Effects of Exit Strategy of the Quantitative Easy Monetary Policy on East Asian Currencies

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Motivation

- The global financial crisis affected emerging market countries' economy through the US and European economies.
- The quantitative easy monetary policies of developed countries supplies abundant money, which circulates into emerging market countries.
- The FRB has already decided to reduce its quantitative easing monetary policy as the global financial crisis is subsiding in.
- FRB's action might make the money flow back to the US and trigger foreign exchange rate depreciate in emerging market countries.

Objectives

This paper has an objective to investigate how changes in monetary policy in the developed countries, especially the US, affect emerging market country economy in East Asia. Specifically, we focus on:

- how changes in interest rates of the developed countries, especially the US, affect interest rates and exchange rates of East Asian emerging market countries.
- how changes in interest rates of the developed countries, especially the US, affect capital flows of East Asian emerging market countries.

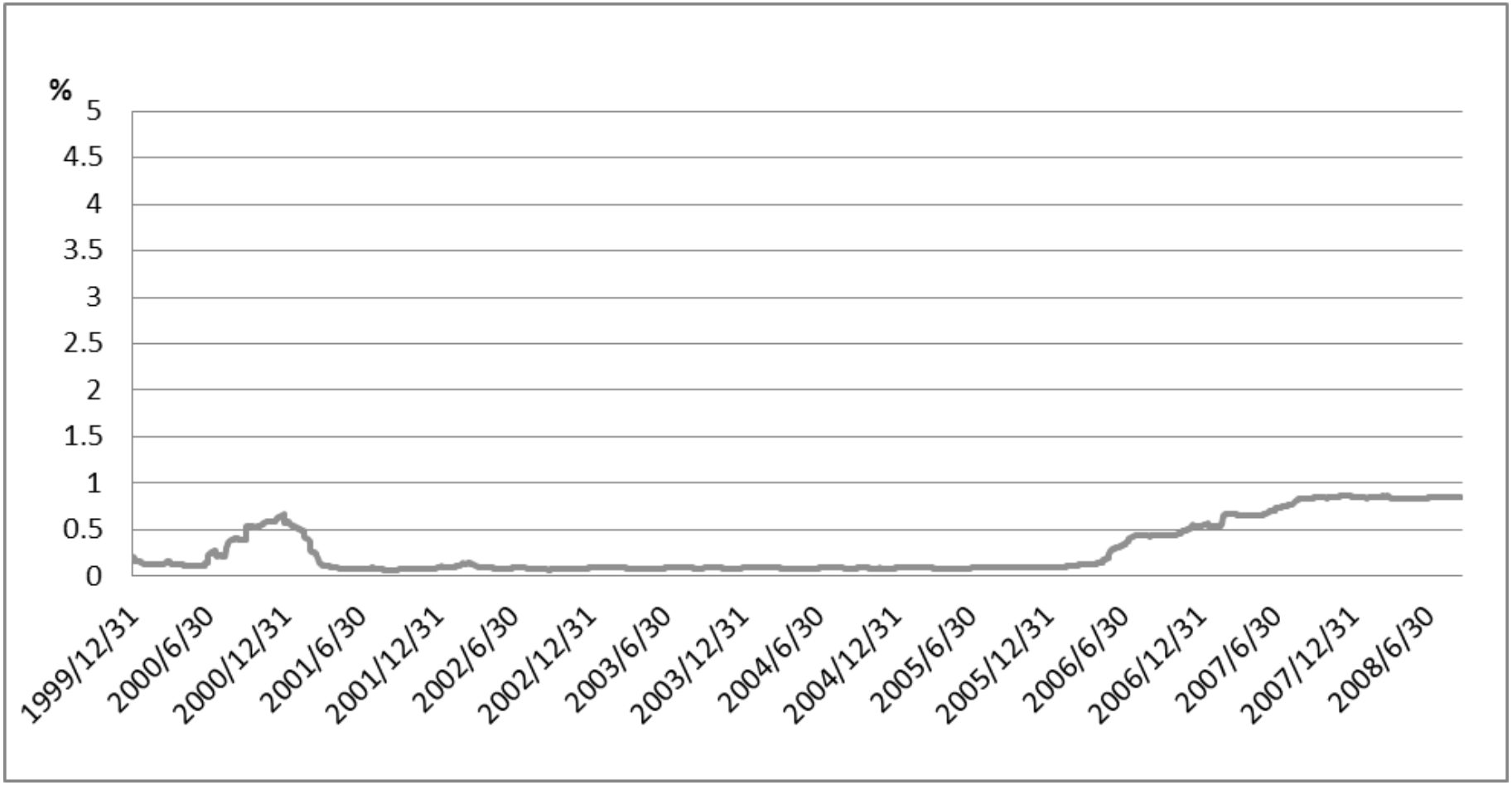
FRB's exit strategy from quantitative easing monetary policy

- The FRB began to reduce the pace of purchasing MBS and long-term Treasury securities toward an exit strategy of quantitative easing monetary policy.
  - MBS: $40 billion per month → $35 billion per month
  - Treasury securities: $45 billion per month → $40 billion per month
- FRB finished the quantitative easing monetary policy and accomplished the exit strategy of quantitative easing monetary policy in October, 2014.
- Market participants expect that interest rates in United States will begin to increase in the mid of 2015.

Effects of the Global Financial Crisis on East Asia (before Sep. 2008)

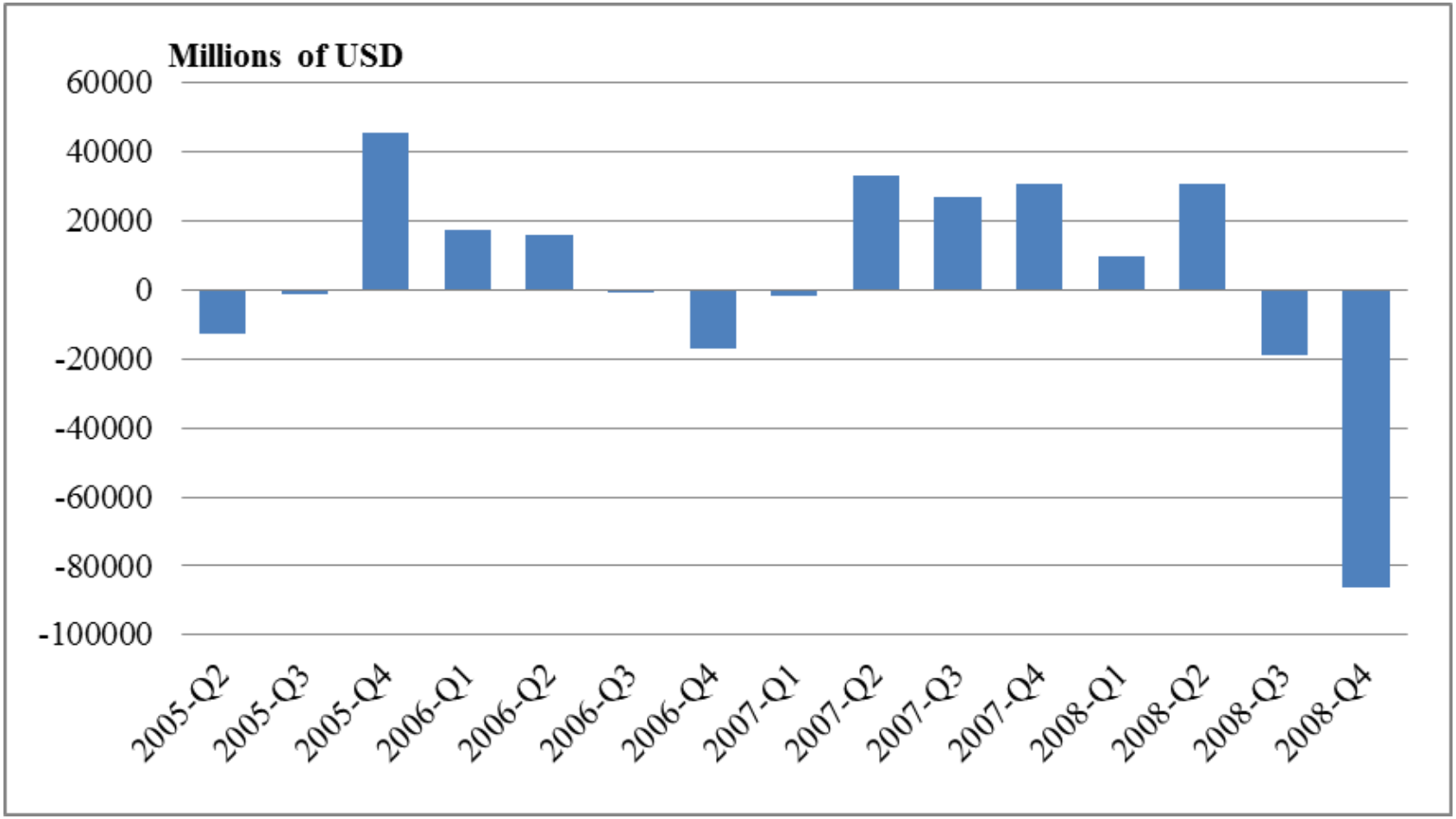
- Speculative money inflowed into East Asia.
  - Low interest in Japan
  - Japanese yen carry trade
- Speculative money came to a sudden stop in 2008.
  - Capital inflow: Korea
  - Capital outflow: Japan
- Asymmetric movements in intra-regional exchange.
  - Japanese yen under-valuation
  - Korean won over-valuation

Japanese yen interest rates (Interbank, 3 months)



