p}'_A) = A_1^p(t)\tilde{e}_{t}^{US/JPN} + A_2^p(t)\Delta\tilde{e}_{t}^{EA/JPN} + A_3^p(t)i^*_p\) and \(m^*_p\) is an optimal money supply for stabilizing the price level.

E. Sudden Shift from a Dollar-Peg to a Managed-Floating Regime (5)

The cumulative loss for a sudden shift from a dollar-peg to a floating regime is defined as follows:

\[
L_p^5(m^{**}_p, T_1 + T_2, T_D, T_E, \tilde{e}_{t,E}^{EA/JPN,2}) = \sum_{t=1}^{T_0} \beta^{t-1}(p_t - \tilde{p}'_A)^2 + \sum_{t=T_0+1}^{T_0+T_D} \beta^{t-1}(p_t - \tilde{p}'_D)^2 + \sum_{t=T_0+T_D+1}^{T_0+T_D+T_E} \beta^{t-1}(p_t - \tilde{p}'_E)^2 \tag{32a}
\]

where \((p_t - \tilde{p}'_A) = A_1^p(t)\tilde{e}_{t}^{US/JPN} + A_2^p(t)\Delta\tilde{e}_{t}^{EA/JPN} + A_3^p(t)i^*_p\) and \(m^{**}_p\) is the optimal money supply for stabilizing the price level.

F. Comparison of Transition Policies

Similar to the case of output stability, we express implications from the static analysis by using a one-period loss in terms of the deviation of the price level from the steady state as follows:

\[
(p_t - \tilde{p}'_A) > (p_t - \tilde{p}'_C) \tag{33a}
\]

\[
(p_t - \tilde{p}'_A) > (p_t - \tilde{p}'_D) \tag{33'a}
\]

We first compare maintaining a dollar peg, policy (1), with a sudden shift to a basket-peg regime without capital controls, policy (3). We define a threshold time
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period $T_{C}^{sp}$ such that

$$L_{1}^{p}(i_{p}^{*}, T_{C}^{sp}) = L_{2}^{p}(u_{p}^{**}, T_{C}^{sp}, e_{t}^{EA/US,2})$$

For the price level stability, similar statements will be satisfied:

$$L_{1}^{p}(i_{p}^{*}, t) < L_{3}^{p}(v_{p}^{**}, t, e_{t}^{EA/US,2}) \quad \text{if } t < T_{C}^{sp} \quad (34a)$$
$$L_{1}^{p}(i_{p}^{*}, t) > L_{3}^{p}(v_{p}^{**}, t, e_{t}^{EA/US,2}) \quad \text{if } t > T_{C}^{sp} \quad (34a')$$

Next, we compare the loss under maintaining a dollar peg, policy (1), to shifting to a floating regime, policy (4). We define a threshold period $T_{D}^{sp}$ such that

$$L_{1}^{p}(i_{p}^{*}, T_{D}^{sp}) = L_{4}^{p}(m_{p}^{*}, T_{D}^{sp}, e_{t}^{EA/US,2})$$

For the case of price level stability, similar statements will be satisfied:

$$L_{1}^{p}(i_{p}^{*}, t) < L_{4}^{p}(m_{p}^{*}, t, e_{t}^{EA/US,2}) \quad \text{if } t < T_{D}^{sp} \quad (34a)$$
$$L_{1}^{p}(i_{p}^{*}, t) > L_{4}^{p}(m_{p}^{*}, t, e_{t}^{EA/US,2}) \quad \text{if } t > T_{D}^{sp} \quad (34a')$$

Summarizing the results above, maintaining a dollar-peg regime is desirable only in the short run (i.e., $t < \min[T_{C}^{sp}, T_{D}^{sp}]$).

