

Currency Policy and International Reserves in East Asia

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Abstract. The authors analyze correlation between international reserves in East Asian countries and their currency policy. The study focuses on ASEAN+3 countries. There is no united exchange rate regime in the region. ASEAN+3 countries are also characterized by frequent changes in exchange rate regimes. In order to create a “safety cushion” after the crises of 1997 and 2008-2009 regional countries increased their international reserves by stimulating export growth through a competitive devaluation policy against the USD. The regression analysis results show that despite the absence of an institutional framework for coordinated monetary policy in the region, de facto there is a pegging of nominal exchange rates of East Asian currencies to the USD.

1. Introduction

Some research papers [1; 2; 3; 4] state that competitive devaluation of a national currency contributes to the growth of the country's exports. At the same time, the impact of monetary policy measures on the volume of foreign trade is studied on the example of a single state. Examining effects of monetary policy on region's trade rather than an individual country [5; 6; 7; 8] shows that competitive devaluation results in declining of regional exports and imports.

East Asian countries currently practice competitive devaluation of their national currencies against USD and it forms two groups of currencies with diametrically opposite dynamics – strong and weak ones. It leads to negative consequences as it increases competition among regional countries, reduces intraregional trade and deepens political tension.

In addition, there is no single currency or financial market in the region [9; 10; 11; 12; 13; 14; 15; 16; 17; 18; 19; 20; 21], which also negatively affects payment balances of East Asian countries. Regional countries are mostly characterized by trade and capital surpluses. This, in turn, puts pressure on exchange rates of East Asian countries.

Coordinated monetary policy can eliminate the current “beggar-the-neighbor” practice and reduce the related tension. At the same time, the idea of pegging ASEAN+3 national currencies to any anchor (usually to a currency basket) or even a common currency is very popular among researchers [5; 6; 7; 8; 22]. Although currency baskets are different, all authors agree that coordinated exchange rates policy will contribute to greater stability in the region and thus ensure further capital inflows.

The remainder of the paper is organized as follows. Section 2 provides a simple conceptual framework based on the Mundell-Fleming model explaining the relationship between exchange rate dynamics and balance of payments and covers exchange rate arrangements in general and their applying in East Asia. Section 3 describes the relationship between monetary policy and total reserves in East Asian countries and the most common criteria of total reserves adequacy. Section 4 investigates em-

pirically the relationship between exchange rate dynamics and balance of payments for 13 East Asian countries. It will be shown that despite the absence of an institutional framework for coordinated monetary policy in the region, de facto there is a pegging of nominal exchange rates of East Asian currencies to the USD. Section 5 concludes the paper.

2. The Mundell–Fleming model and exchange rate regimes in East Asia

Monetary policy directly impacts on balance of payments and indirectly – on economic growth. The relationship between exchange rate dynamics and balance of payments is described by the Mundell–Fleming model [23; 24; 25; 26] (Equation 1).

$$NE(e, y) = NKE(\Delta i, e, k), \quad (1)$$

where NE is net exports of goods, NKE is net capital exports, e is nominal exchange rate, y is GDP, Δi is an interest rates difference in studied countries, k is capital flows.

The model examines the case of a small open economy under perfect capital mobility and price rigidity (short-term period). It is assumed that the domestic interest rate coincides with the global one, and effectiveness of monetary policy depends on the exchange rate regime. The model considers only two cases – hard peg and free floating. And it is impossible to simultaneously achieve three following objectives: a) free capital movement; b) fixed exchange rate and c) autonomous monetary policy. This is so-called “the impossible trinity”.

In theory, balance of payments should be in equilibrium, i.e. net exports of goods should be balanced by net exports of capital. In practice, however, such a state is almost unattainable, and there is a deficit (negative balance) or a surplus (positive balance). In theory, a balance of payments deficit leads to currency devaluation and a surplus causes a revaluation [23; 24; 27; 28; 29]. But this is true only in the case of free floating. Countries with other exchange rate regimes devalue or revalue their national currency regardless this principle, which often leads to “currency wars” (also known as competitive devaluation policy). Countries seek to gain a trade advantage over other countries (exports of goods and services become more competitive in other countries, and imports into the country become more and more expensive) or to stimulate capital inflows and thus to increase international reserves. Reserves, in turn, are used for currency interventions, financing of a balance of payments deficit and foreign borrowing.

Monetary policy pursues such goals as maintaining balance of payments, ensuring stable economic growth and stability of the national currency. However, in practice, these goals can be achieved by various methods as [30; 31; 32]: a) exchange-rate considerations; b) currency restrictions; c) currency interventions; and d) diversification of international reserves.