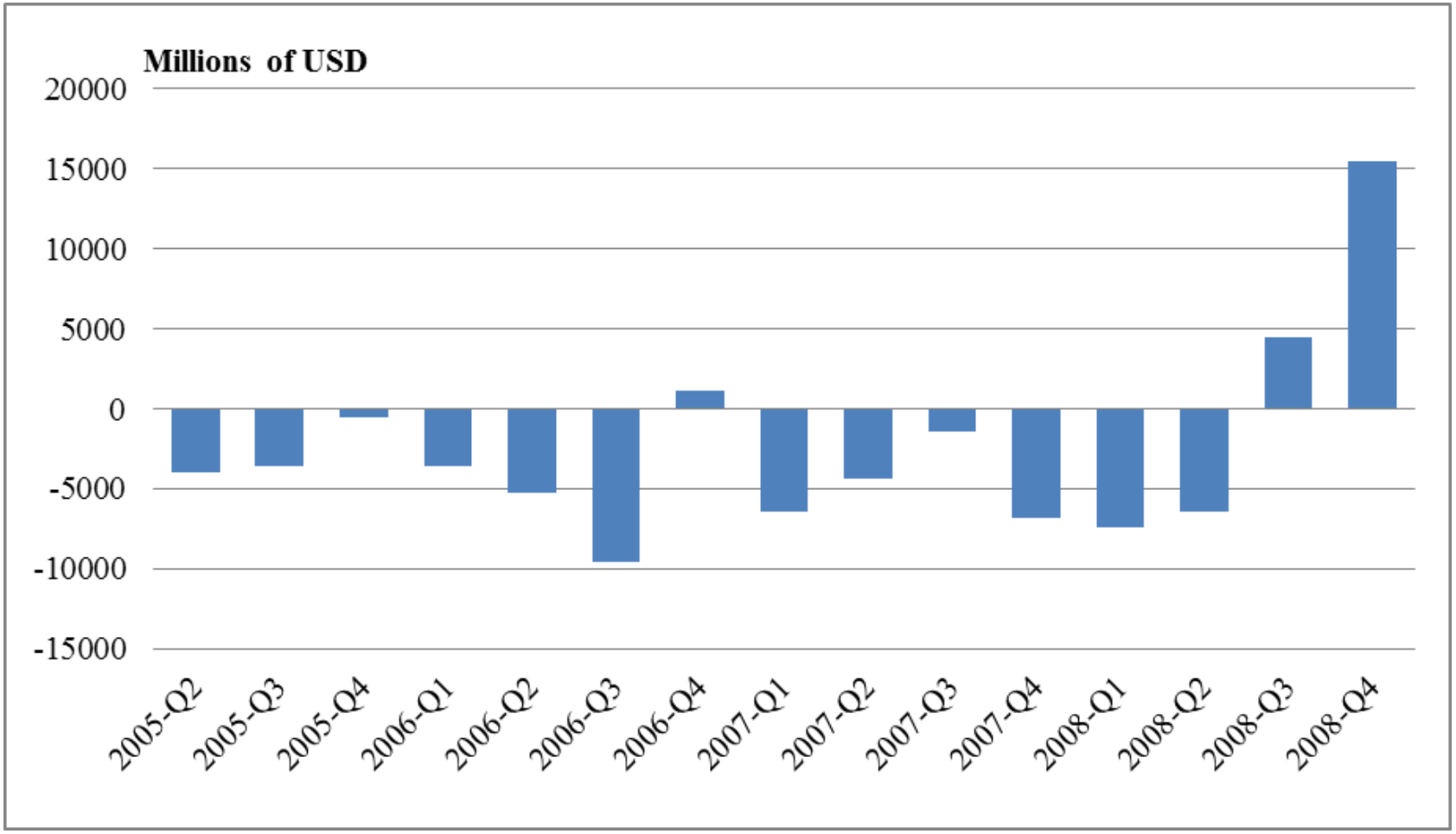
Data: Datastream

Asset and liability balance (net position) of Japan



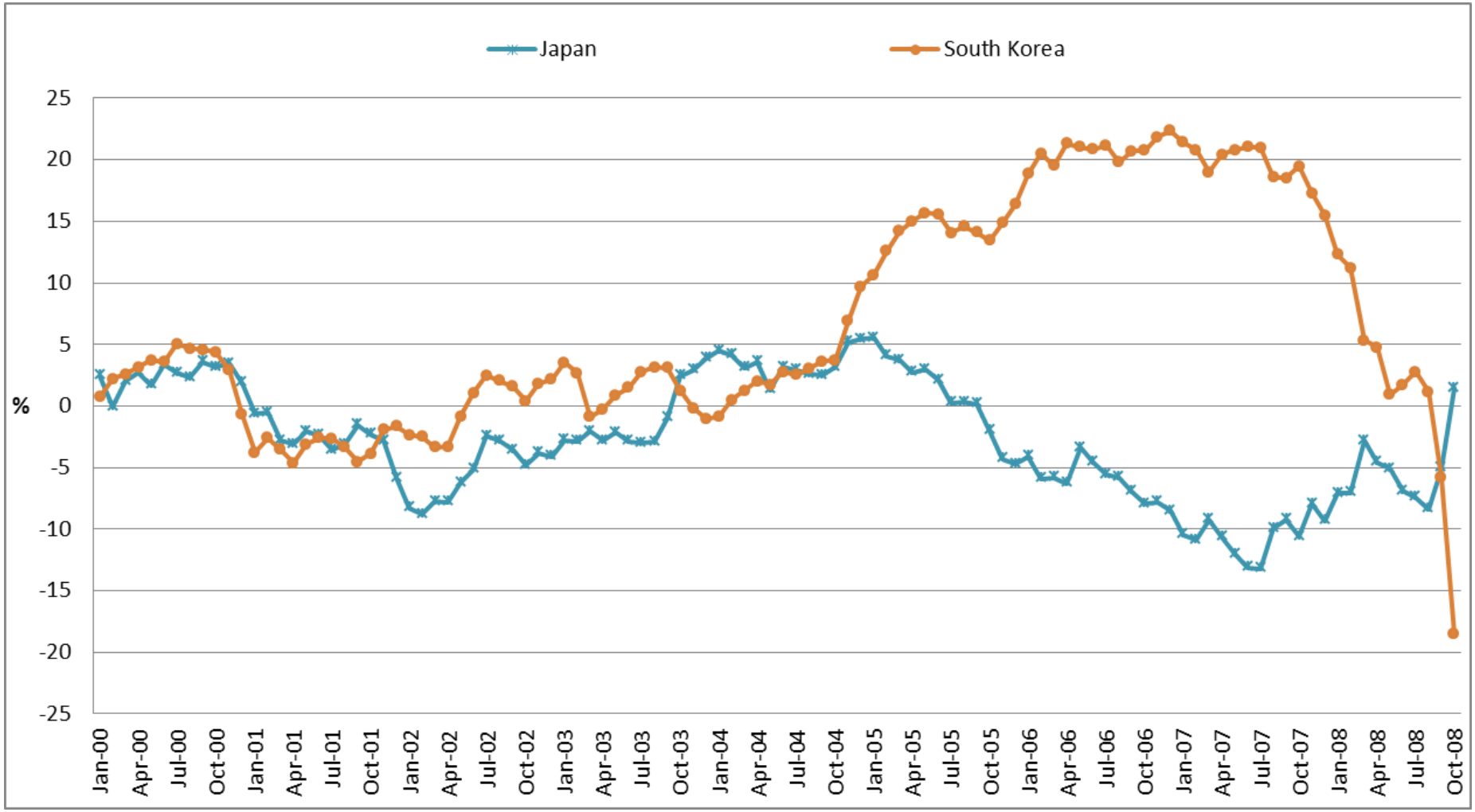
Data: BIS

Asset and liability balance (net position) of Korea



Data: BIS

Nominal AMU Deviation Indicators (~Sep. 2008)

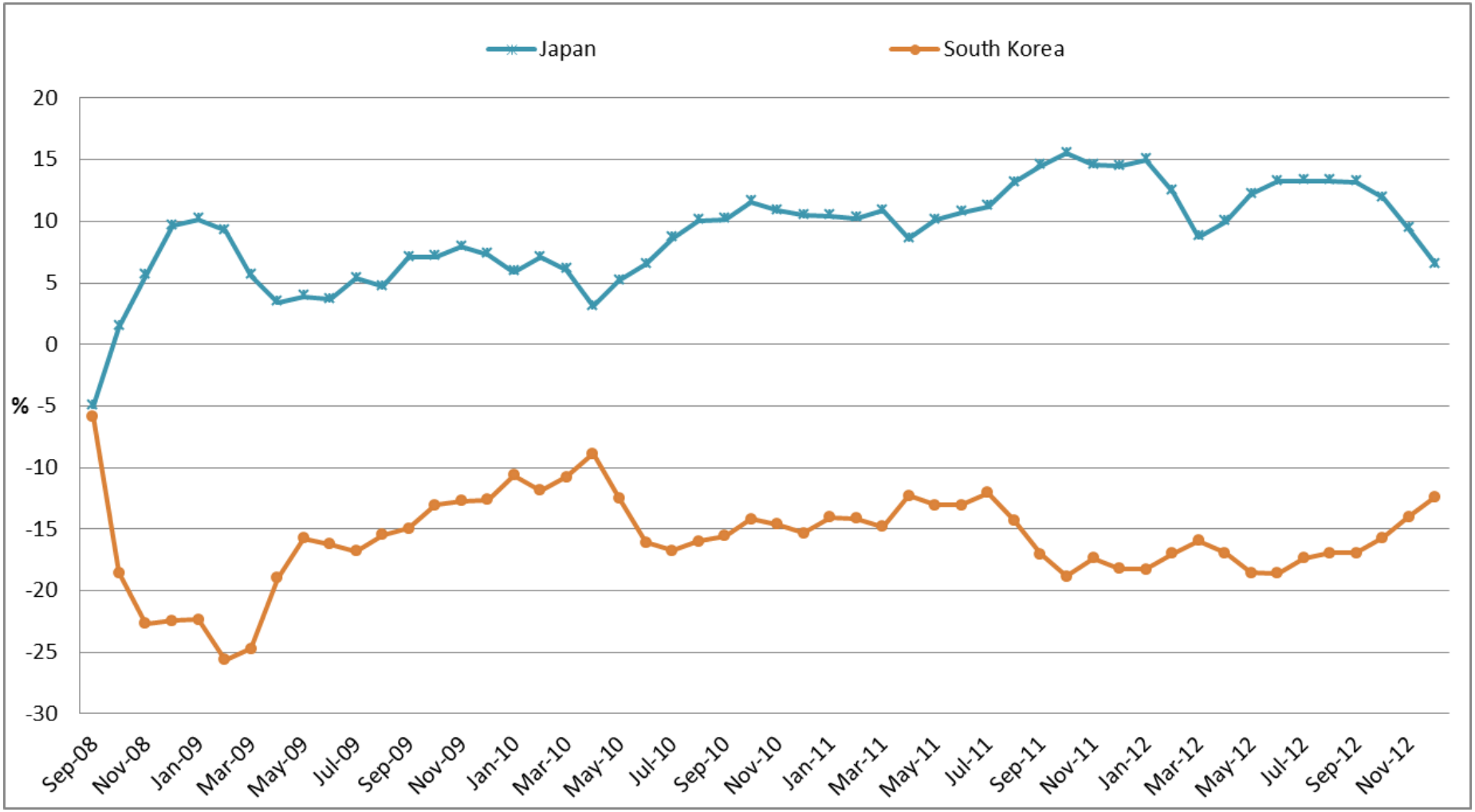


Data: RIETI (http://www.rieti.go.jp/users/amu/index.html)

Effects of the Global Financial Crisis on East Asia (after Sep. 2008)

- US and European financial institutions closed the carry trade.
- Korea was hit by sudden capital outflows as the carry trades closed.
- The global financial crisis changed capital flows from Korea to Japan.
- The Korean won abruptly depreciated against the Japanese yen during the global financial crisis.

Nominal AMU Deviation Indicators (Sep. 2008~)



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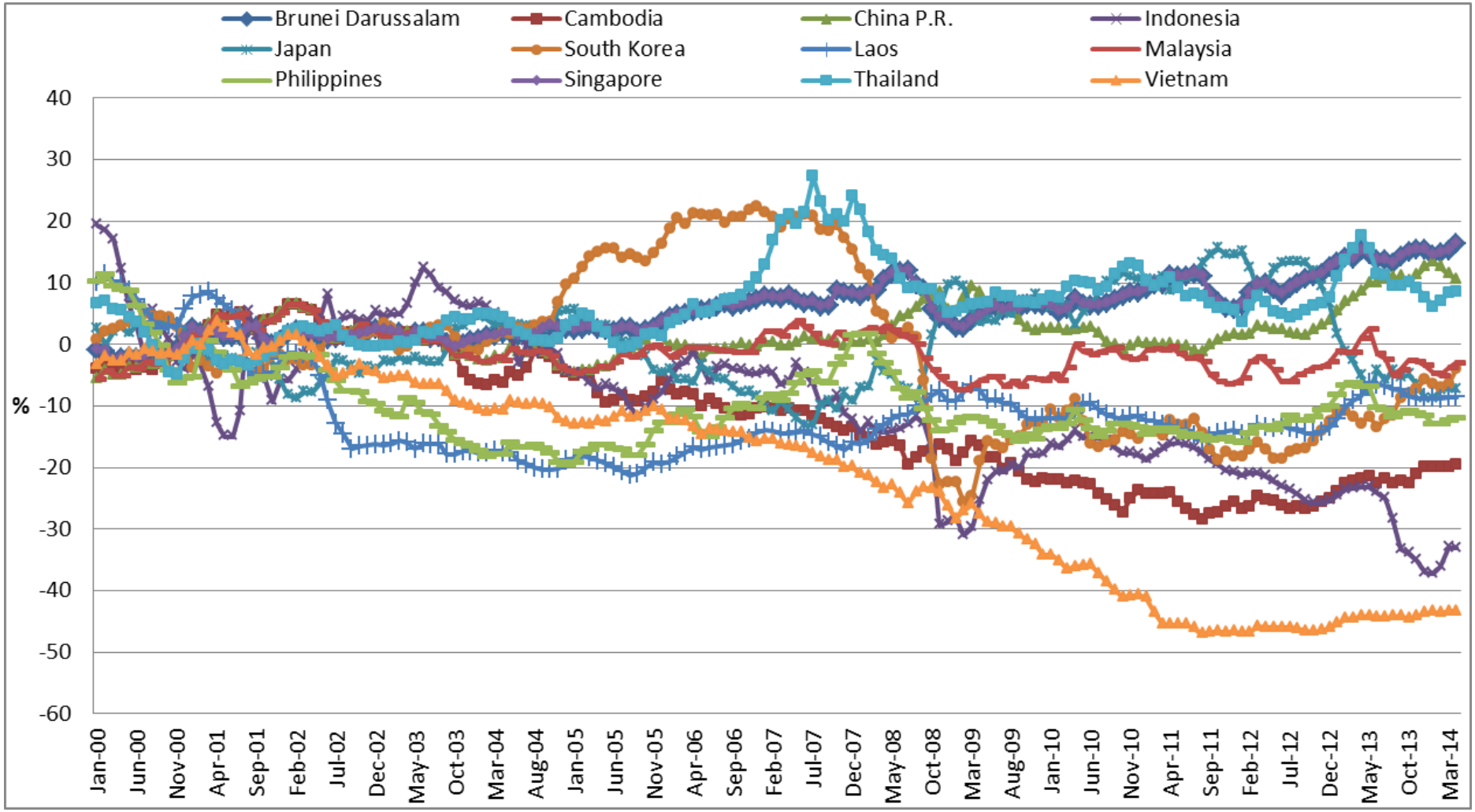
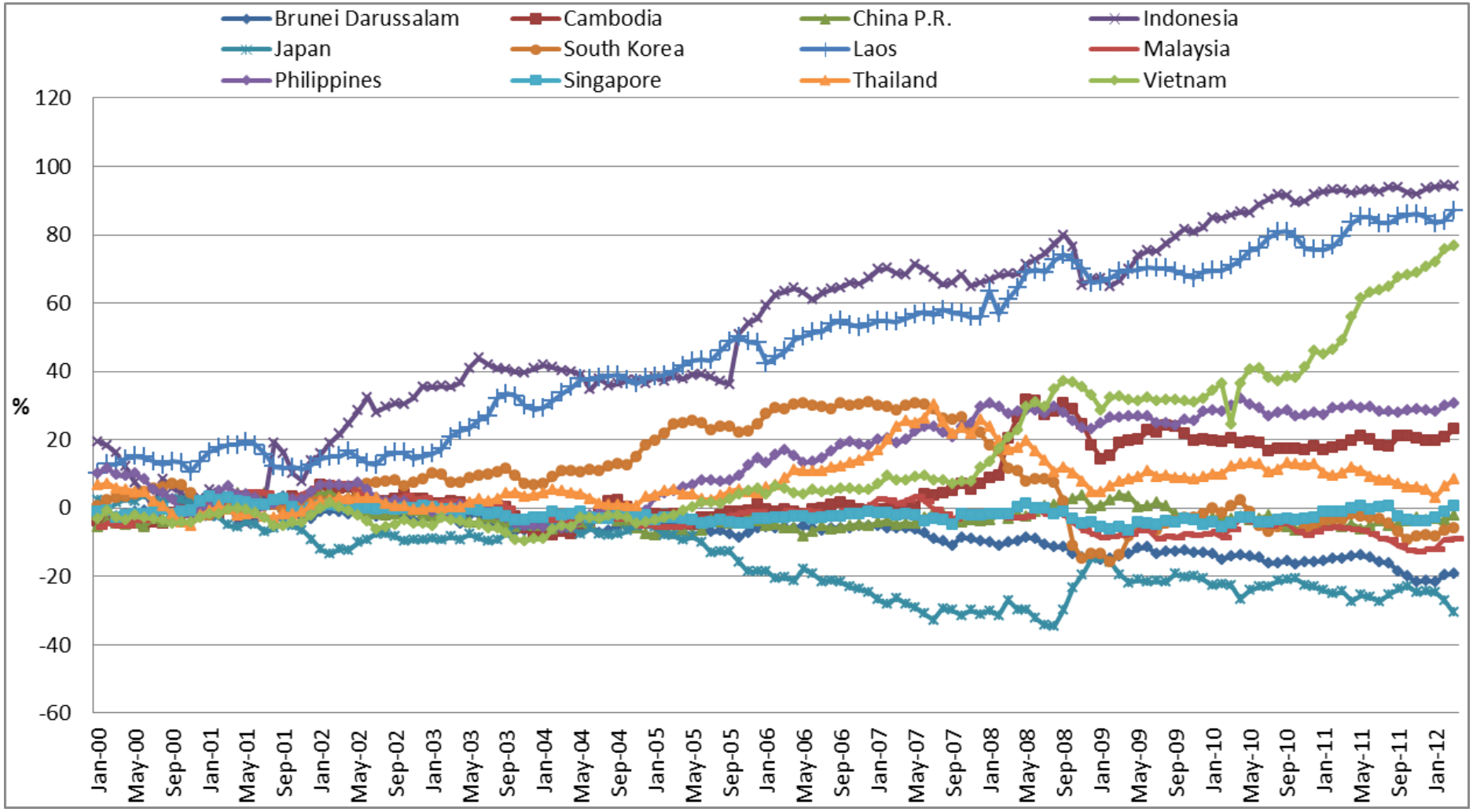
Nominal AMU Deviation Indicators



