ADBI-JFSA Joint Conference
March 8, 2013

Liquidity of U. S. dollars in Tokyo market: Comparison with London and New York, and its Implications for Asian Financial Policy

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The Motivation of this paper

- The role of U. S. dollars is important in international transactions.
- In particular, the role of liquidity of U. S. dollars is critical in the crisis.
- But the market thickness of U. S. dollar transactions is different across the markets.
- Comparison with the London and New York markets, Asian markets are thinner.

$\Rightarrow$ Asian markets are more fragile to international liquidity crisis.

$\Rightarrow$ Implications for Asian Financial Policy.

Growing Asia-Pacific in the world economy

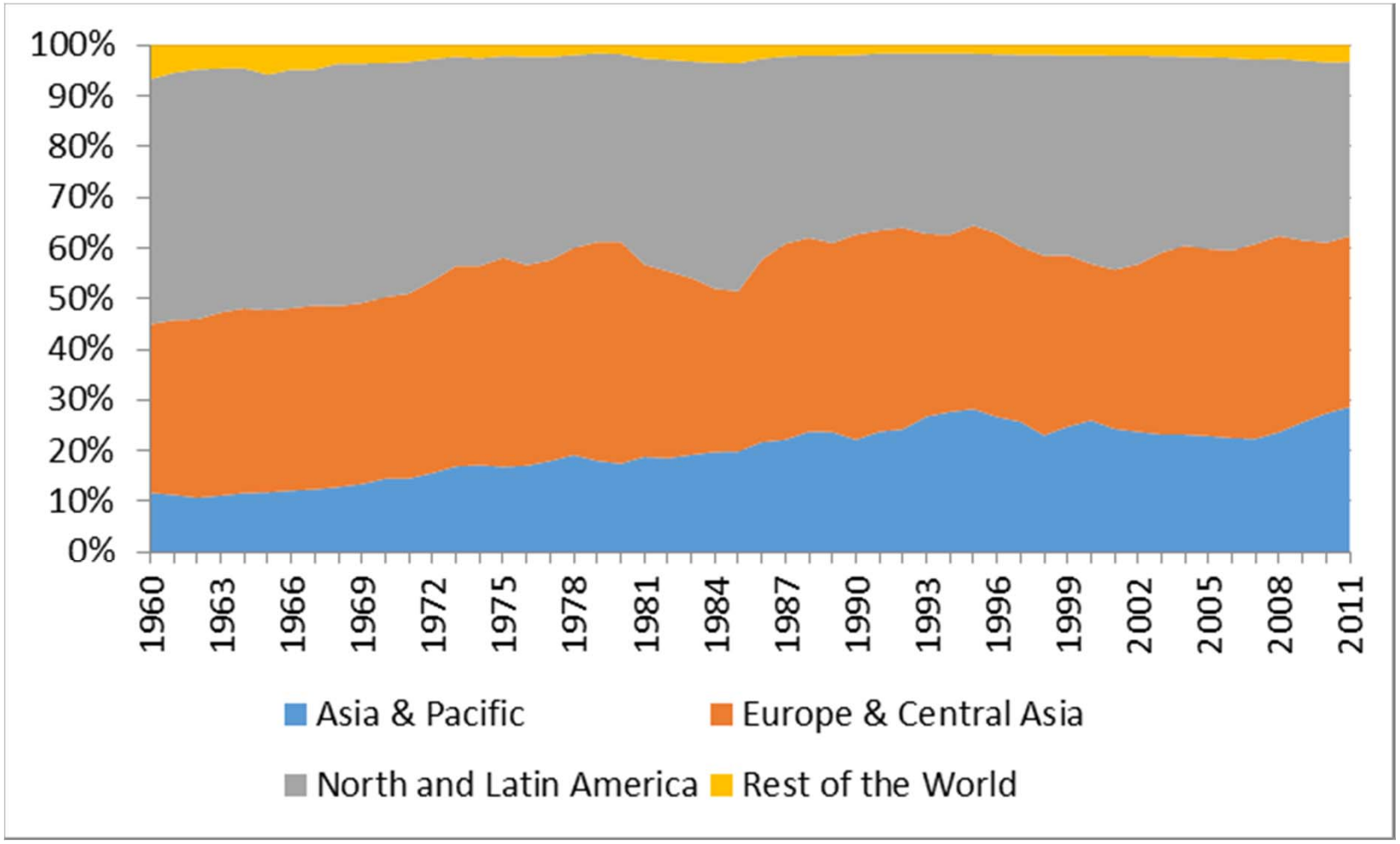
The Asia-Pacific region is increasing its share in the world GDP.

- The Asia-Pacific's GDP share which was only 11% in 1960 increased to about 27% in 2011.