We compare a gradual adjustment to a basket peg, policy (2), with a sudden shift to a basket peg, policy (3). Given time period $T_{2}$, we define $T_{1}^{*}$ such that

$$L_{2}^{p}(v_{p}^{*}, T_{1}^{*}, T_{2}) = L_{3}^{p}(v_{p}^{**}, T_{1}^{*} + T_{2}, e_{t}^{EA/US,2})$$

For the case of price level stability, similar statements will hold as follows:

$$L_{2}^{p}(v_{p}^{*}, T_{1}^{*}, T_{2}) < L_{3}^{p}(v_{p}^{**}, T_{1}^{*} + T_{2}, e_{t}^{EA/US,2}) \quad \text{if } T_{1} < T_{1}^{*} \quad (36a)$$
$$L_{2}^{p}(v_{p}^{*}, T_{1}^{*}, T_{2}) > L_{3}^{p}(v_{p}^{**}, T_{1}^{*} + T_{2}, e_{t}^{EA/US,2}) \quad \text{if } T_{1} > T_{1}^{*} \quad (36a')$$

Next, we consider a comparison between sudden shifts; that is, policy (3) and policy (4). Given time periods $T_{1}$ and $T_{2}$, the optimal basket weight $v_{p}^{**}$, and money supply $m_{p}^{*}$, we define $e_{t,p}^{EA/US,2}$ such that

$$L_{3}(v_{p}^{**}, T_{1} + T_{2}, e_{t,p}^{EA/US,2}) = L_{4}(m_{p}^{*}, T_{1} + T_{2}, e_{t,p}^{EA/US,2})$$
We obtain the similar statements as in the case of output stability:

\[ L_3(v_p^*, T_1 + T_2, \tilde{e}_{t.p}^{E_A/US,2}) < L_4(m_p^*, T_1 + T_2, \tilde{e}_{t.p}^{E_A/US,2}) \quad \text{if} \quad \tilde{e}_{t.p}^{E_A/US,2} > \tilde{e}_{t.p}^{E_A/US,2*} \]  
\[ (37a) \]

\[ L_3(v_p^*, T_1 + T_2, \tilde{e}_{t.p}^{E_A/US,2}) > L_4(m_p^*, T_1 + T_2, \tilde{e}_{t.p}^{E_A/US,2}) \quad \text{if} \quad \tilde{e}_{t.p}^{E_A/US,2} < \tilde{e}_{t.p}^{E_A/US,2*} \]  
\[ (37'a) \]

Finally, we contrast a shift to a managed-floating regime, policy (5), with a shift to a free-floating regime, policy (4). Given time period \( T_1 + T_2, T_D, T_E \), money supply \( m^* \) and \( m^{**} \), and exchange rate volatility for the whole period \( \tilde{e}_{t,E}^{E_A/US,2*} \), we define the exchange rate volatility for intervention periods \( \tilde{e}_{t,E,p}^{E_A/US,2*} \):

\[ L_5(m^{**}, T_1 + T_2, T_D, T_E, \tilde{e}_{t,E,p}^{E_A/US,2*}) = L_4(m^*, T_1 + T_2, \tilde{e}_{t,p}^{E_A/US,2*}) \]

We obtain similar statements to the case of output stability.

\[ L_5(m^{**}, T_1 + T_2, T_D, T_E, \tilde{e}_{t,E,p}^{E_A/US,2*}) \]
\[ < L_4(m^*, T_1 + T_2, \tilde{e}_{t,p}^{E_A/US,2*}) \quad \text{if} \quad \tilde{e}_{t,E}^{E_A/US,2*} > \tilde{e}_{t,E}^{E_A/US,2*} \]  
\[ (38a) \]

\[ L_5(m^{**}, T_1 + T_2, T_D, T_E, \tilde{e}_{t,E,p}^{E_A/US,2*}) \]
\[ > L_4(m^*, T_1 + T_2, \tilde{e}_{t,p}^{E_A/US,2*}) \quad \text{if} \quad \tilde{e}_{t,E}^{E_A/US,2*} < \tilde{e}_{t,E}^{E_A/US,2*} \]  
\[ (38'a) \]

\textbf{Appendix 5. Comparison of Transition Policies}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Policy} & \textbf{Costs} & \textbf{Estimates} & \\
\hline
(1) Maintaining a dollar-peg regime & Limited capital inflows & \(0.033^a\) & \(0.003^a\) & \\
(2) Gradually shifting to a basket-peg regime & Time to reach stable regime & \(0.003^b\) & \(0.000096^b\) & \\
(3) Suddenly shifting to a basket-peg regime & Adjustment costs & \(0.0066^c\) & \(0.00000079^c\) & \\
(4) Suddenly shifting to a free-floating regime & High volatility of \(i\) & \(0.0028^d\) & \(0.00000037^d\) & \\
 & High volatility of \(e^{E_A/US}\) and \(e^{E_A/JPN}\) & \(0.0030^e\) & \(0.00018^e\) & \\
 & High volatility of \(e^{E_A/US}\) and \(e^{E_A/JPN}\) & \(0.0034^f\) & \(0.0000038^d\) & \\
 & Large deviations of \(e^{E_A/US}\) and \(e^{E_A/JPN}\) & \(0.0013^f\) & \(0.000024^f\) & \\
\hline
\end{tabular}
\caption{Cost Estimates of the Five Transition Policies}
\end{table}