Data: RIETI (http://www.rieti.go.jp/users/amu/index.html)

Real AMU Deviation Indicators



Data: RIETI (http://www.rieti.go.jp/users/amu/index.html)

Asymmetric movements among East Asian currencies

- The asymmetric movements in intra-regional exchange rates among East Asian currencies have occurred since 2005 and have continued till the recent years.
- One of major reasons for intra-regional exchange rate misalignment is that carry trades brought about capital flows among East Asian countries.
  - relatively lower interest rate such as Japan
  - relatively higher interest rates such as Korea and Thailand
- The carry trade would have driven capital flows within the region affected fluctuations of intra-regional exchange rates among East Asian countries.

Empirical analysis of effects of interest rates in the US on East Asia (1)

- FRB decided to finish its quantitative easy monetary policy as the global financial crisis is subsiding in the United States.
- Abundant money which flowed from the United States into emerging market countries is beginning to flow backward to US.
- It has been feared that the emerging market countries are beginning to face depreciation of their home currencies and drops in stock prices.

Empirical analysis of effects of interest rates in the US on East Asia (2)

- Eichengreen and Gupta (2014) analyze the effects of “tapering talk” on macroeconomic variables of emerging markets.

- Aizenman, Binici and Hutchison (2014) shed light over the effects of “tapering news,” which trigger a reduction of capital inflows and a depreciation of exchange rates on emerging markets.

Empirical analysis of effects of interest rates in the US on East Asia (3)

- Bowman, Londono and Sapriza (2014) explore how the U.S. unconventional monetary policy affected emerging market economy's asset price as well as capital flow.

- Lim, Mohapatra and Stocker (2014) focus mostly on the effect of unconventional monetary policies of high income economies on the financial inflows to developing economies, and simulate the effect of monetary policy normalization.

Empirical analysis of effects of interest rates in the US on East Asia (4)

- We consider how an exit strategy of quantitative easing monetary policy by the FRB will affect capital flows in East Asian countries.
- We empirically analyze how the interest rates in the US affect interest rates, exchange rates, capital flows in East Asian countries.
- Vector Autoregressive (VAR) Model is used to investigate causality relationships among the economic variables.

Empirical analysis (1)

1. How changes in interest rates in the US affect interest rates in East Asian countries.
   - **Interest rate in US ⇗ ⇢ interest rate East Asian country ⇗**
2. How interest differentials between the US and East Asian countries affect exchange rates of the home currencies in terms of the US$.
   - **Interest differentials (US–Asia) ⇗ ⇢ exchange rates (N.C./US$) ⇗**

Empirical analysis (2)

3. How interest differentials between a weighted average of interest rates in the US and the euro zone and East Asian countries affect exchange rate of the AMU in terms of a currency basket of the US$ and the euro.
   - **IWUSDEURWASIA ⇗ ⇢ US$+euro/AMU ⇘**
4. How the interest differential between the US and Japan affects East Asian currencies.
   - **Interest differentials (US–Japan) ⇗ ⇢ N.C./AMU ⇘**

Empirical analysis (3)

5. How interest differentials between the US and the East Asian countries affects capital flows or financial accounts of East Asian countries.
   - **Interest differential ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**
   - **Interest differential ⇗ ⇢ other investment (Asset–Liability) ⇗**
6. How expected return differentials between the US and the East Asian countries affects capital flows or financial accounts of East Asian countries.
   - **Expected return differentials ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**
   - **Expected return differentials ⇗ ⇢ other investment (Asset–Liability) ⇗**

Countries to be analyzed

External Variables	Target countries and region	Whole East Asian countries and region
US **Euro zone**	1. Japan 2. China 3. Korea 4. Hong Kong 5. Singapore 6. Thailand 7. Indonesia 8. Malaysia 9. the Philippines 10.Vietnam	Weighted average (weight: AMU(CMI))

Data sources (1)

	US	Euro zone	Japan	Korea	Hong Kong	Singapore
Interest rate	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)	Datastream (uncollateralized overnight)	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)
Exchange rate			Datastream	Datastream	Datastream	Datastream
AMU AMU DI			RIETI	RIETI	RIETI	RIETI
Portfolio and other investments			Bank of Japan	Bank of Korea	Balance of Payments Statistics	Balance of Payments Statistics

Data sources (2)

	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China
Interest rate	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)	Datastream (inter-bank, 3 months)	Datastream (Treasury Bills, 364 days)	Datastream (uncollateralized overnight)
Exchange rate	Datastream	Datastream	Datastream	Datastream	Datastream	Datastream
AMU AMU DI	RIETI	RIETI	RIETI	RIETI	RIETI	RIETI
Portfolio and other investments	Balance of Payments Statistics	Balance of Payments Statistics	Balance of Payments Statistics	Balance of Payments Statistics	Balance of Payments Statistics	Balance of Payments Statistics

Analytical periods (1)

(1) January 1, 2000 to December 31, 2013 for analyses that daily data on interest rates and exchange rates.

(2) Q1 2000 to Q3 2013 for Hong Kong, Singapore, Thailand, and the Philippines in using quarterly data on financial account. Due to data constraints, analytical periods are Q1 2000 to Q4 2012 for Malaysia and Vietnam.

(3) January 2000 to December 2013 for Japan and Korea.

(4) We cannot conduct any analysis of financial accounts in China because data on Chinese financial account is available only for a period from Q1 2010 to Q4 2012.

Analytical periods (2)

(1) January 1, 2000 to December 16, 2008 for analyses that daily data on interest rates and exchange rates.

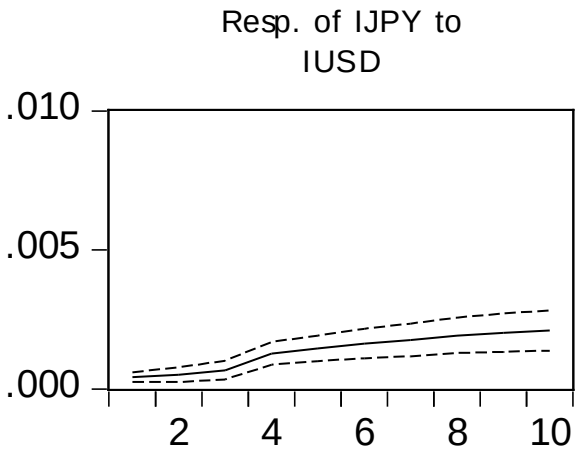
(2) Q1 2000 to Q4 2008 for Hong Kong, Singapore, Thailand, the Philippines, Malaysia and Vietnam in using quarterly data on financial account.

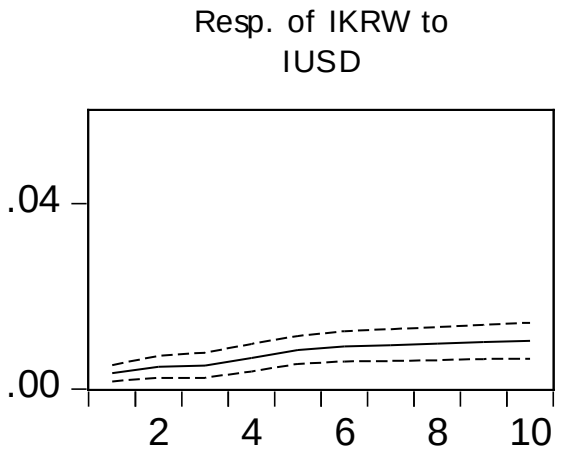
(3) January 2000 to December 2008 for Japan and Korea.