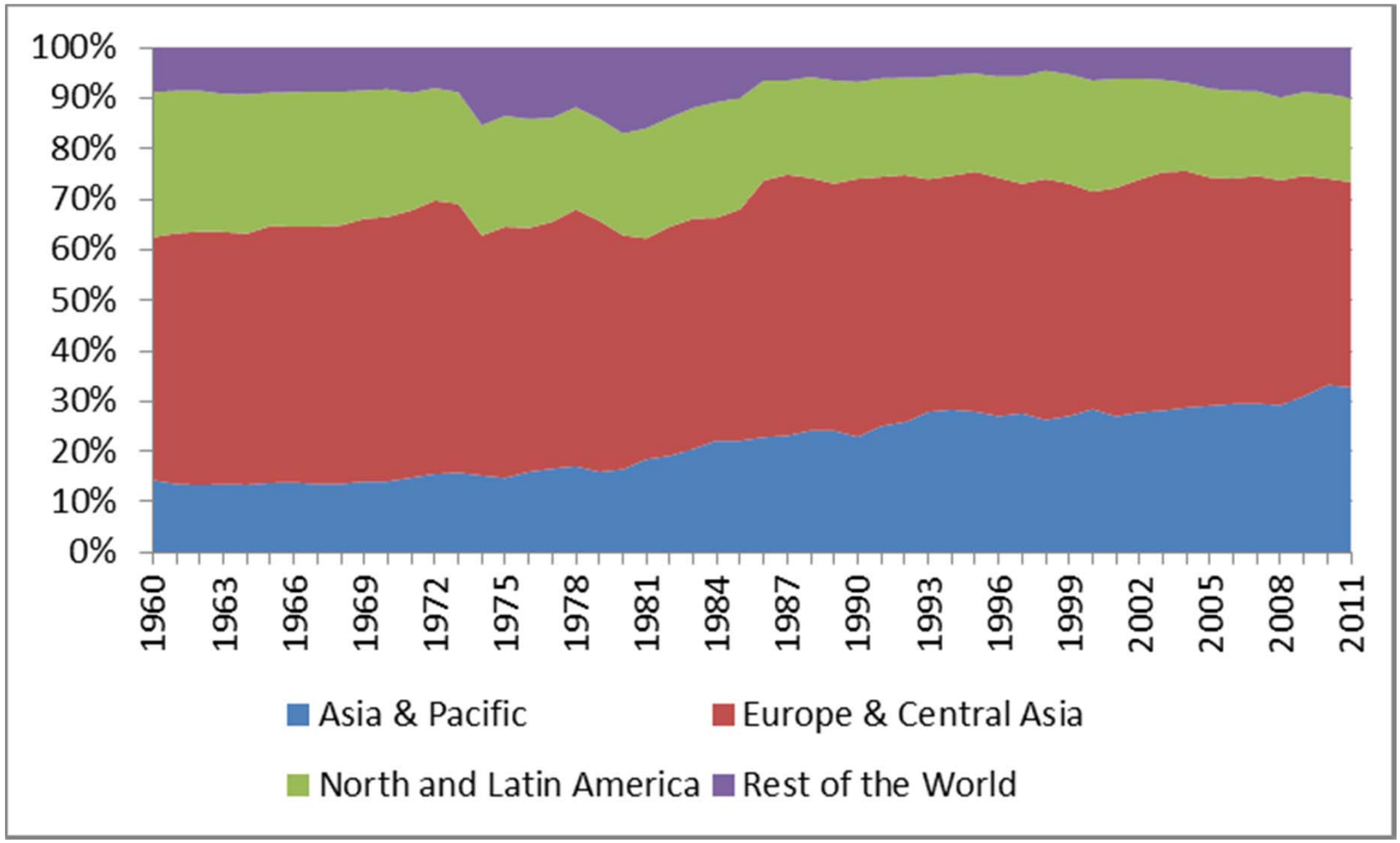
The growing Asia & Pacific region is more dramatic in the share in the world merchandise trade.

- The Asia-Pacific's export share which was only 14% in 1960 increased to about 33% in 2011.