\textit{Continued.}
Table A.5. Continued.

| Policy | Costs                                    | Estimates          |
|--------|------------------------------------------|--------------------|
| (5) Suddenly shifting to a managed-floating regime | High volatility of interest rates | 0.0034<sup>d</sup> 0.0000038<sup>d</sup> |
|         | No monetary policy autonomy during interventions | 0.023<sup>e</sup> 0.00038<sup>e</sup> |

PRC = People’s Republic of China.

Notes:
- The estimate is the cumulative losses over 9 quarters (one initial period plus 2 years).
- The estimate is the difference between the cumulative losses under a transition period of 14 quarters and one of 18 quarters.
- The estimate is the difference between the cumulative losses based on baseline λ and on a 20% deviation from the baseline λ.
- The estimate is the change in cumulative losses due to an increase in interest rates originally driven by a 0.001-unit US/JPN shock.
- The estimate is a change in cumulative losses due to a 0.001-unit US/JPN shock.
- The estimate is a change in cumulative losses due to a 0.001-unit US/JPN shock.
- The estimate is a fraction of cumulative losses during intervention periods.

Source: Authors’ calculations.

Appendix 6. Sources of Data, Unit Root, and Cointegration Tests

Appendix 6 summarizes sources of data for our regressions and the results of the unit root and cointegration tests. Table A6.1 provides details on our data and sources.

Table A6.1. Source of Data for Estimation

| Variables | Definition | Economy | Source |
|-----------|------------|---------|--------|
| e<sub>EA/US</sub> | Nominal US dollar exchange rate | PRC, THA | IMF IFS |
| e<sub>EA/JPN</sub> | Nominal yen exchange rate | PRC, THA | IMF IFS |
| e<sub>EA/US</sub> + p<sub>US</sub> − p<sub>t</sub> | Real US dollar exchange rate | PRC, THA | IMF IFS |
| e<sub>EA/JPN</sub> + p<sub>JPN</sub> − p<sub>t</sub> | Real yen exchange rate | PRC, THA | IMF IFS |
| p<sub>t</sub> | Nominal government bond yields | JPN | IMF IFS |
| m<sub>t</sub> | Real money supply (M1) | PRC, THA | IMF IFS |
| ∆e<sub>EA/US</sub> | Risk premium on US dollar exchange rate | PRC, THA | IMF IFS |
| ∆e<sub>EA/JPN</sub> | Risk premium on yen exchange rate | PRC, THA | IMF IFS |
| y<sub>t+1</sub> − y<sub>t</sub> | Change in domestic CPI | PRC, THA | IMF IFS |
| y<sub>t</sub> − y<sub>¯</sub> | Output gap | PRC, THA | Authors’ calculation |

CPI = Consumer Price Index, IMF IFS = International Monetary Fund’s International Financial Statistics, JPN = Japan, PRC = People’s Republic of China, THA = Thailand, US = United States.

We start by applying the DF-GLS unit root tests. The results of the unit root test are presented in Table A6.2. Reflecting the 10% significance critical value on DF-GLS statistics, some variables, such as the real interest rate and the output...
Table A6.2. Dicky-Fuller Generalized Least Square Unit Root Tests