Results of empirical analysis (1)
Full Sample Period

- **Interest rate in US ⇗ ⇢ interest rate East Asian country ⇗**

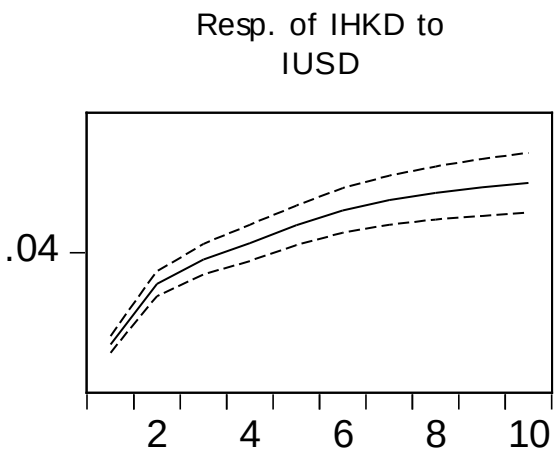
Japan

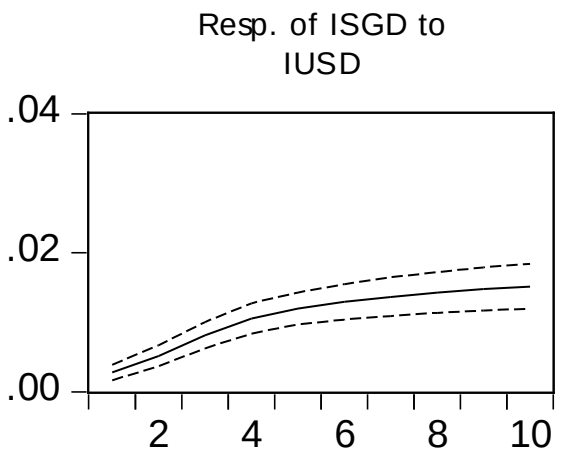




Korea

Hong Kong



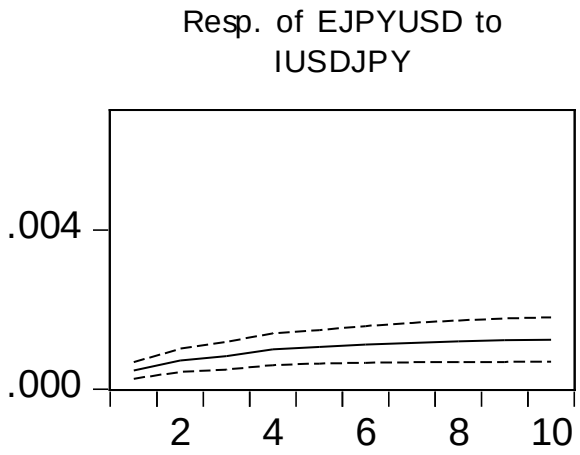


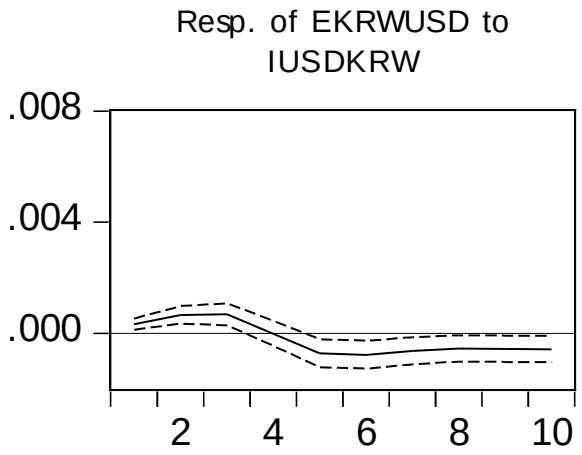
Singapore

Results of empirical analysis (2)
Full Sample Period

- **Interest differentials (US–Asia) ⇗ ⇢ exchange rates (N.C./US$) ⇗**

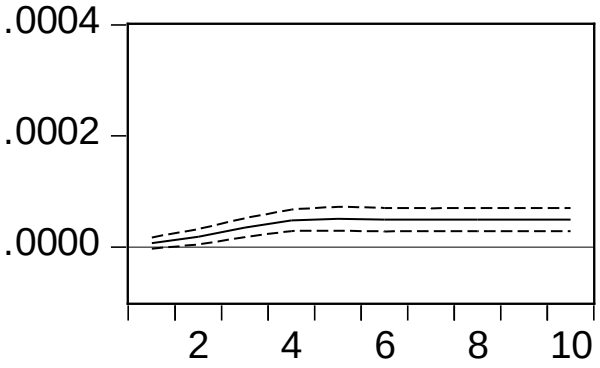
Japan

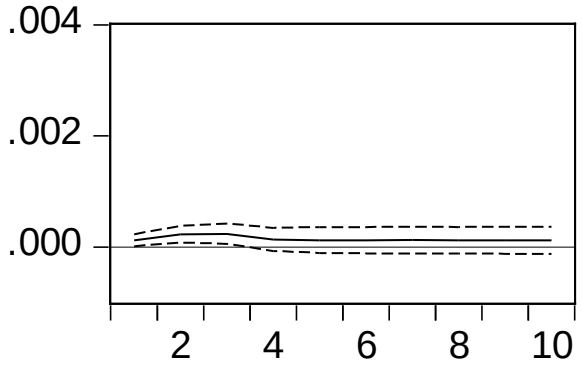




Korea

Hong Kong

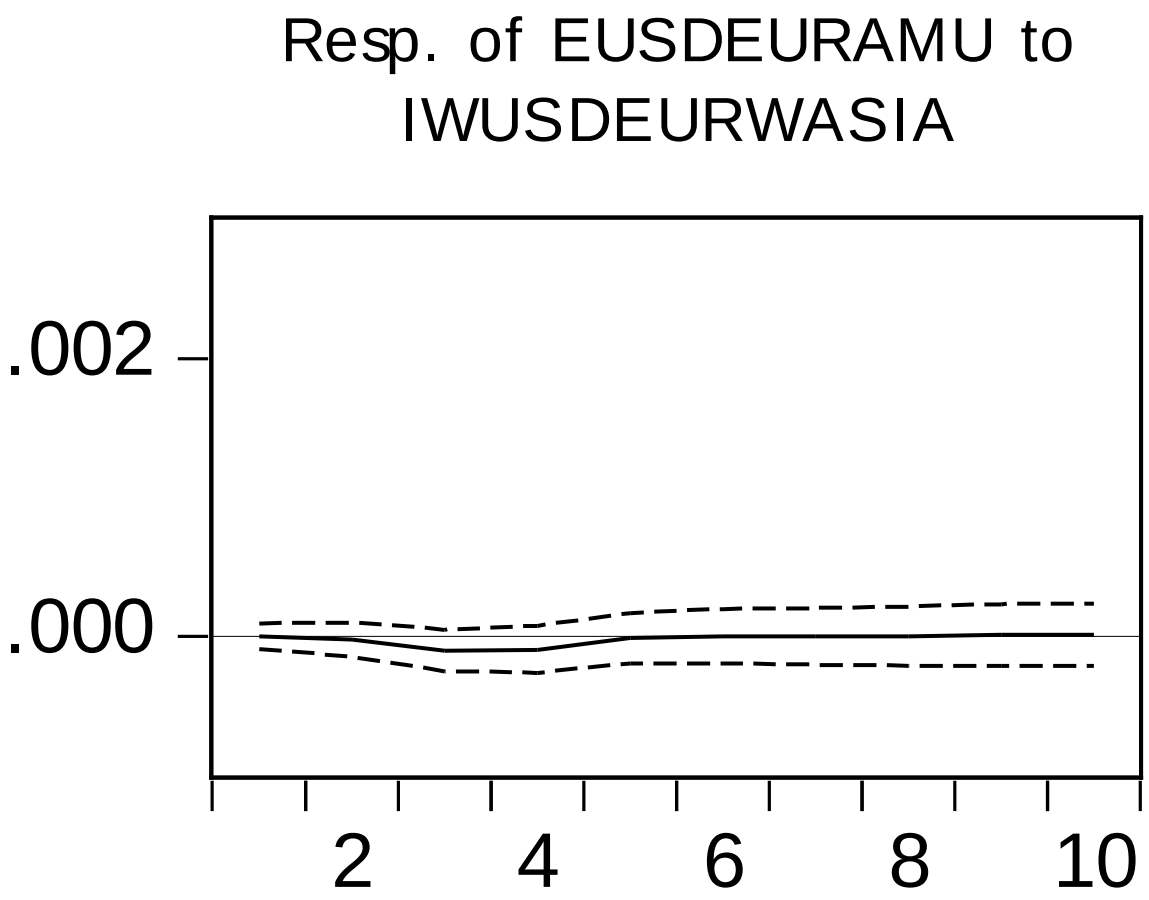




Singapore

Results of empirical analysis (3)
Full Sample Period

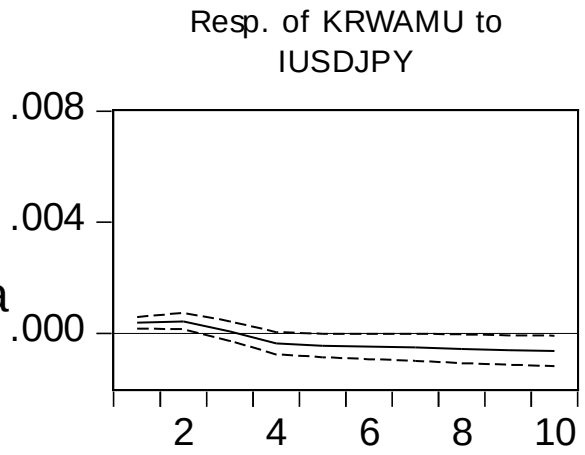
- **IWUSDEURWASIA ⇗ ⇢ US$+euro/AMU ⇘**

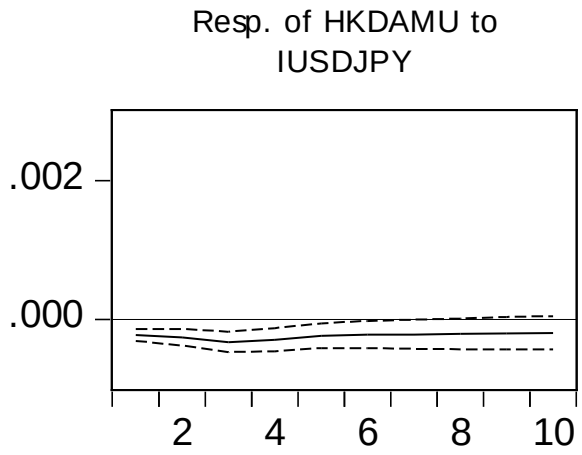


Results of empirical analysis (4)
Full Sample Period

- **Interest differentials (US–Japan) ⇗ ⇢ N.C./AMU ⇘**

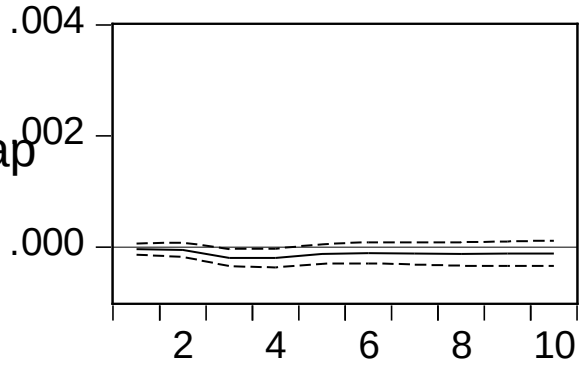
Korea

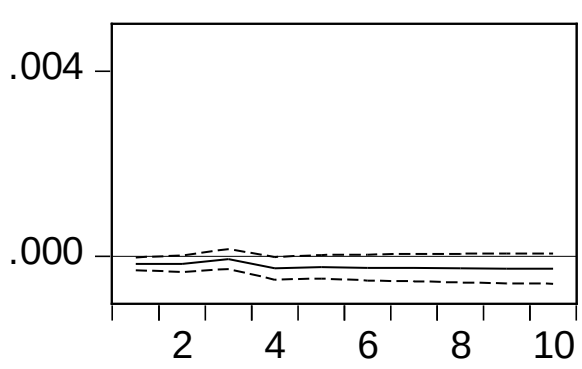




Hong Kong

Singapore



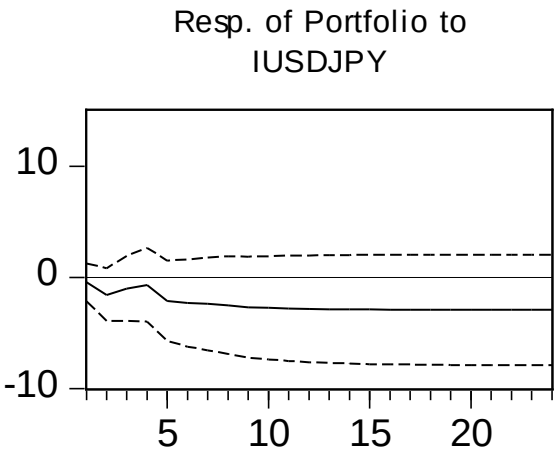


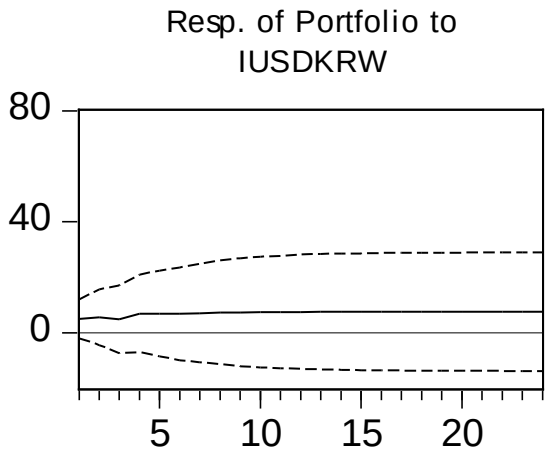
Thailand

Results of empirical analysis (5)
Full Sample Period

- **Interest differential ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**

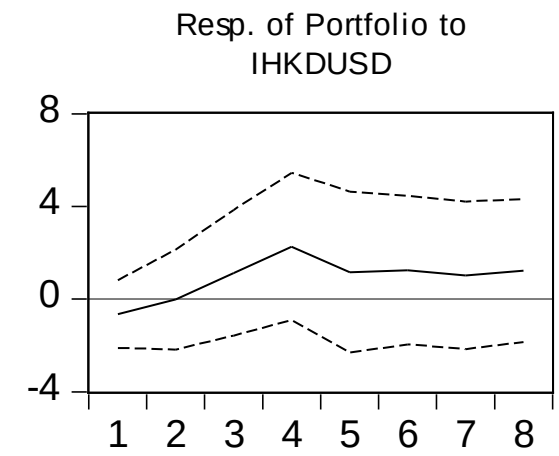
Japan

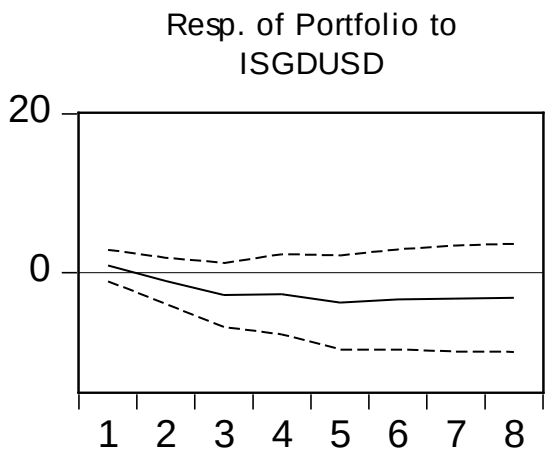




Korea

Hong Kong



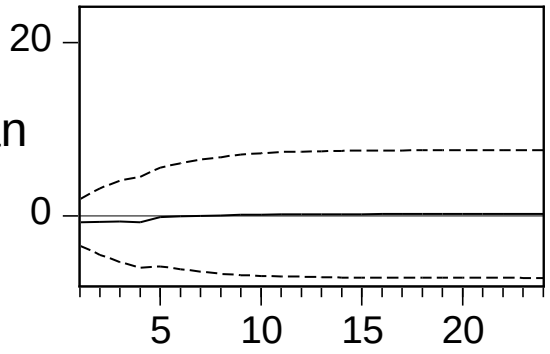


Singapore

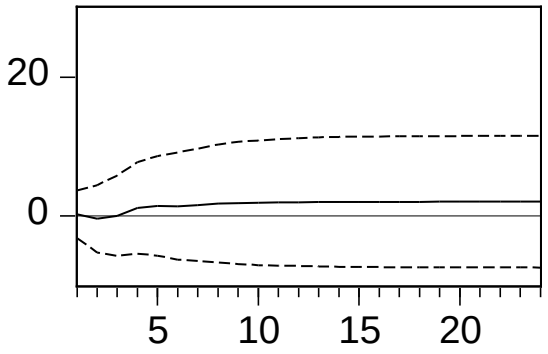
Results of empirical analysis (6)
Full Sample Period