IMF classifies all exchange rate arrangements into 4 types and 10 categories (Table 1). Most countries (136 out of 189 IMF members) apply hybrid exchange rate regimes (all categories except free floating, no separate legal tender and currency boards).

Table 1. Classification of Exchange Rate Arrangements.

Type	Categories
Hard pegs	Ex- change arrange- ment with no sepa- rate legal tender
Soft pegs	Cur- rency board ar- rangement
	Con- ventional pegged arrange- ment
	Pegged exchange rate within horizontal bands
	Stabi- lized ar- rangement
	Crawl- ing peg
	Crawl- like ar- rangement
Floating regimes (mar- ket determined rates)	Float- ing
Residual	Free floating
	Other managed arrange- ment

Notes: This classification is based on the information available on IMF members' de facto arrangements, as analyzed by the IMF staff, which may differ from countries' officially announced (de jure) arrangements.

Source: IMF Annual Report on Exchange Arrangements and Exchange Restrictions (2016).

Classification as an exchange rate arrangement with *no separate legal tender* means that the currency of another country circulates as the sole legal tender (formal dollarization). A *currency board* arrangement is a monetary arrangement based on an explicit legislative commitment to exchange domestic currency for a specified foreign currency at a fixed exchange rate, combined with restrictions on the issuing authority to ensure the fulfillment of its legal obligation.

For a *conventional peg* the country formally (de jure) pegs its currency at a fixed rate to another currency or basket of currencies, where the basket is formed, for example, from the currencies of major trading or financial partners and weights reflect the geographic distribution of trade, services, or capital flows. The anchor currency or basket weights are public or notified to the IMF. The country authorities stand ready to maintain the fixed parity through direct or indirect intervention.

A *pegged exchange rate within horizontal bands* means that the value of the currency is maintained within certain margins of fluctuation of at least $\pm 1\%$ around a fixed central rate, or the margin between the maximum and minimum value of the exchange rate exceeds 2%. The central rate and width of the band are public or notified to the IMF.

A *stabilized arrangement* entails a spot market exchange rate that remains within a margin of 2% for six months or more (with the exception of a specified number of outliers or step adjustments) and is not floating. The required margin of stability can be met either with respect to a single currency or a basket of currencies, where the anchor currency or the basket is ascertained or confirmed using statistical techniques.

A *crawling peg* means that the currency is adjusted in small amounts at a fixed rate or in response to changes in selected quantitative indicators, such as past inflation differentials vis-à-vis major trading partners or differentials between the inflation target and expected inflation in major trading partners. The rules and parameters of the arrangement are public or notified to the IMF.

For classification as a *crawl-like arrangement*, the exchange rate must remain within a narrow margin of 2% relative to a statistically identified trend for six months or more (with the exception of a specified number of outliers) and the exchange rate arrangement cannot be considered as floating. Normally, a minimum rate of change greater than allowed under a stabilized arrangement is required.

A *floating* exchange rate is largely market determined, without an ascertainable or predictable path for the rate. In particular, an exchange rate that satisfies the statistical criteria for a stabilized or a crawl-like arrangement will be classified as such unless it is clear that the stability of the exchange rate is not the result of official actions. Foreign exchange market intervention may be either direct or indirect. A floating exchange rate can be classified as *free floating* if intervention occurs only exceptionally and aims to address disorderly market conditions and if the authorities have provided information or data confirming that intervention has been limited to at most three instances in the previous six months, each lasting no more than three business days.

Other managed arrangement is a residual and is used when the exchange rate arrangement does not meet the criteria for any of the other categories. Arrangements characterized by frequent shifts in policies may fall into this category.

East Asian countries apply different exchange-rate regimes. According to the IMF data, as of the end of 2016, 11 out of 13 countries in the region applied hybrid exchange rates regimes. Brunei Darussalam is one of the countries that apply a currency board arrangement and the Brunei dollar is pegged to the Singapore dollar. Singapore, Vietnam and Lao PDR put into practice a stabilized arrangement. Indonesia, the Republic of Korea, Thailand and the Philippines implement floating arrangements and Japan applies free floating. Finally, China, Cambodia, Malaysia and Myanmar put on other managed arrangements.