Asia & Pacific region is increasing the share in the world GDP



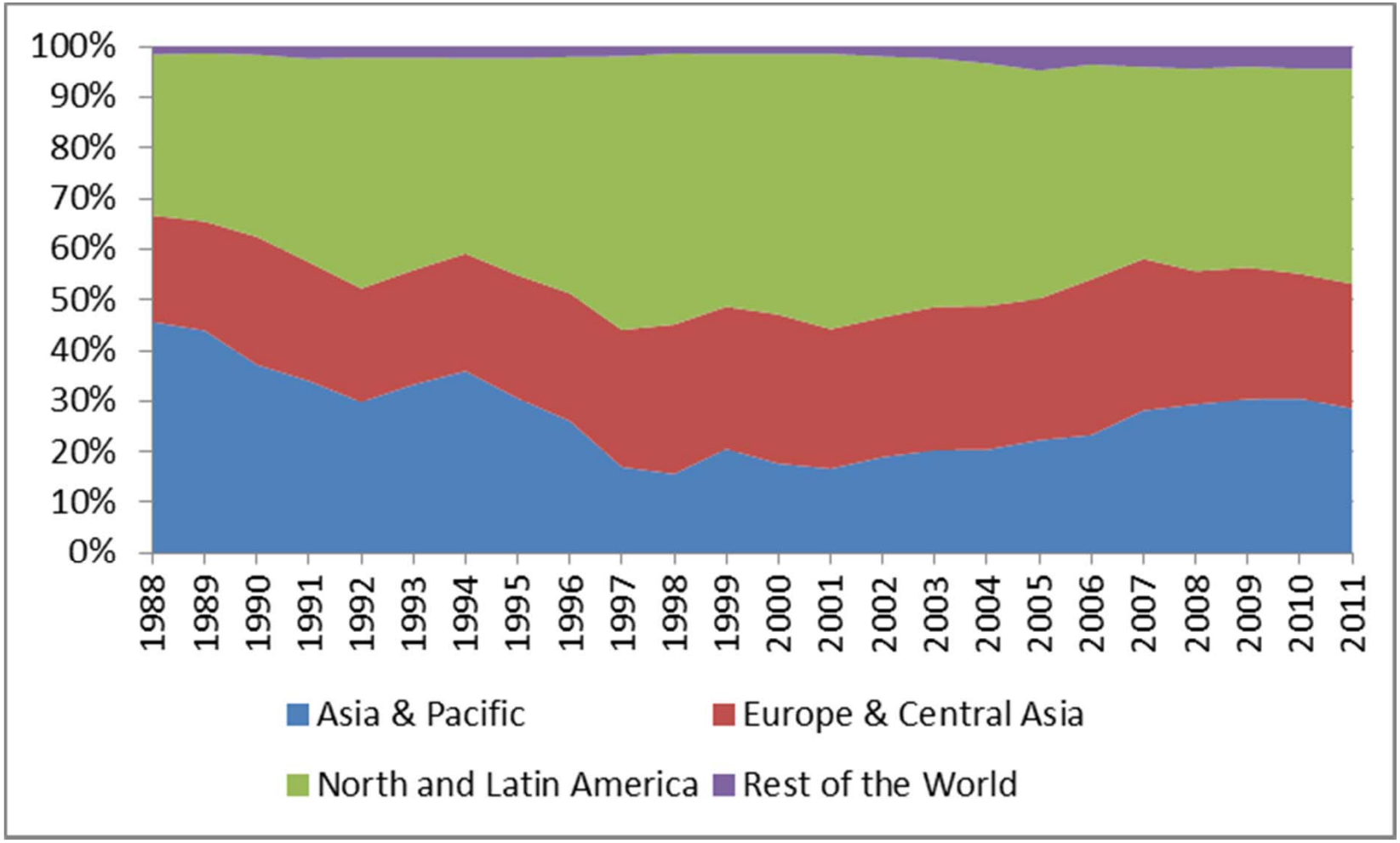
Growing Asia & Pacific region is more dramatic in the share in the world merchandise trade.



The financial markets in Asia-Pacific have large potentiality

- After the crash of the speculative bubble in Japan, Asia & Pacific region reduced its share in market capitalization of listed companies in the world.
- But because of emerging economies in the region, its share recovered in the 2000s.
- Moreover, Asia & Pacific region has very high saving rates.
- The potential supply of funds is huge in Asia & Pacific region.

Asia & Pacific region still has large share in Market capitalization of listed companies in the world



Asia & Pacific region has high saving rates (saving rates in 2010)

		Gross	Net
East Asia & Pacific (all income levels)		29.2	17.0
East Asia & Pacific (developing only)		46.5	35.8
	China	52.7	41.9
	Hong Kong SAR, China	29.3	16.0
	Indonesia	32.9	22.3
	Japan	23.2	9.6
	Korea, Rep.	31.6	18.7
	Malaysia	34.1	22.0
	Philippines	27.2	17.4
	Singapore	47.7	33.3
	Thailand	32.3	20.9
	Vietnam	33.2	23.8
World		19.3	6.3
High income: OECD		17.0	3.2
European Union		18.5	4.8
United States		10.9	−3.1

Some Structural Problems of Financial markets in East Asia

- Double mismatches (not in Tokyo market)

(1) Currency mismatch

(2) Maturity mismatch

$\Rightarrow$ Asian Crisis in 1997

- Heavy reliance on the US dollar for intra-regional transactions.
- In the US dollar transactions, Asia & Pacific markets (including in Tokyo market) are much thinner than London and New York markets.
- This presentation focuses this issue!