- **Interest differential ⇗ ⇢ other investment (Asset–Liability) ⇗**

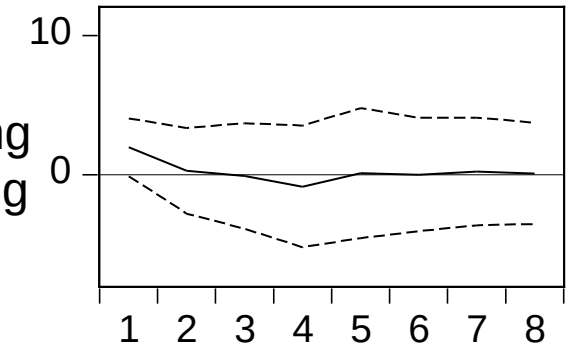
Japan



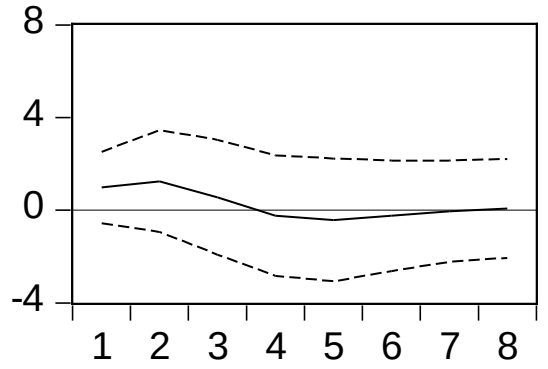
Korea



Hong Kong



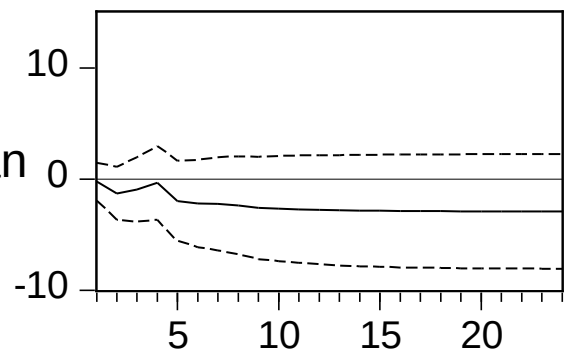
Singapore



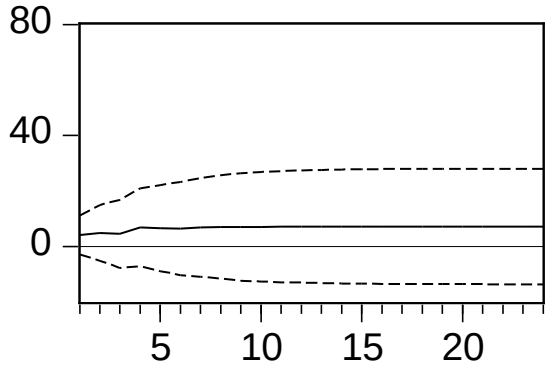
Results of empirical analysis (7)
Full Sample Period

- **Expected return differentials ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**

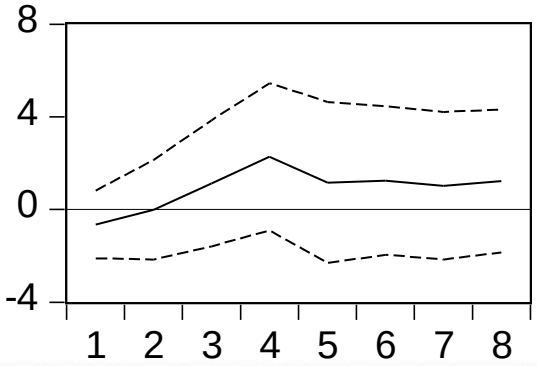
Japan



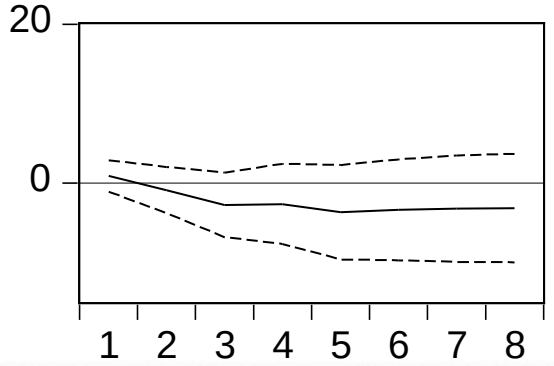
Korea



Hong Kong



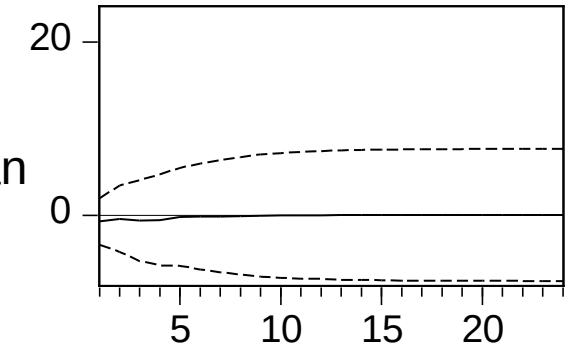
Singapore



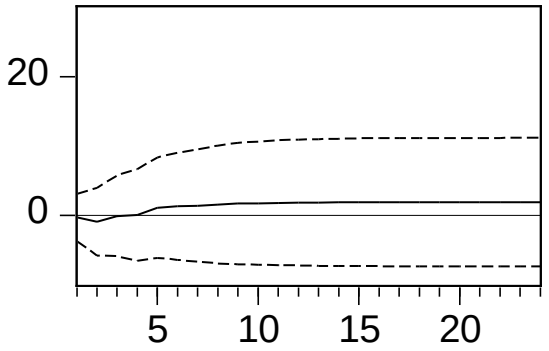
Results of empirical analysis (8)
Full Sample Period

- **Expected return differentials ⇗ ⇢ other investment (Asset–Liability) ⇗**

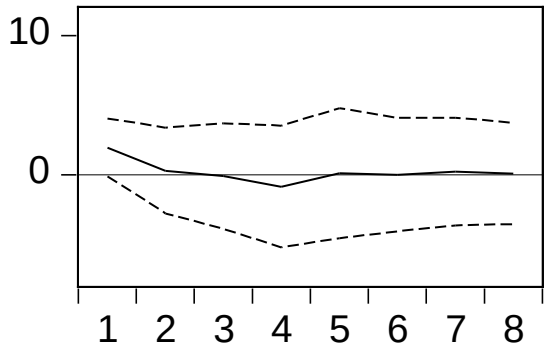
Japan



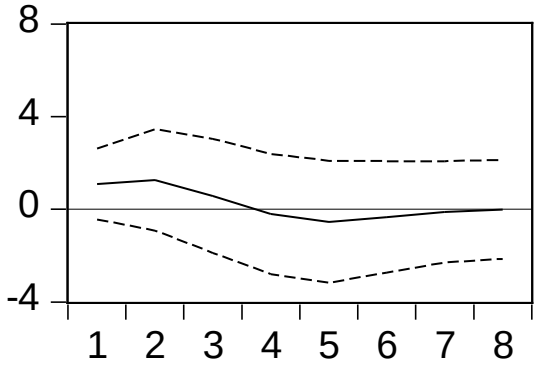
Korea



Hong Kong



Singapore



Implication of the empirical results: effects of the exit strategy（1）

- It is expected that interest rates in the East Asian countries increase to follow increase in the interest rates in the US if the FRB adopts an exit strategy of the quantitative easing monetary policy to raise the FF rate.

Implication of the empirical results: effects of the exit strategy（1，cont'd）

- According to our estimation regarding the accumulated impulse responses, if FRB raises the FF rate by 2%points, interest rates in East countries will be (10 days accumulated)
  - **Korea: 0.741%points ⇗**
  - **Hong Kong: 4.074%points ⇗**
  - **Singapore: 1.111%points ⇗**
  - **Thailand: 0.593%points ⇗**

Implication of the empirical results: effects of the exit strategy（2）

- Given the different timing of exit strategy of quantitative easing monetary policy between the FRB and the Bank of Japan, the interest differential will widen.
- It would stimulate carry trades which borrow the Japanese yen fund with lower interest rate to invest in other East Asian countries with higher interest rates.

Implication of the empirical results: effects of the exit strategy（2, cont'd）

- According to our estimation regarding the accumulated impulse responses, if FRB raises the FF rate by 2%points and Japan keep its interest rate at near 0%, exchange rates in East countries will be (10 days accumulated)
  - **Korea: 3.925%points ⇗**
  - **Hong Kong: 1.185%points ⇗**
  - **Singapore: 0.889%points ⇗**
  - **Thailand: 2.444%points ⇗**
  - **Indonesia: 4.815%points ⇗**
  - **Vietnam: 1.407%points ⇗**

Implication of the empirical results: effects of the exit strategy（3）

- it is expected that the exit policy of the quantitative easing monetary policy by the FRB would increase interest rates in the United States.
- For the reasons, most of East Asian countries would face sudden stop of capital inflows and/or reversal of capital flows and moreover capital outflows.

Implication of the empirical results: effects of the exit strategy（3, cont'd）

- According to our estimation regarding the accumulated impulse responses, if FRB raises the FF rate by 2%points, capital flows in Korea will be (two years accumulated)
  - **From aspect of interest differentials**
    - **Portfolio investment: 58.023% ⇗**
    - **Other investment: 15.658% ⇗**
  - **From aspect of expected return differentials**
    - **Portfolio investment: 54.090% ⇗**
    - **Other investment: 14.358% ⇗**

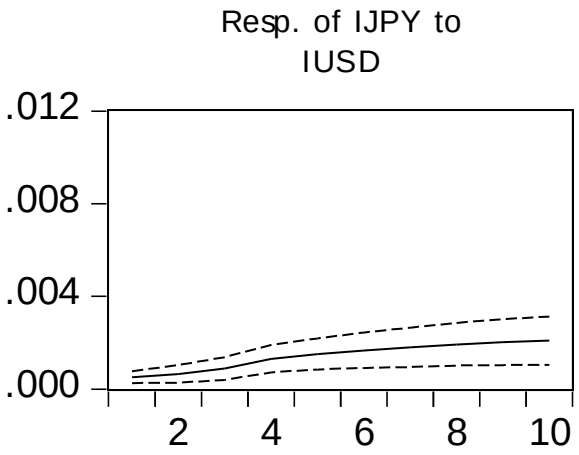
Conclusion

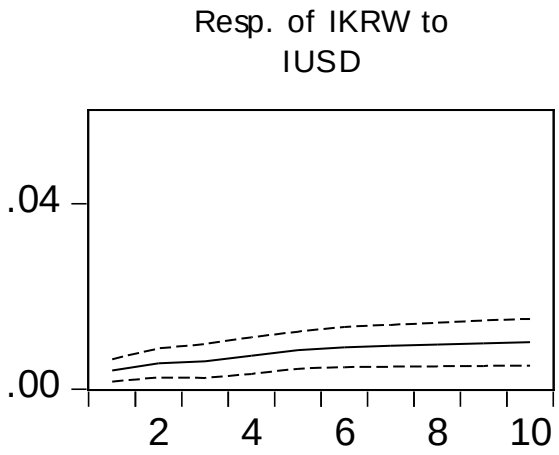
- Our findings are consistent with the common saying that “when the United States sneezes, emerging countries catch a cold.”
- Exit strategy of quantitative easing monetary policy by the FRB or FRB’s raising interest rates affects interest rates, exchange rates, and capital flows of East Asian countries.
- Empirical results suggest that if the FRB adopts the exit strategy to raise interest rates, it would give an upward pressure to interest rates in East Asia.
- East Asian countries would face sudden stop of capital inflows and capital outflows to depreciate East Asian currencies.