East Asian countries are also characterized by frequent changes in exchange rate regimes. Thus, only Brunei Darussalam, Japan and the Republic of Korea did not change exchange rate regimes during the period 2000–2016. At the same time Cambodia, Vietnam and Lao PDR practiced various forms of soft pegs to the USD. China and Malaysia changed hard pegs to the USD to soft pegs; Singapore changed the floating exchange rate to soft peg to a basket of currencies (its composition is not disclosed). The Philippines and Thailand, on the contrary, moved from soft pegs to floating exchange rate regimes. While Indonesia first changed the floating exchange rate to a soft peg, but then reverted to a floating arrangement.

In Myanmar, there were official and parallel currency markets. The kyat was officially pegged to the SDR at K 8.50847 per SDR within a margin of $\pm 2\%$. This rate was effective between 1977 and 2012 and used for payments by state-controlled companies [33; 34]. Since April 2, 2012, the de jure exchange rate arrangement was reclassified to a managed float from a conventional peg to the SDR.

3. Monetary policy and total reserves in East Asian countries

The crises of 1997 and 2008–2009 had a significant impact on exchange rate regimes in the region. During 1990s most East Asian countries pegged their currencies to the USD [35]. Speculations with the Thai baht caused depreciation of other Asian currencies and changing to floating exchange rate regimes [35; 36]. After the crisis of 1997, most regional countries reverted to pegging against the USD, and they preferred soft pegs with the exception of Malaysia (the ringgit was pegged at MYR 3.8 per USD). After the crisis of 2008–2009, pegging of ASEAN currencies to the USD became even “softer”, however, regional countries did not apply free floating unlike the case of 1997.

In the 1990s East Asian countries had insignificant international reserves (Table 2). Thus, \$28 billion was spent to maintain a rate of the Thai baht in the spring of 1997. At that time international reserves of Thailand amounted to \$30 billion, so the monetary authorities did not have funds to maintain the rate further, and they applied a floating regime (in addition, there were different exchange rates for internal and external transactions).

Table 2. Total Reserves of East Asian Countries (USD billions).

Country	1997	1998	2008	2009	2016	2017
Brunei Darussalam	n/a	n/a	0.8	1.4	3.5	3.5
Cambodia	0.3	0.4	2.6	3.3	8.9	11.8
China	146.4	152.8	1966.0	2452.9	3097.7	3235.7
Indonesia	17.5	23.6	51.6	66.1	116.4	130.2
Japan	226.7	222.4	1030.8	1051.7	1216.5	1264.1
Republic of Korea	20.5	52.1	201.5	270.4	370.2	388.8
Lao PDR	0.1	0.1	0.9	0.9	0.9	1.3
Malaysia	21.5	26.2	92.2	96.7	94.5	102.4
Myanmar	0.3	0.4	3.9	5.5	4.9	5.2
Philippines	8.7	10.8	37.5	44.2	80.7	81.4
Singapore	71.4	75.1	177.5	192.0	251.1	285.0
Thailand	26.9	29.5	111.0	138.4	171.8	202.5
Vietnam	2.0	2.0	23.9	16.4	36.5	49.1

Notes: Total reserves comprise holdings of monetary gold, special drawing rights, reserves of IMF members held by the IMF, and holdings of foreign exchange under the control of monetary authorities. The gold component of these reserves is valued at year-end (December 31) London prices.

Source: World Development Indicators Database.

Despite the unfavorable situation in 1997, by the end of 1998, most East Asian countries increased their reserves (Table 2). Subsequently, their value only rose. Thus, total reserves of ASEAN+3 countries amounted to \$5.8 trillion by the end of 2017, multiplied in 10.6 times within 20 years.

Vietnam, Cambodia and Myanmar had the highest average growth rates for the period 1997-2017 (21.4%, 20.8% and 19.8% respectively); meanwhile Malaysia and Singapore showed the lowest growth rates (9.3% and 7.5% respectively). In terms of the value of total reserves China and Japan are the leaders (\$3.2 and 1.3 trillion respectively). The regional “outsiders” are Brunei Darussalam and Lao PDR (\$3.5 and 1.3 billion respectively) (Table 2).

Raising the value of total reserves by ASEAN+3 countries is explained by their fears after the Asian crisis and the desire to create a “safety cushion”. The increase in reserves was due to the export growth through the policy of competitive devaluation against the USD. In addition, there were capital inflows in various forms. After overcoming consequences of the Asian crisis, regional countries kept practicing competitive devaluation policy, despite the fact that they had surplus trade and capital balances.

However the value itself does not show the adequacy of total reserves. There is no generally accepted criterion, but in practice, the most common are the following criteria: a) total reserves in months of imports; b) money and quasi money (M_2) to total reserves ratio; and c) the Reddy criterion.