A. People's Republic of China

| Variables                  | Degree | Trend | Lag | DF-GLS Stat. | Results |
|----------------------------|--------|-------|-----|--------------|---------|
| $e_{EA}/US$                | Level  | 0     | 0   | $-2.67^{***}$| I(0)$^b$|
| $e_{EA/JPN}$               | Level  | 0     | 1   | $-3.06^{***}$| I(0)$^b$|
| $i$                        | Level  | 0     | 0   | $-1.65^*$    | I(0)$^b$|
| $i - (p_{t+1}^r - p_t)$    | Level  | 0     | 8   | 0.17         |         |
| $i_{US}$                   | Level  | 0     | 3   | $-2.68^{***}$| I(0)$^b$|
| $m - p$                   | Level  | 0     | 5   | $-1.88^*$    | I(0)$^b$|
| $e_{EA}/US - p_{US} - p$   | Level  | 0     | 0   | $-2.57^{**}$ | I(0)$^b$|
| $e_{EA/JPN} - p_{JPN} - p$ | Level  | 0     | 2   | $-3.22^{***}$| I(0)$^b$|
| $e_{US/JPN}$              | Level  | 0     | 0   | $-2.80^{***}$| I(0)$^b$|
| $\Delta e_{EA}/US$        | Level  | 0     | 0   | 0.17         |         |
| $\Delta e_{EA/JPN}$       | Level  | 0     | 0   | $-0.68^{***}$| I(1)$^c$|
| $p_{t+1} - p_t$           | Level  | 0     | 8   | 0.14         |         |
| $y_t - \bar{y}$           | Level  | 0     | 4   | $-1.61^*$    | I(0)$^b$|

B. Thailand

| Variables                  | Degree | Trend | Lag | DF-GLS Stat. | Results |
|----------------------------|--------|-------|-----|--------------|---------|
| $e_{EA}/US$                | Level  | 0     | 0   | $-2.90^{***}$| I(0)$^b$|
| $e_{EA/JPN}$               | Level  | 0     | 0   | $-3.27^{***}$| I(0)$^b$|
| $i$                        | Level  | 0     | 0   | $-5.24^{***}$| I(0)$^b$|
| $i - (p_{t+1}^r - p_t)$    | Level  | 0     | 0   | -1.07        |         |
| $i_{US}$                   | Level  | 0     | 0   | $-5.60^{***}$| I(1)$^c$|
| $m - p$                   | Level  | 0     | 2   | $-2.77^{***}$| I(0)$^b$|
| $e_{EA}/US - p_{US} - p$   | Level  | 0     | 0   | $-3.03^{***}$| I(0)$^b$|
| $e_{EA/JPN} - p_{JPN} - p$ | Level  | 0     | 0   | $-2.21^{***}$| I(0)$^b$|
| $e_{US/JPN}$              | Level  | 0     | 0   | $-2.20^{**}$ | I(0)$^b$|
| $\Delta e_{EA}/US$        | Level  | 0     | 0   | $-3.81^{***}$| I(0)$^b$|
| $\Delta e_{EA/JPN}$       | Level  | 0     | 0   | $-5.81^{***}$| I(0)$^b$|
| $p_{t+1} - p_t$           | Level  | 0     | 0   | $-3.23^{***}$| I(0)$^b$|
| $y_t - \bar{y}$           | Level  | 0     | 2   | 0.97         |         |
| 1st diff.                  | Level  | 0     | 3   | $-1.83^*$    | I(1)$^c$|

DF-GLS = Dicky-Fuller generalized least squares.

Notes:

$^a$The critical values for the DF-GLS statistics are 5%, $-1.98$; and 10%, $-0.62$. Our results of the unit root are based on a 10% critical value.

$^b$I(0) shows that the variable follows the stationary process at the level.

$^c$I(1) shows that the variable has a unit root of degree 1.

Source: Authors’ calculations.

gap, have a unit root. Then, we move onto Johansen cointegration tests for equations shown in Table A6.3. Using the 5% significance critical criteria, we find cointegration relationships among the variables in these equations for both the PRC and Thailand.
## Table A6.3. Johansen Cointegration Tests

### A. People’s Republic of China

| Equation | Variables | Trend | Hypothesis | Trace Statistics | P-values |
|----------|-----------|-------|------------|-----------------|----------|
| Aggregate demand | $y_t - \bar{y}$ | Deterministic | None<sup>c</sup> | 162.3*** | 0.00 |
| | $e_{EA/US} - p_{US} - p$ | | At most 1<sup>c</sup> | 118.9*** | 0.00 |
| | $e_{EA/JPN} - p_{JPN} - p$ | | At most 2<sup>c</sup> | 75.8*** | 0.00 |
| | $i - (p_{t+1} - p_t)$ | | At most 3<sup>c</sup> | 36.9*** | 0.00 |
| | $\Delta e_{EA/US}$ | | At most 4<sup>c</sup> | 14.0* | 0.08 |
| | $\Delta e_{EA/JPN}$ | | At most 5<sup>c</sup> | 2.7* | 0.09 |