Invoice Currency Ratios (%) in Japan's Exports

Exports to USA

	2006	2008	2009	2011	2012
	July-Dec.	Jan.-June	July-Dec.	Jan.-June	July-Dec.
US dollar	89.1	87.6	86.8	83.1	85.0
Yen	10.8	12.2	13.0	16.8	15.0
Euro	0.1	0.2	0.1	0.1	0.1

Exports to Asia

	2006	2008	2009	2011	2012
	July-Dec.	Jan.-June	July-Dec.	Jan.-June	July-Dec.
US dollar	49.5	48.3	50.7	48.6	51.7
Yen	48.8	50.0	47.5	49.3	45.3
Euro	n.a.	n.a.	n.a.	0.2	n.a.

Invoice Currency Ratios (%) in Japan's Imports

Imports from USA

	2006	2008	2009	2011	2012
	July-Dec.	Jan.-June	July-Dec.	Jan.-June	July-Dec.
US dollar	75.6	79.7	79.2	77.5	74.9
Yen	23.6	19.3	19.7	21.9	24.4
Euro	0.7	0.6	0.4	0.4	0.6

Imports from Asia

	2006	2008	2009	2011	2012
	July-Dec.	Jan.-June	July-Dec.	Jan.-June	July-Dec.
US dollar	72.4	71.7	70.5	71.6	71.4
Yen	26.0	26.9	27.9	26.8	26.8
Euro	0.3	0.3	0.4	0.3	0.3

Currency Shares of Foreign Exchange Turnover in the Tokyo Market

Unit: %

	Apr-04	Apr-07	Apr-10
Yen ↔ US Dollar	60.6	58.2	62.3
Euro ↔ US Dollar	11.7	10.8	9.5
Euro ↔ Yen	6.9	5.9	8.6
Others	20.8	25.1	19.7

Geographical distribution of foreign exchange transactions

- London is the largest money center in the foreign exchange transactions.
- The UK share exceeded 30%, which was twice as large as the US share and was much larger than the other shares.
- No Asian markets, including Tokyo, Hong Kong, and Singapore, had comparable shares to the UK.
- This implies that in terms of the US dollar transactions Asia & Pacific markets are much thinner than London and New York markets.

Currency Shares of Geographical Distribution of Foreign Exchange Market Turnover

Country	1995	1998	2001	2004	2007	2010
Australia	2.5	2.3	3.2	4.1	4.1	3.8
Denmark	1.9	1.3	1.4	1.6	2.1	2.4
France	3.8	3.7	2.9	2.6	3.0	3.0
Germany	4.8	4.7	5.4	4.6	2.4	2.1
Hong Kong SAR	5.6	3.8	4.0	4.1	4.2	4.7
Japan	10.3	7.0	9.0	8.0	5.8	6.2
Singapore	6.6	6.9	6.1	5.1	5.6	5.3
Switzerland	5.4	4.4	4.5	3.3	5.9	5.2
United Kingdom	29.3	32.6	32.0	32.0	34.6	36.7
United States	16.3	18.3	16.1	19.1	17.4	17.9
others	13.5	15.0	15.2	15.6	14.8	12.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Liquidity shortage of U. S. dollars in the crisis

- Thinner transactions of the US dollar in Asia & Pacific markets are not a big problem in tranquil periods.
- But they may cause a serious problem when financial markets are under turbulent.
- Ex.1. Asian Financial Crisis
- Ex.2. Global Financial Crisis
- This presentation focuses the second example!

“Liquidity risk”

- In the financial turmoil, the trader may not be given as much “balance sheet” to invest, which is perceived as a shortage of liquidity to the trader.
- Because of the role of the US dollar as the international currency, the traders were especially sensitive to a liquidity shortage of the US dollar in international transactions.