Results of empirical analysis (1)
Short Sample Period

- **Interest rate in US ⇗ ⇢ interest rate East Asian country ⇗**

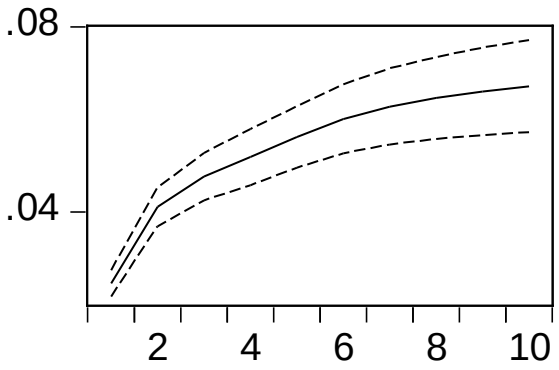
Japan

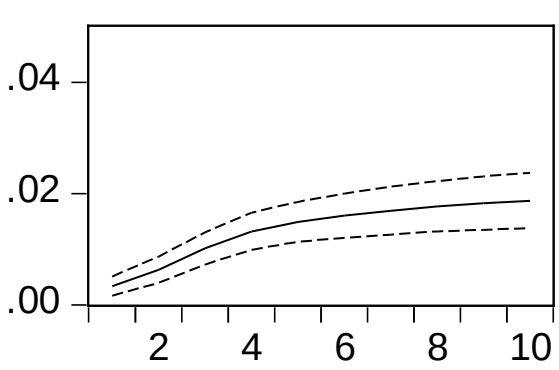




Korea

Hong Kong



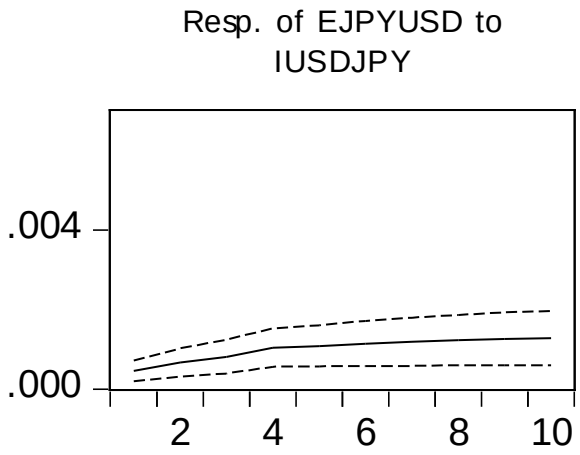


Singapore

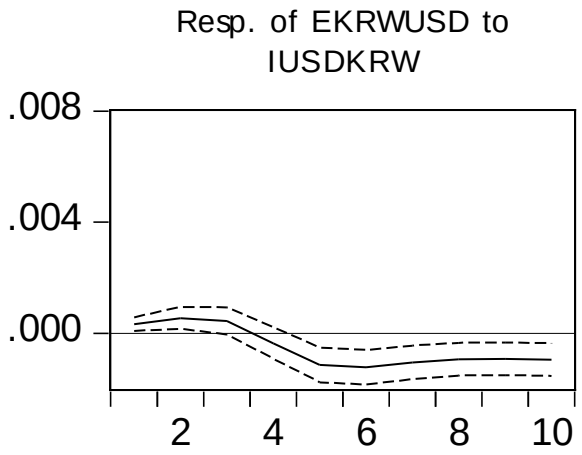
Results of empirical analysis (2)
Short Sample Period

- **Interest differentials (US–Asia) ⇗ ⇢ exchange rates (N.C./US$) ⇗**

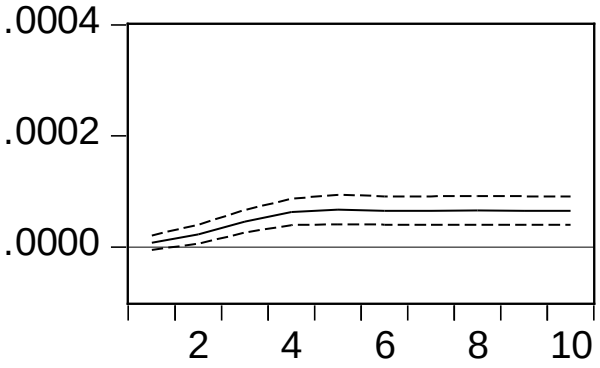
Japan



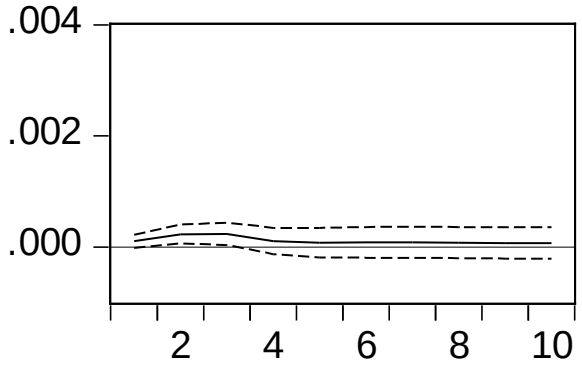
Korea



Hong Kong

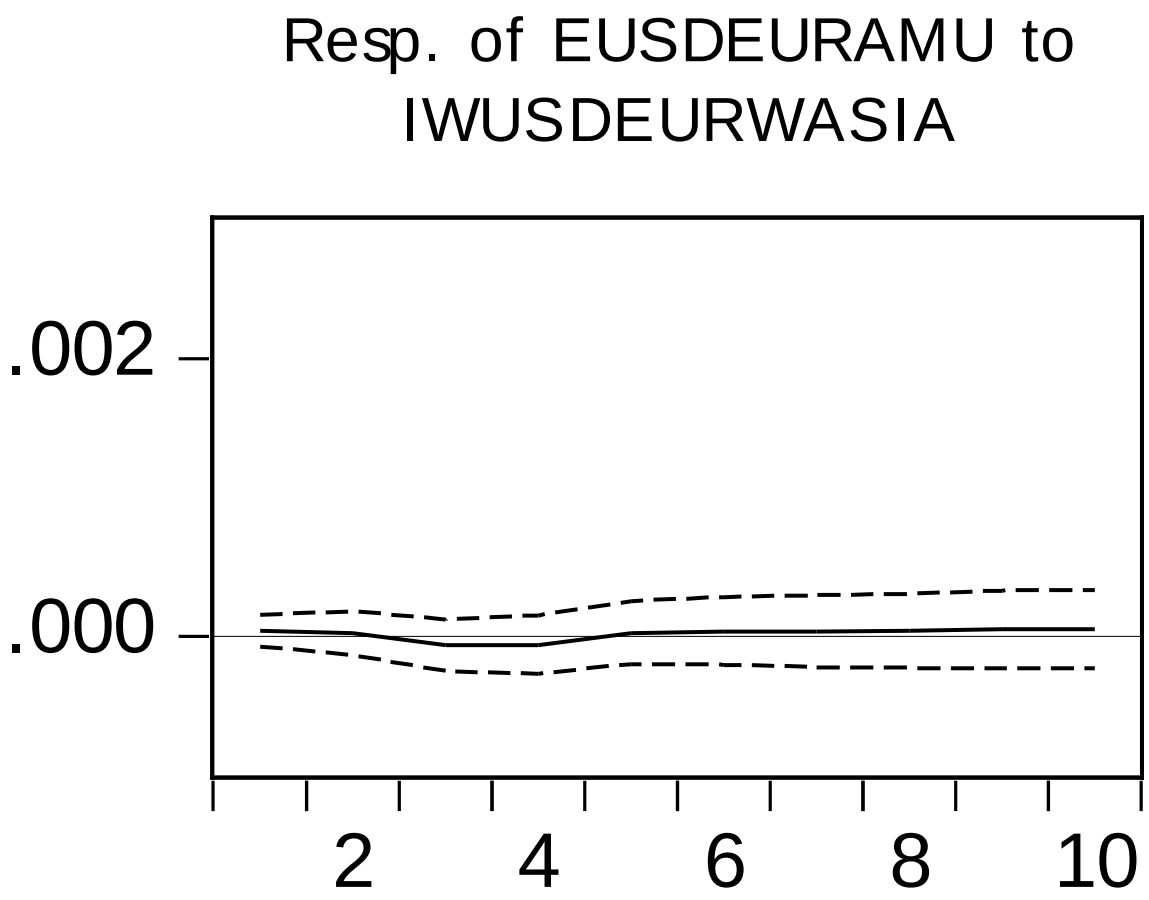


Singapore



Results of empirical analysis (3)
Short Sample Period

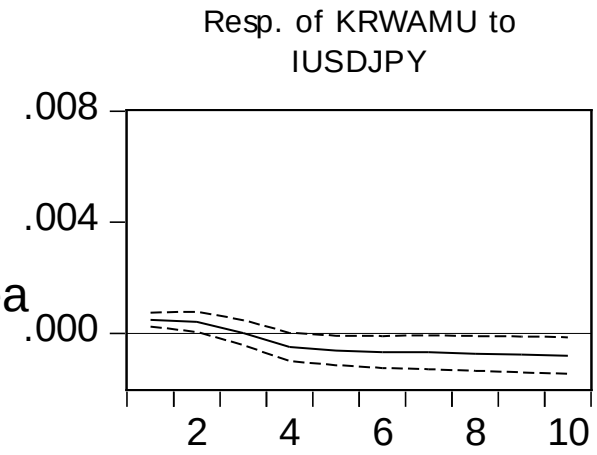
- **IWUSDEURWASIA ⇗ ⇢ US$+euro/AMU ⇘**



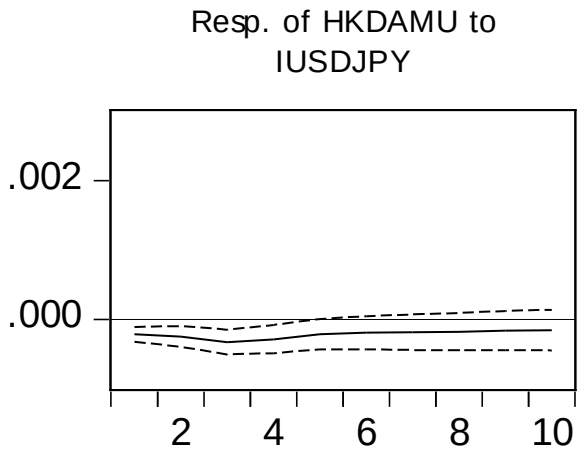
Results of empirical analysis (4)
Short Sample Period

- **Interest differentials (US–Japan) ⇗ ⇢ N.C./AMU ⇘**

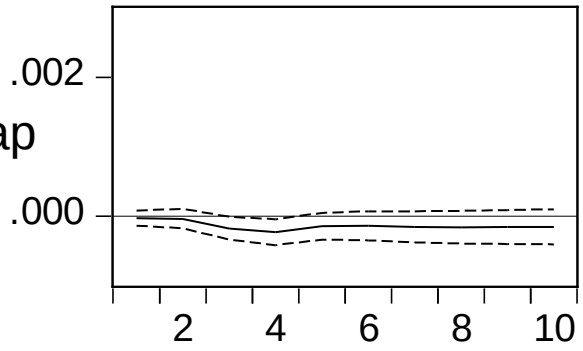
Korea



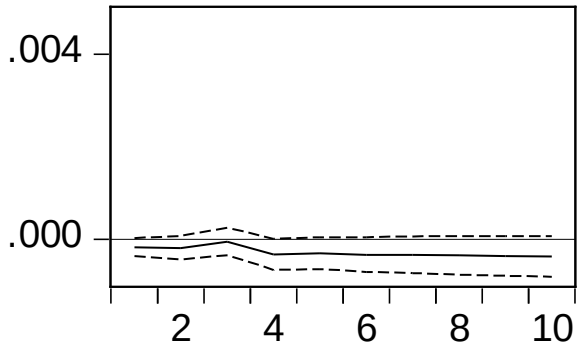
Hong Kong



Singapore



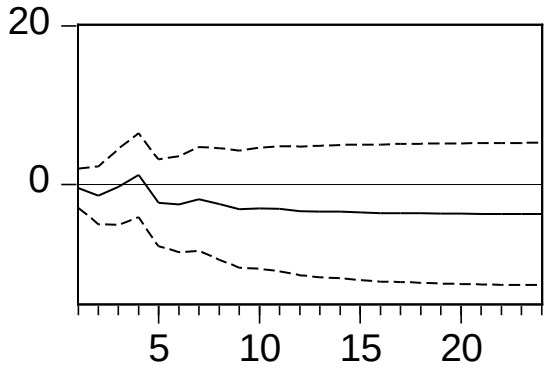
Thailand

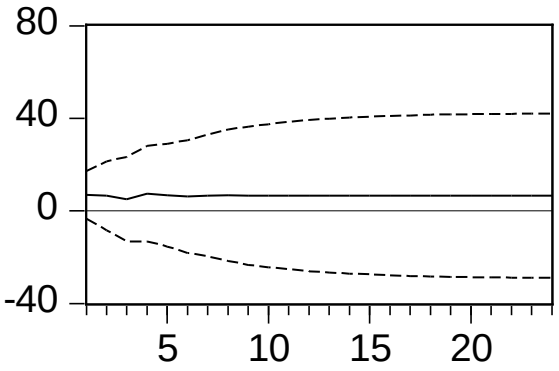


Results of empirical analysis (5)
Short Sample Period

- **Interest differential ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**