### Aggregate supply

| Equation | Variables | Trend | Hypothesis | Trace Statistics | P-values |
|----------|-----------|-------|------------|-----------------|----------|
| Aggregate demand | $p_{t+1} - p_t$ | Deterministic | None<sup>c</sup> | 171.3*** | 0.00 |
| | $y_t - \bar{y}$ | | At most 1<sup>c</sup> | 121.8*** | 0.00 |
| | $e_{EA/US} - p_{US} - p$ | | At most 2<sup>c</sup> | 78.8*** | 0.00 |
| | $e_{EA/JPN} - p_{JPN} - p$ | | At most 3<sup>c</sup> | 37.8*** | 0.00 |
| | $\Delta e_{EA/US}$ | | At most 4<sup>c</sup> | 14.8* | 0.04 |
| | $\Delta e_{EA/JPN}$ | | At most 5<sup>c</sup> | 2.7* | 0.09 |

### Notes:

-<sup>a</sup> Denotes 5% critical values.
-<sup>b</sup> Denotes MacKinnon, Haug, and Michelis (1999) p-values.
-<sup>c</sup> Denotes rejection of the hypothesis at the 5% significance level.

Source: Authors’ calculations.

## Appendix 7. Simulation Algorithm

The procedure of simulation exercises is the following:

1. First, we set parameter values as reported in Table 5, which are obtained from regression results.
   - Time intervals are set as follows: $T_0 = 1$, $T_1 = 18$, and $T_2 = 18$.
   - For the exchange rates and exchange rate risks, we use the actual data for Q1 1999–Q4 2010 for the PRC, and Q1 1993–Q1 2006 for Thailand.

2. Second, we numerically compute the value of a one-period loss function for each exchange rate regime (A)–(E) (as specified in section IV.B.1–5).
   - We use the obtained reduced forms in Appendix 2.
• In the case of a floating regime, we use King-Watson (2002) solution algorithms for singular linear difference systems under rational expectations.

3. Third, we calculate the cumulative losses for each transition policy, (1)–(5) (as specified in Section V.A–E on the basis of initial optimal instrument values).

4. Fourth, we compute the optimal instrument values as specified in section V.A–E, using the cumulative losses derived in the 3rd step.

5. Fifth, on the basis of optimal instrument values obtained in the 4th step, we compute cumulative losses for each transition policy, (1)–(5).

Appendix 8. Time Intervals and Optimal Basket Weights

We analyze optimal basket weights under a basket peg under different time intervals using Thai data to examine the relationship between the two. First, we consider the case of a gradual adjustment to a basket-peg regime, policy (2). Given a fixed time interval for transition periods $T_1$ (e.g., $T_1 = 18$), the optimal basket weight increases as time intervals under the desired basket peg increase. An increase in the length of the periods under the desired basket peg leads to an increase in the share of cumulative losses under the desired basket peg (losses after the economy completes

Figure A8.1. **Optimal Basket Weights and Time Intervals under Policy (2)**

Source: Authors’ calculations.
a transition) in total cumulative losses. In the case of Thailand, the increase in the length of periods results in an increase in the weight on the US dollar rate. However, given a fixed time interval under the desired basket-peg $T_2$ (for instance $T_2 = 18$), the longer the time intervals for transition become, the higher the optimal basket weight is. An increase in the length of the transition period leads to an increase in the share of cumulative losses during transition in total cumulative losses. This results in an increase in optimal basket weights, indicating the higher relative importance of the US dollar rate for Thailand.

Next, in the case of a sudden shift to a basket-peg regime, policy (3), the longer the time intervals under the desired basket peg, the higher the optimal basket weight becomes. As in the previous case, if the time intervals under the desired basket peg become longer, the share of cumulative losses under the desired basket-peg regime in total cumulative losses increases. An increase in the time interval under the desired basket peg also results in higher optimal basket weights for Thailand.