Some methodological issue:
the covered interest parity (CIP) condition

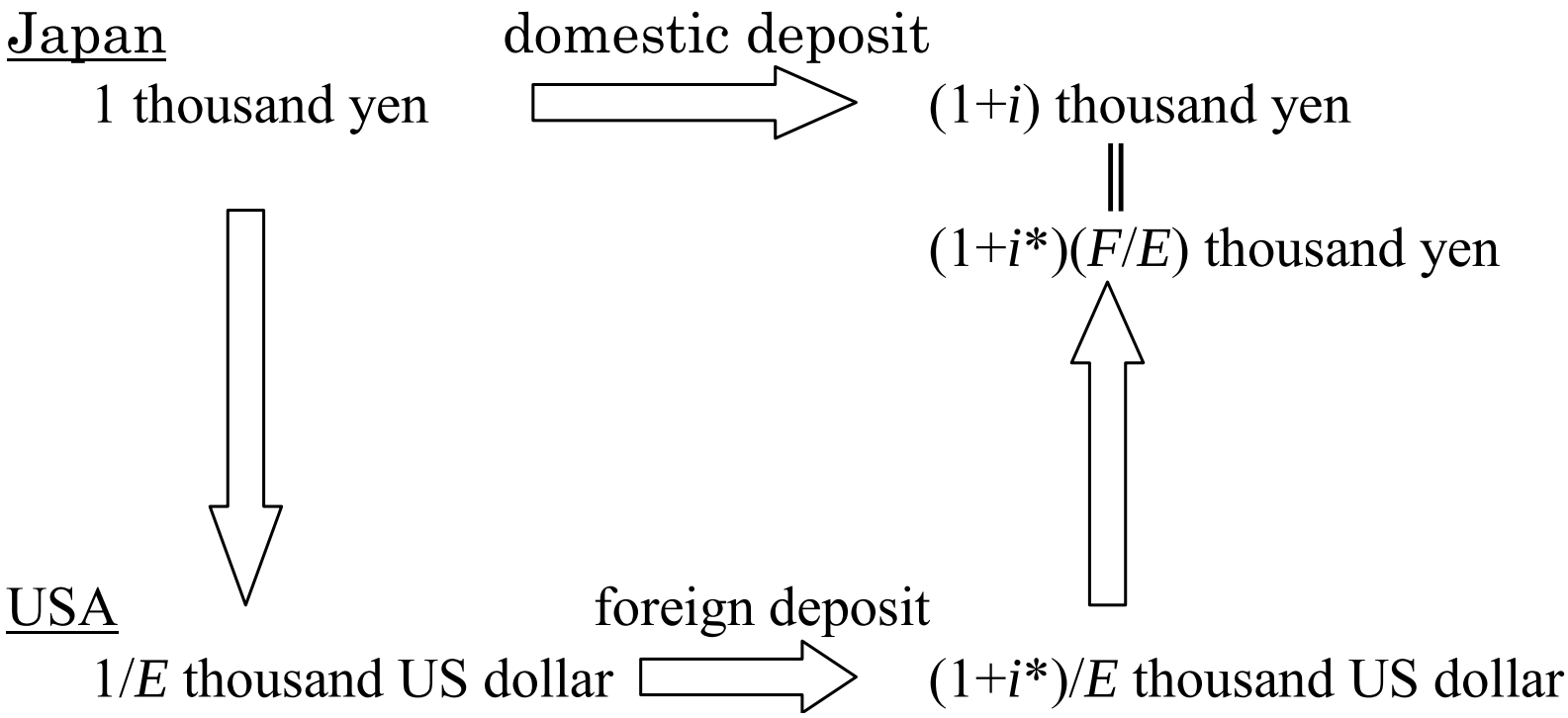
- This presentation examines how the role of US dollar as international liquidity differed across the markets.
- Methodology:

  the covered interest parity (CIP) condition.
- What is the covered interest parity (CIP) condition ?
- The CIP condition is an arbitrage condition between local and foreign investments.
- During tranquil period, CIP condition holds in riskless arbitrage.

Arbitrage and Covered Interest Parity (CIP)

i: domestic interest rate, *i**: foreign interest rate

E:spot exchange rate, F: forward exchange rate



The covered interest parity (CIP) condition in the crisis

- During tranquil periods, CIP condition holds in riskless arbitrage.
- But, during the crisis, there were substantial deviations from CIP condition.
- In particular, the CIP condition varied across the markets in the global financial crisis.
- Why?

Deviations from CIP condition

- $(1+i^{us}_t) - (1+i^{n}_t)(f_{t+1}/e_t)$,
- where

i^{us}_t = three-month US dollar OIS rate,

i^{n}_t = three-month non-US dollar OIS rate,

e_t = the spot exchange rate between the two currencies,

f_{t+1} = its three-month forward exchange rate.

Unsecured vs secured

- unsecured rates : LIBOR (London Interbank Offered Rate), TIBOR (Tokyo Interbank Offered Rate)