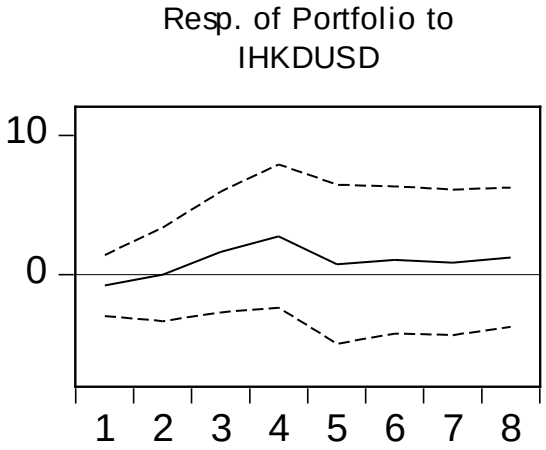
Japan

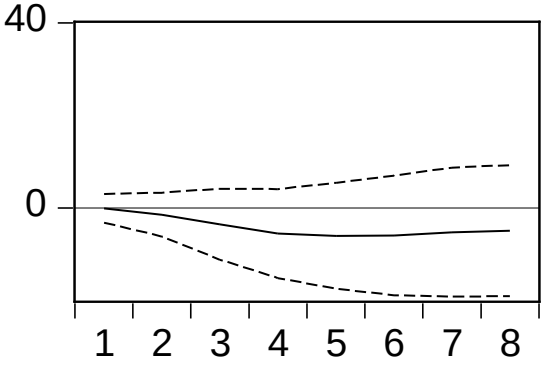




Korea

Hong Kong



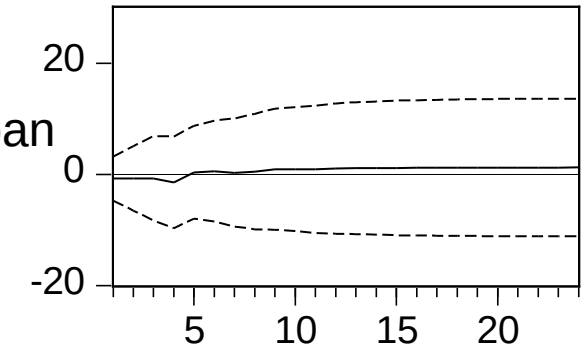


Singapore

Results of empirical analysis (6)
Short Sample Period

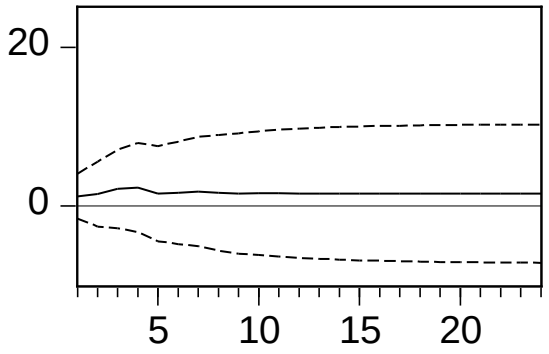
- **Interest differential ⇗ ⇢ other investment (Asset–Liability) ⇗**

Resp. of Others to IUSDJPY



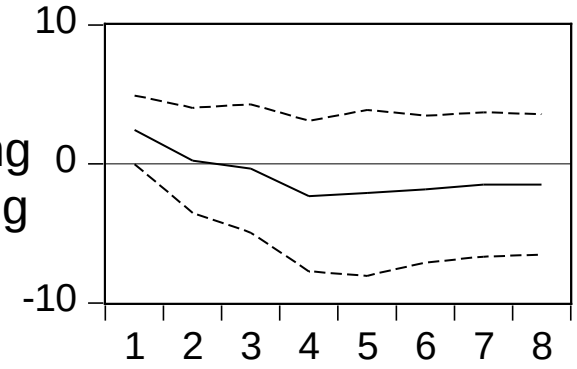
Japan

Resp. of Others to IUSDKRW



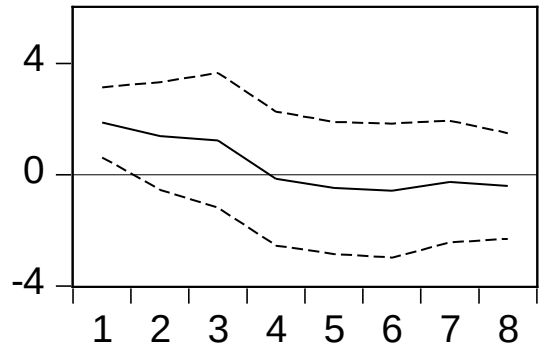
Korea

Resp. of Others to IHKDUSD



Hong Kong

Resp. of Others to ISGDUSD

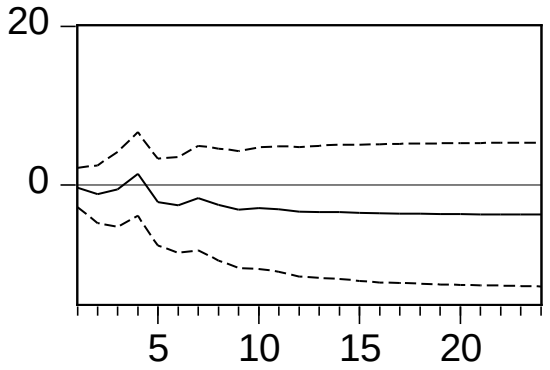


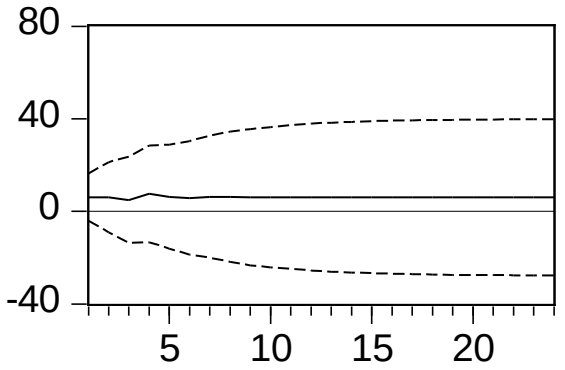
Singapore

Results of empirical analysis (7)
Short Sample Period

- **Expected return differentials ⇗ ⇢ portfolio investment (Asset–Liability) ⇗**

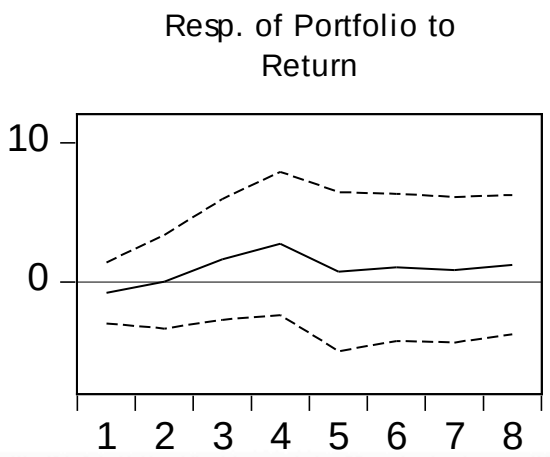
Japan

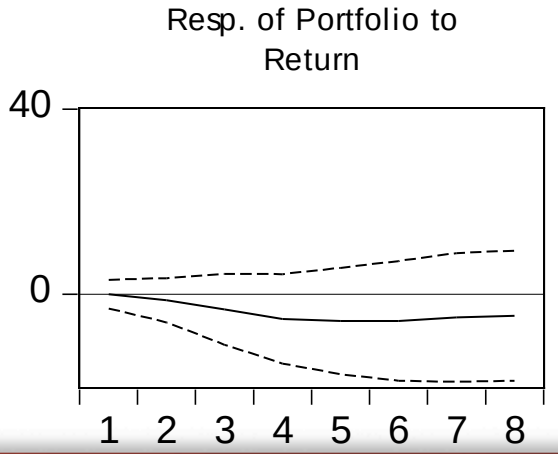




Korea

Hong Kong

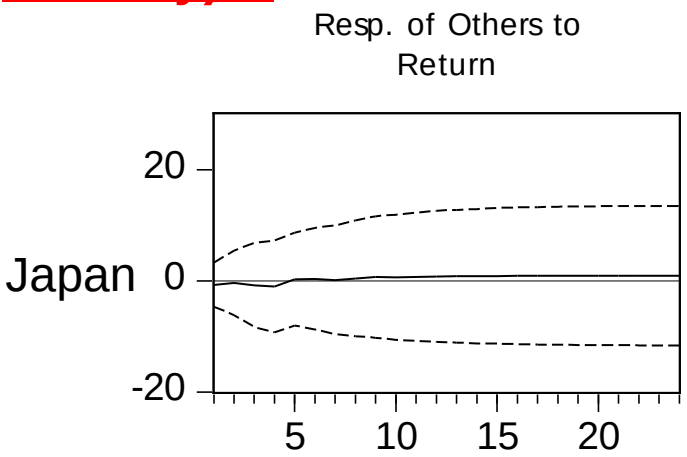


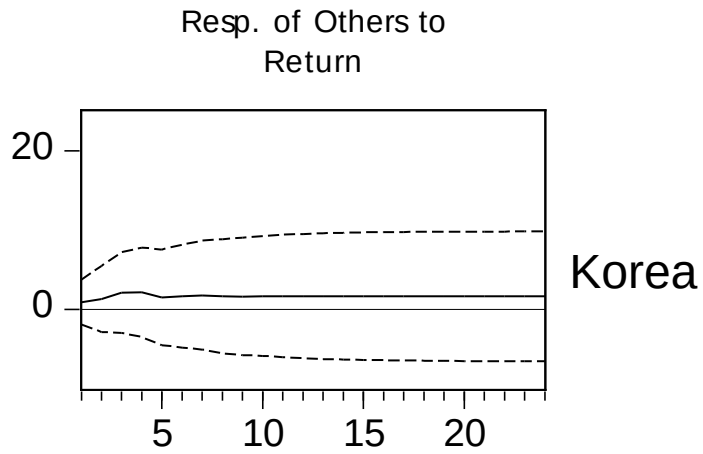


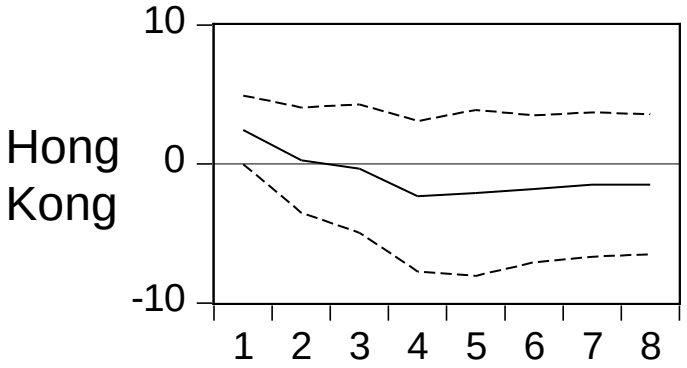
Singapore

Results of empirical analysis (8)
Short Sample Period

- **Expected return differentials ⇗ ⇢ other investment (Asset–Liability) ⇗**







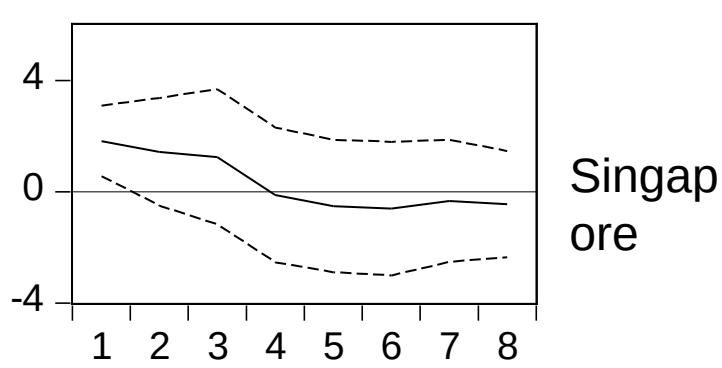


Table 1: Relationship between Interest Rates in the United States, the Euro Zone and East Asian Countries (full sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest rate in US B: interest rate in euro zone C: interest rate in East Asian country	A→C(+) accumulated response	○ 0.002***	○ 0.010***	○ 0.055***	○ 0.015***	○ 0.008***	x –	x –	○ 0.028***	△ 0.008	x –	N/A
		B→C(+) accumulated response	○ 0.002***	○ 0.014***	○ 0.032***	○ 0.010***	○ 0.011***	△ 0.004	○ 0.006***	○ 0.039***	○ 0.017***	○ 0.001***	
2	A: a weighted average of interest rate in US and euro zone B: a weighted average of interest rate of East Asian countries	A→B(+) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	○ 0.006***
3	A: a weighted average of interest rates in US and euro zone B : interest rate in East Asian country	A→B(+) accumulated response	○ 0.002***	○ 0.013***	○ 0.056***	○ 0.016***	○ 0.009***	x –	○ 0.002*	○ 0.034***	△ 0.011	x –	N/A