Total reserves in months of imports (the “import criterion”) imply that the volume of reserves must provide payments for imports of goods and services within at least 3 months. It is believed that this period is sufficient to eliminate effects of external shocks. Money and quasi money (M_2) to total reserves ratio (the “money criterion”) implies that the sum of currency outside banks, demand deposits other than those of the central government, and the time, savings, and foreign currency deposits of resident sectors other than the central government should not exceed the volume of the country's total reserves more than five times, and in the case of a crisis the Central Bank should redeem all its obligations in the form of coins and banknotes back. The Reddy criterion combines total reserves in months of imports and annual foreign debt payments (it is calculated for each country individually).

During the crisis of 1997 seven East Asian countries (the Republic of Korea, Myanmar, Cambodia, Lao PDR, Malaysia, the Philippines and Vietnam) did not meet the “import criterion” (Table 3).

Table 3. Total Reserves of East Asian Countries in Months of Imports.

Country	1997	1998	2008	2009	2016	2017
Brunei Darussalam	n/a	n/a	2.0	4.1	9.2	n/a
Cambodia	2.7	3.5	4.8	6.2	6.6	n/a
China	15.4	15.3	19.2	25.7	16.8	15.5
Indonesia	3.0	5.2	4.0	6.5	7.2	7.0
Japan	5.7	6.6	13.3	18.4	17.0	16.3
Republic of Korea	1.4	5.1	4.5	7.8	8.4	7.7
Lao PDR	1.9	2.2	6.6	6.5	1.8	n/a
Malaysia	2.6	4.3	5.6	7.2	5.6	5.5
Myanmar	1.5	1.6	8.6	11.4	3.3	2.9
Philippines	2.0	3.1	6.4	9.2	8.8	7.9
Singapore	5.2	6.7	4.6	6.0	5.7	6.0
Thailand	4.1	6.4	6.1	9.8	8.3	8.7
Vietnam	1.7	1.7	3.2	2.6	2.3	2.6

Source: World Development Indicators Database.

In 2008 only Brunei Darussalam did not meet the criterion, in 2009 it was Vietnam. In 2017 Myanmar and Vietnam were experiencing a shortage of total reserves.

In 1997 eight countries of the region did not meet the “money criterion” (China, Indonesia, Japan, the Republic of Korea, Malaysia, Myanmar, the Philippines and Thailand) (Table 4).

Table 4. Money and Quasi Money to Total Reserves of East Asian Countries Ratio.

Country	1997	1998	2008	2009	2013	2014
Brunei Darussalam	n/a	n/a	10.3	6.1	3.2	3.2
Cambodia	1.2	0.7	1.1	1.2	1.6	1.7
China	7.6	8.3	3.5	3.6	4.6	5.1
Indonesia	6.9	2.4	3.8	3.1	3.6	3.1
Japan	41.6	40.4	9.8	10.9	9.6	9.2
Republic of Korea	10.5	3.5	6.4	4.5	5.1	5.4
Lao PDR	2.8	2.2	1.5	2	n/a	n/a
Malaysia	5.8	3.4	3	2.9	3.4	4
Myanmar	164.6	179.9	236.1	214.3	n/a	n/a
Philippines	5.8	3.7	2.8	2.4	2.3	2.6
Singapore	1.2	1.3	1.3	1.3	1.4	1.5
Thailand	5.6	4.2	2.7	2.2	3.1	3.3
Vietnam	3	3.3	3.9	6.8	7.7	6.9

Source: World Development Indicators Database.

In 2008 Brunei Darussalam, Japan, the Republic of Korea and Myanmar were experiencing a shortage of total reserves. In 2009 Brunei Darussalam, Japan, Vietnam and Myanmar did not meet the “money criterion”.

In Myanmar the volume of money and quasi money exceeded the volume of the country's total reserves more than a hundred times. This was partly due to the dual exchange rate regime (the parallel exchange rate against the USD was almost a hundred times higher than the official rate of the kyat).