  i = risk free rate + risk premium

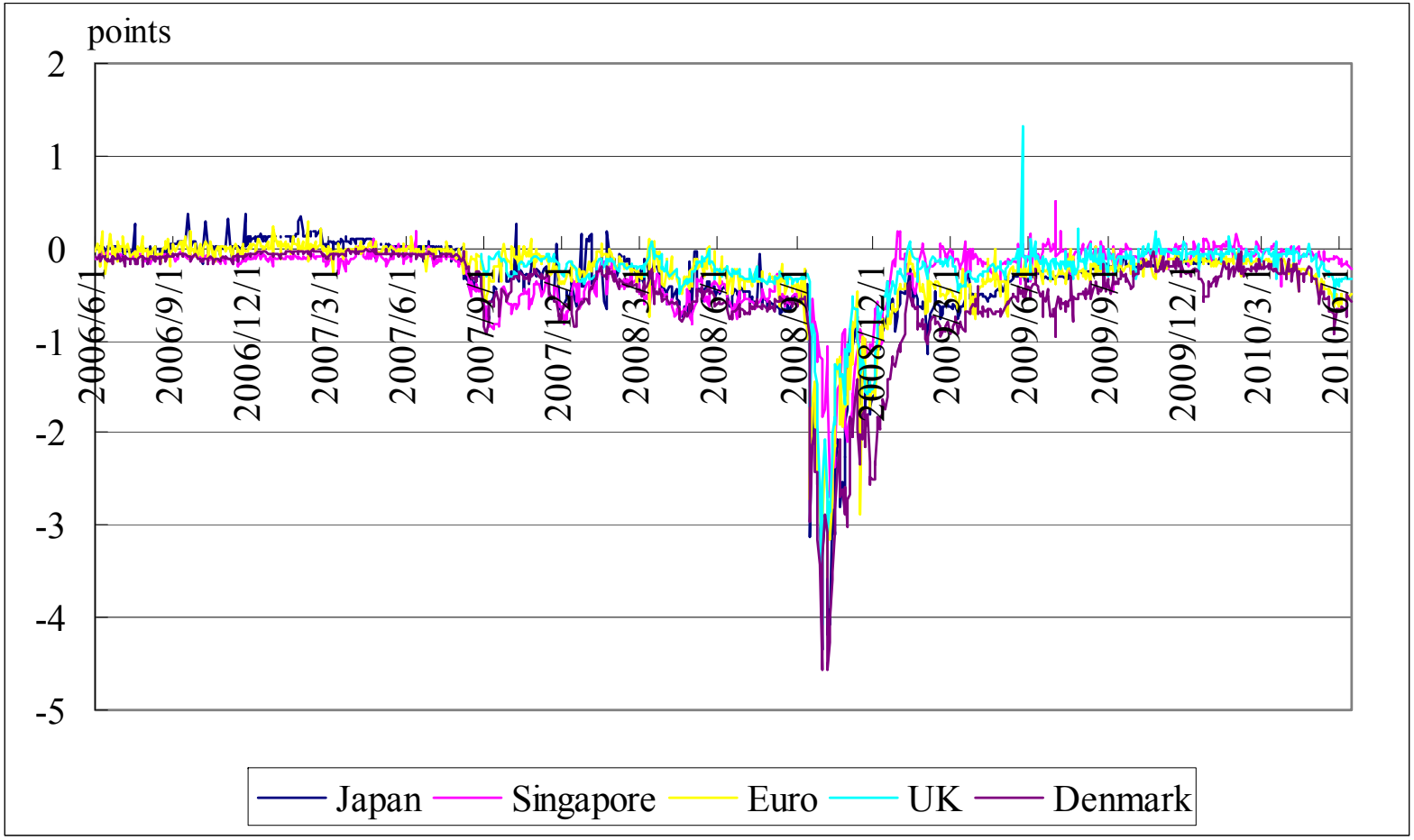
- secured rates : overnight index swap (OIS), government bond rate, treasury rate

  i = risk free rate

The role of US dollar as liquidity

- Even if we use risk free rates, the CIP condition suggests that during the crisis, only the US dollar interest rate became low on the forward market.
- This is true for most major currencies in the world.
- Why?
- Because the crisis increases liquidity needs in international financial market.
- Because the US dollar is the only international currency.