Table 2: Relationship between Interest Rates in the United States, the Euro Zone and East Asian Countries (short sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest rate in US B: interest rate in euro zone C: interest rate in East Asian country	A→C(+) accumulated response	○ 0.002***	○ 0.010***	○ 0.067***	○ 0.019***	○ 0.008**	x –	△ 0.001	○ 0.029***	△ 0.008	x –	N/A
		B→C(+) accumulated response	○ 0.001**	○ 0.015***	○ 0.041***	○ 0.013***	○ 0.010***	x –	○ 0.003***	○ 0.041***	○ 0.019*	○ 0.001**	
2	A: a weighted average of interest rate in US and euro zone B: a weighted average of interest rate of East Asian countries	A→B(+) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	○ 0.007***
3	A: a weighted average of interest rates in US and euro zone B : interest rate in East Asian country	A→B(+) accumulated response	○ 0.002***	○ 0.013***	○ 0.069***	○ 0.019***	○ 0.010**	x –	○ 0.001*	○ 0.036***	△ 0.011	x –	N/A

Table 3: Relationship between Interest Differentials between the United States/the Euro Zone and East Asian Countries and Exchange Rates of East Asian Countries (full sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential between US and East Asian country B: N.C./US$	A→B(+) accumulated response	○ 0.001***	○ -0.001**	○ 0.000	○ 0.000	○ 0.000	x –	△ 0.000	x –	x –	○ 0.000	N/A
2	A: interest differential between euro zone and East Asian country B: N.C./euro	A→B(+) accumulated response	x –	○ 0.000	△ 0.000	△ 0.000	△ 0.000	x –	x –	x –	x –	x –	N/A
3	A: differential between a weighted average of interest rates of US and euro zone and a weighted average of interest rates in East Asian countries B: US$+euro/AMU	A→B(-) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	△ 0.000
4	A: differential between a weighted average of interest rates of US and euro zone and a weighted average of interest rates in East Asian countries B: AMU DI	A→B(-) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	△ 0.000
5	A: differential between a weighted average of interest rates of US and euro zone and interest rates in East Asian countries B: N.C./AMU	A→B(+) accumulated response	○ 0.001***	○ -0.001***	○ 0.000	x –	△ 0.000	x –	x –	△ 0.000	x –	x –	
6	A: differential between a weighted average of interest rates of US and euro zone and interest rates in East Asian countries B: AMU DI	A→B(-) accumulated response	○ -0.056***	○ 0.063***	○ -0.030***	x –	△ -0.008	x –	x –	x –	x –	x –	N/A

Table 4: Relationship between Interest Differentials between the United States/the Euro Zone and East Asian Countries and Exchange Rates of East Asian Countries (short sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential between US and East Asian country B: N.C./US$	A→B(+) accumulated response	○ 0.001***	○ -0.001***	○ 0.000	○ 0.000	○ 0.000	x –	○ 0.000	x –	x –	○ 0.000	N/A
2	A: interest differential between euro zone and East Asian country B: N.C./euro	A→B(+) accumulated response	x –	x –	△ 0.000	△ 0.000	△ 0.000	x –	x –	x –	x –	x –	N/A
3	A: differential between a weighted average of interest rates of US and euro zone and a weighted average of interest rates in East Asian countries B: US$+euro/AMU	A→B(-) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	x –
4	A: differential between a weighted average of interest rates of US and euro zone and a weighted average of interest rates in East Asian countries B: AMU DI	A→B(-) accumulated response	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	○ 0.000
5	A: differential between a weighted average of interest rates of US and euro zone and interest rates in East Asian countries B: N.C./AMU	A→B(+) accumulated response	○ 0.001***	x –	○ 0.000	x –	△ 0.000	x –	x –	x –	x –	x –	N/A
6	A: differential between a weighted average of interest rates of US and euro zone and interest rates in East Asian countries B: AMU DI	A→B(-) accumulated response	○ -0.065***	x –	○ -0.039***	x –	△ -0.009	x –	x –	x –	x –	x –	N/A

Table 5: Relationship between Interest Differentials and Exchange Rates (full sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential between US and Japan B:N.C./AMU	A→B(-) accumulated response	N/A	○ -0.001**	○ 0.000	△ 0.000	△ 0.000	○ -0.001***	△ 0.000	○ 0.000	△ 0.000	○ 0.000	N/A
2	A: interest differential between US and Japan B: AMU DI	A→B(+) accumulated response	N/A	○ 0.053**	○ 0.016	△ 0.012	△ 0.033*	○ 0.065**	△ 0.001	○ 0.019*	△ 0.014	○ 0.014	N/A
3	A: interest differential between euro zone and Japan B:N.C./AMU	A→B(-) accumulated response	N/A	x –	△ 0.000	△ 0.000	x –	○ -0.001*	△ 0.000	△ 0.000	△ 0.000	△ 0.000	N/A
4	A: interest differential between euro zone and Japan B: AMU DI	A→B(+) accumulated response	N/A	x –	△ 0.013	△ 0.014	x –	○ 0.046*	△ 0.016	△ 0.014	△ -0.009	○ 0.021*	N/A
5	A: interest differential between US and euro zone B:N.C./AMU	A→B(+) accumulated response	△ 0.000	○ -0.001***	x –	x –	x –	x –	△ 0.000	x –	x –	x –	N/A
6	A: interest differential between US and euro zone B: AMU DI	A→B(-) accumulated response	○ -0.044**	○ 0.058**	x –	x –	x –	x –	△ -0.008	x –	x –	x –	N/A

Table 6: Relationship between Interest Differentials and Exchange Rates (short sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential between US and Japan B:N.C./AMU	A→B(-) accumulated response	N/A	○ -0.001**	○ 0.000	○ 0.000	△ 0.000	○ -0.001**	△ 0.000	○ 0.000	△ 0.000	○ 0.000	N/A
2	A: interest differential between US and Japan B: AMU DI	A→B(+) accumulated response	N/A	○ 0.069**	○ 0.013	○ 0.016	○ 0.046*	○ 0.082**	△ 0.007	○ 0.020	△ 0.017	○ 0.008	N/A
3	A: interest differential between euro zone and Japan B:N.C./AMU	A→B(-) accumulated response	N/A	x –	△ 0.000	x –	x –	△ -0.001	△ 0.000	△ 0.000	x –	△ 0.000	N/A
4	A: interest differential between euro zone and Japan B: AMU DI	A→B(+) accumulated response	N/A	x –	△ 0.016	x –	x –	△ 0.055	△ 0.019	△ 0.021	x –	△ 0.023	N/A
5	A: interest differential between US and euro zone B:N.C./AMU	A→B(+) accumulated response	○ 0.001**	○ -0.001***	x –	x –	x –	x –	x –	x –	x –	x –	N/A
6	A: interest differential between US and euro zone B: AMU DI	A→B(-) accumulated response	○ -0.052**	○ 0.075***	x –	x –	x –	x –	x –	x –	x –	x –	N/A

Table 7: Relationship between Interest Differentials/Expected Return Differentials and Capital Flows (full sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential B: portfolio investment	A→B(+) accumulated response	x –	△ 7.630	△ 1.229	△ -3.197	△ 0.529	△ 1.564	△ 4.153	N/A	△ -2.197	N/A	N/A
2	A: interest differential B: other investment	A→B(+) accumulated response	x –	△ 2.059	△ 0.077	△ 0.068	x –	△ -0.295	x –	△ 0.891	△ 1.021	N/A	N/A
3	A: expected return differential B: portfolio investment	A→B(+) accumulated response	x –	△ 7.248	△ 1.230	△ -3.179	△ 0.516	△ 1.411	△ 4.121	N/A	△ -2.244	N/A	N/A
4	A: expected return differential B: other investment	A→B(+) accumulated response	x –	△ 1.924	△ 0.076	△ -0.009	x –	△ -0.331	x –	△ 0.899	△ 1.035	N/A	N/A

Table 8: Relationship between Interest Differentials/Expected Return Differentials and Capital Flows (short sample)

		expected relation	Japan	Korea	Hong Kong	Singapore	Thailand	Indonesia	Malaysia	Vietnam	Philippines	China	East Asia
1	A: interest differential B: portfolio investment	A→B(+) accumulated response	x –	△ 6.554	△ 2.752	x –	△ 0.825	△ 5.243	△ 1.459	N/A	△ -3.751	N/A	N/A
2	A: interest differential B: other investment	A→B(+) accumulated response	x –	△ 1.594	△ -2.337	△ -0.153	△ 1.106	△ 0.571	x –	△ 9.968	△ 2.600	N/A	N/A
3	A: expected return differential B: portfolio investment	A→B(+) accumulated response	x –	△ 6.078	△ 2.757	x –	△ 0.718	△ 5.299	△ 1.297	N/A	△ -3.805	N/A	N/A
4	A: expected return differential B: other investment	A→B(+) accumulated response	x –	△ 1.665	△ -2.332	△ -0.122	△ 1.082	△ 0.610	x –	△ 9.877	△ 2.634	N/A	N/A

Table 9: One Standard Deviation of Estimated Values (%point) (full sample)

US interest rate (daily)	Interest differential between US and Japan (daily)	Interest differential between US and Korea (daily)	Interest differential between US and Hong Kong (daily)	Interest differential between US and Singapore (daily)	Interest differential between US and Thailand (daily)	Interest differential between US and Indonesia (daily)	Interest differential between US and Malaysia (daily)	Interest differential between US and Vietnam (daily)	Interest differential between US and Philippines (daily)
0.027	0.027	0.059	0.054	0.041	0.071	0.095	0.035	0.111	0.150
Interest differential between US and China (daily)	Interest differential between US and Japan (monthly)	Interest differential between US and Korea (monthly)	Interest differential between US and Hong Kong (quarterly)	Interest differential between US and Singapore (quarterly)	Interest differential between US and Thailand (quarterly)	Interest differential between US and Indonesia (quarterly)	Interest differential between US and Malaysia (quarterly)	Interest differential between US and Vietnam (quarterly)	Interest differential between US and Philippines (quarterly)
0.029	0.261	0.263	0.430	0.450	0.611	1.346	0.639	1.860	1.417
Expected return differential between US and Japan (monthly)	Expected return differential between US and Korea (monthly)	Expected return differential between US and Hong Kong (quarterly)	Expected return differential between US and Singapore (quarterly)	Expected return differential between US and Thailand (quarterly)	Expected return differential between US and Indonesia (quarterly)	Expected return differential between US and Malaysia (quarterly)	Expected return differential between US and Vietnam (quarterly)	Expected return differential between US and Philippines (quarterly)	
0.257	0.268	0.431	0.442	0.603	1.359	0.626	1.862	1.425	

Table 10: One Standard Deviation of Estimated Values (%point) (short sample)

US interest rate (daily)	Interest differential between US and Japan (daily)	Interest differential between US and Korea (daily)	Interest differential between US and Hong Kong (daily)	Interest differential between US and Singapore (daily)	Interest differential between US and Thailand (daily)	Interest differential between US and Indonesia (daily)	Interest differential between US and Malaysia (daily)	Interest differential between US and Vietnam (daily)	Interest differential between US and Philippines (daily)
0.033	0.033	0.066	0.067	0.051	0.085	0.113	0.037	0.103	0.171
Interest differential between US and China (daily)	Interest differential between US and Japan (monthly)	Interest differential between US and Korea (monthly)	Interest differential between US and Hong Kong (quarterly)	Interest differential between US and Singapore (quarterly)	Interest differential between US and Thailand (quarterly)	Interest differential between US and Indonesia (quarterly)	Interest differential between US and Malaysia (quarterly)	Interest differential between US and Vietnam (quarterly)	Interest differential between US and Philippines (quarterly)
0.035	0.316	0.303	0.530	0.453	0.652	1.386	0.613	1.778	1.553
Expected return differential between US and Japan (monthly)	Expected return differential between US and Korea (monthly)	Expected return differential between US and Hong Kong (quarterly)	Expected return differential between US and Singapore (quarterly)	Expected return differential between US and Thailand (quarterly)	Expected return differential between US and Indonesia (quarterly)	Expected return differential between US and Malaysia (quarterly)	Expected return differential between US and Vietnam (quarterly)	Expected return differential between US and Philippines (quarterly)	
0.311	0.310	0.531	0.450	0.645	1.407	0.606	1.789	1.565	

Note:

- ○: statistically significant and expected sign (95% confidence interval; including time lag in response)
- △: statistically insignificant but expected sign (95% confidence interval)
- x: not expected sign
- –: accumulated impulse response is insignificant (95% confidence interval)
- N/A: no data or not analyzed due to a few number of data
- ***, **, and * represent a statistically at a significant level of 1%, 5%, and 10%, respectively.