4. Simulation results and implications

As noted above, positive or negative balance of payments puts pressure on the exchange rate. In addition, positive balance of payments (the difference between net exports of goods and services and net capital exports) provides an increase in total reserves. The mentioned Mundell-Fleming model will be used to study the functional dependence between the volume of total reserves and monetary policy measures in the countries of East Asia. This relationship will be described by two versions of the regression equation (they differ in the argument *er*) (Equations 2 and 3).

$$zvr_{it} = \beta_0 + \beta_1 saldo_{it} + \beta_2 dummy_{it} + \beta_3 er_{it} + u_{it}, \tag{2}$$

$$zvr_{it} = \beta_0 + \beta_1 saldo_{it} + \beta_2 dummy_{it} + \beta_3 er_t + u_{it}, \tag{3}$$

where zvr_{it} is natural logarithm of the volume of total reserves of the country *i* in the period *t*, $saldo_{it}$ is natural logarithm of the balance of payments of the country *i* in the period *t*, $dummy_{it}$ is a dummy variable reflecting the balance of payments deficit, er_{it} is natural logarithm of the exchange rate against the USD of the national currency of the country *i* in the period *t*, er_t is natural logarithm of the AMU¹ exchange rate against the USD in the period *t*, and u_{it} is a random fluctuation.

Regression analysis is based on the panel data of ASEAN+3 countries for the period 1997–2017. Data include following: a) the volume of total reserves in USD millions, b) the volume of balance of payments in USD millions, c) AMU rates against the USD, and d) nominal exchange rates of the ASEAN+3 national currencies against the USD. Data sources include UNCTAD Statistics Database and IMF Statistics Database.

The analysis results show that fluctuations in the nominal exchange rates of East Asian currencies against the USD have a weak impact on the change in the volume of total reserves. Thus, devaluation against the USD by 1% provides an increase in total reserves by 0.58%. At the same time, an increase in the positive balance of payments by 1% stimulates the reserves growth by 0.41% (Table 5).

Table 5. Simulation Results.

Characteristic	Exchange Rates	
	National Currencies	AMU
Saldo	0.41***	0.27***
Dummy	-0.29**	-0.49***
Er	0.58***	4.63***
Constant	3.87***	7.84***
R-squared	0.35	0.51

Notes: Significance level: ** – $\alpha = 0.01$; *** – $\alpha = 0.001$.

Source: Authors’ simulation.

If the effect of fluctuations in the nominal exchange rates of East Asian currencies against the USD is considered for the region, not separately for each studied country, the simulation results are quite different. The competitive devaluation policy of ASEAN+3 countries results in the following: simultaneous depreciation of the East Asian national currencies (via the AMU) to the USD by 1% leads to an increase in total reserves by 4.63%. At the same time, an increase in the positive balance of payments by 1% raises the volume of total reserves by only 0.27% (Table 5).

¹ Asian Monetary Unit (AMU) is an artificial monetary unit comprising the ASEAN+3 currencies. It is calculated as a weighted average of East Asian currencies according to the method used to calculate the European Currency Unit (ECU) adopted by the European Union (EU) countries under the European Monetary System (EMS) prior to the introduction of the euro. I.e. basket currency shares are calculated taking into account the trade turnover of ASEAN+3 countries with the USA and the EU, as well as the PPP volume of GDP).

5. Concluding remarks

Exchange rate regimes in the ASEAN+3 countries were significantly influenced by the crises of 1997 and 2008–2009. During 1990s most East Asian countries pegged their currencies to the USD, but the crisis of 1997 caused depreciation of regional currencies and changing to floating exchange rate regimes. After the crisis, most East Asian countries reverted to pegging against the USD. The global financial crisis caused depreciation of regional currencies and “softer” pegging to the USD, however, the ASEAN+3 countries did not apply free floating unlike the case of 1997.

Since the Asian crisis the ASEAN+3 countries have been raising the value of total reserves. It is explained by their fears after the crisis and the desire to create a “safety cushion”. The increase in reserves was due to the export growth through the policy of competitive devaluation against the USD. In addition, there were capital inflows in various forms. After overcoming consequences of the Asian crisis, regional countries kept practicing competitive devaluation policy, despite the fact that they had surplus trade and capital balances.

Despite the practice of competitive devaluation policy, East Asian countries apply different exchange-rate regimes and they are also characterized by frequent changes in exchange rate arrangements. According to the IMF data, 11 out of 13 countries in the region applied hybrid exchange rates regimes. Brunei Darussalam applies a currency board arrangement. Singapore, Vietnam and Lao PDR put into practice a stabilized arrangement. Indonesia, the Republic of Korea, Thailand and the Philippines implement floating arrangements and Japan applies free floating. Finally, China, Cambodia, Malaysia and Myanmar put on other managed arrangements.

Despite the absence of an institutional framework for coordinated monetary policy in the region, the regression analysis results show that *de facto* there is a pegging of nominal exchange rates of East Asian currencies to the USD. It manifests itself through a policy of competitive devaluation aimed at stimulating the region's exports and, as a result, increasing total reserves. However, this practice causes not only the accumulation of total reserves, but also the growth of interest rates and inflation.

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