Deviations from the CIP condition between the US dollar and five currencies



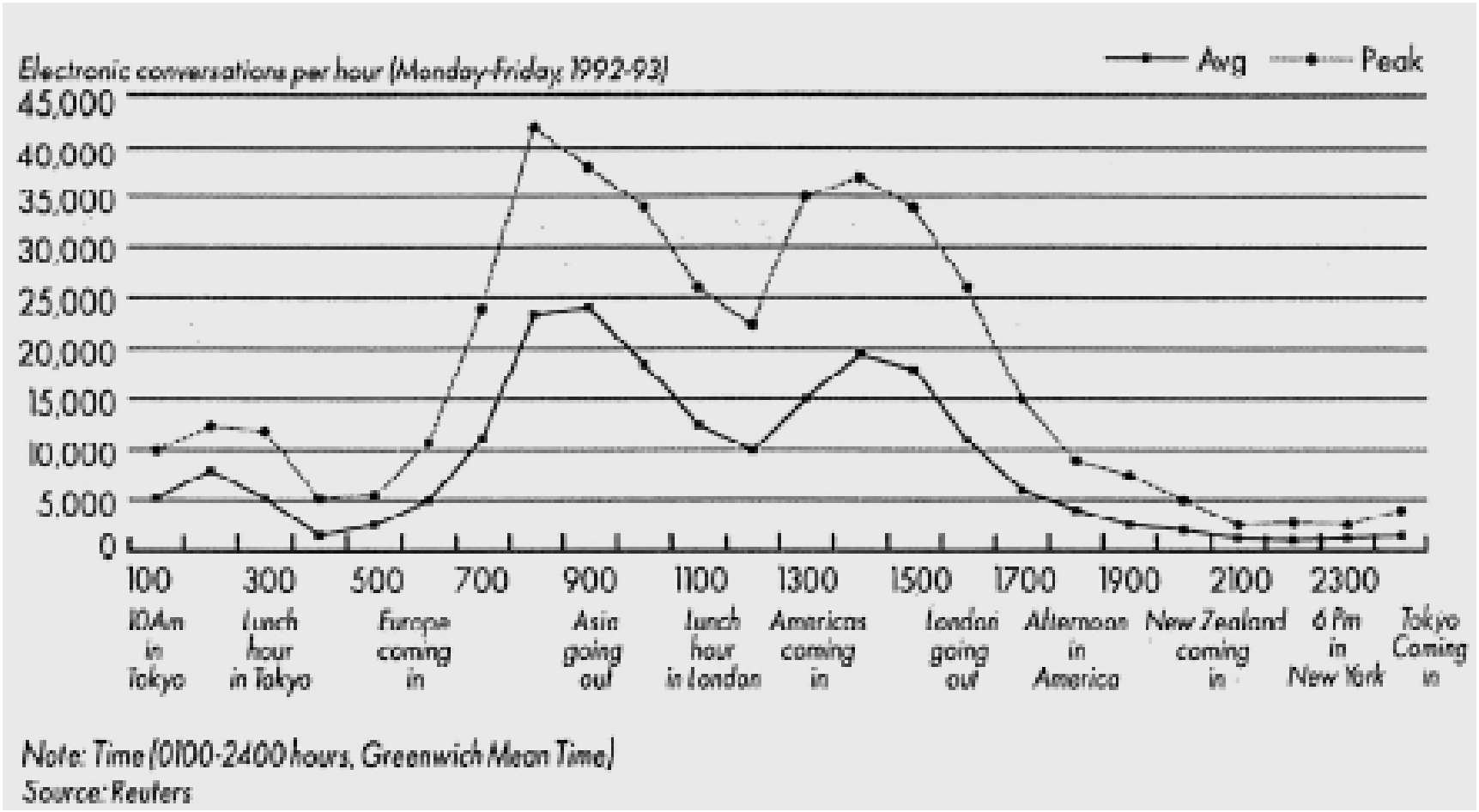
Some regional features: Comparison among the three major markets

- Liquidity risk may differ not only across currencies but also across markets.
- We calculate the CIP condition between the Japanese Yen and the US dollar and examine how it was violated in 2007-2009 in the three markets: Tokyo, London, and New York.
- In the GFC, US and European banks substantially deteriorated their credit quality but many of Japanese banks did not.

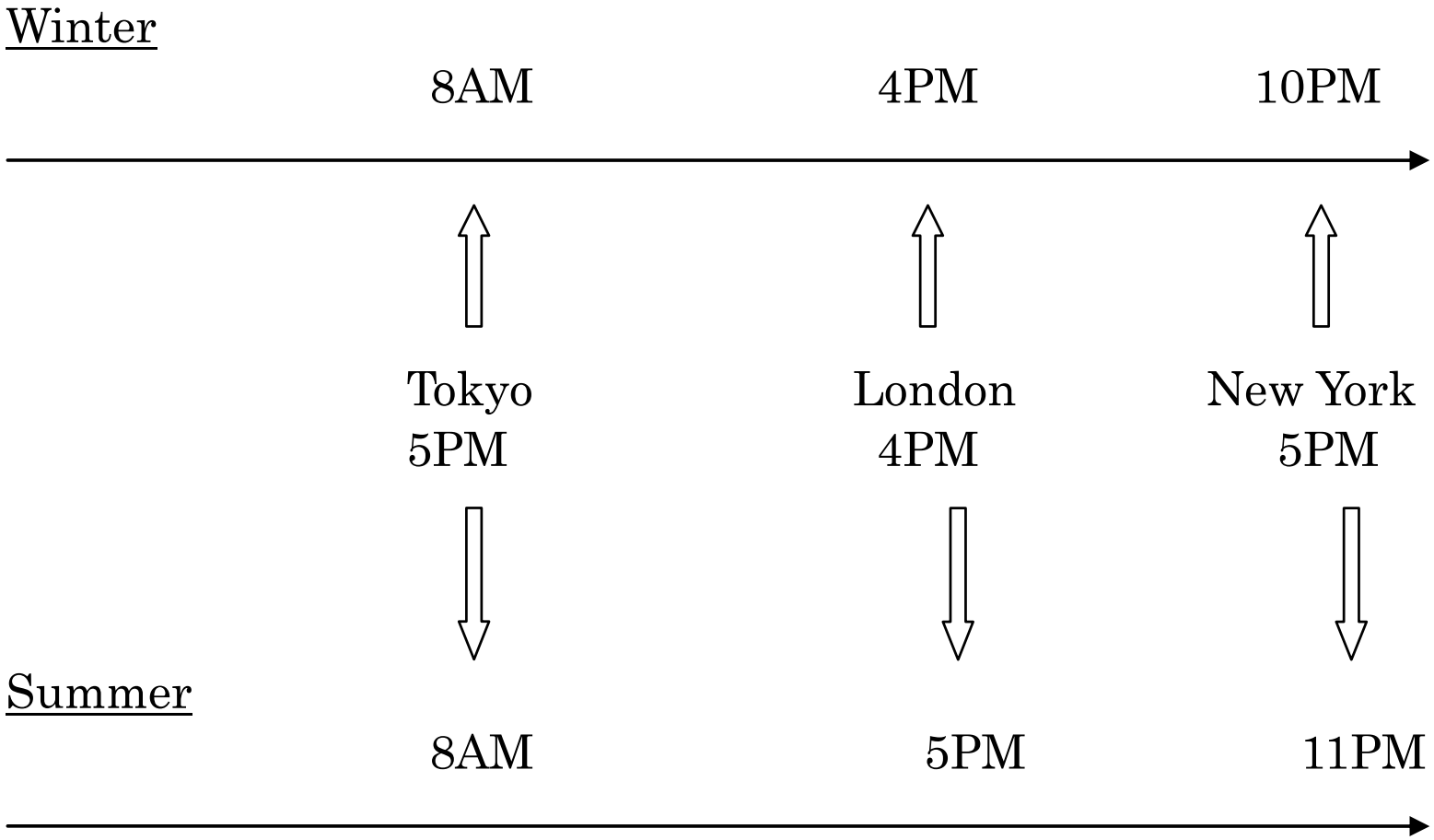
Key findings

- We find larger deviations from the CIP condition in the Tokyo market than in the London and New York markets.
- Why?
- Because of liquidity shortage!
- Tokyo market:

- Trading volume is small
- London and NY markets are closed.


Electronic conversations per hour (Monday-Friday 1992-93)
Avg
Peak
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
100
300
500
700
900
1100
1300
1500
1700
1900
2100
2300
10Am in Tokyo
Lunch hour in Tokyo
Europe coming in
Asia going out
lunch hour in London
Americas coming in
London going out
Afternoon in America
New Zealand coming in
6 Pm in New York
Tokyo Coming in
Note: Time (0100-2400 hours, Greenwich Mean Time)
Source: Reuters

GMT (Greenwich Mean Time)



Biannual average of deviations from CIP condition

Unit: basis points

	Tokyo 5pm	London 4pm	New York 5pm
Jan. 2007 - June 2007	-9.53	-9.45	-9.53
July 2007 - Dec. 2007	-46.65	-46.51	-46.15
Jan. 2008 - June 2008	-42.36	-42.36	-42.18
July 2008 - Dec. 2008	-135.79	-134.50	-135.38
Jan. 2009 - June 2009	-50.42	-49.11	-49.29
July 2009 - Dec. 2009	-21.02	-20.62	-20.46

Monthly average of deviations from CIP condition

Unit: basis points

	Tokyo	London	New York
Average July 2008	-60.11	-59.57	-59.88
Average August 2008	-67.61	-66.68	-66.33
Average September 2008	-150.61	-159.10	-169.30
2008/9/1-9/15	-57.62	-61.72	-62.01
2008/9/16-9/30	-243.59	-256.48	-266.84
Average October 2008	-304.92	-293.74	-293.49
Average November 2008	-135.00	-134.99	-135.46
Average December 2008	-92.63	-88.14	-86.23
Average January 2009	-56.05	-53.68	-54.57
Average February 2009	-71.23	-69.97	-69.65
Average March 2009	-60.52	-57.08	-57.88

Implications
Credit risk vs liquidity risk

- In the GFC, the credit quality of US and European banks declined substantially, but that of Japanese banks did not.

$\Rightarrow$ In local currency transactions, the London and New York markets carried a larger counter-party credit risk than in the Tokyo market.

- However, because of the role of the US dollar as the international currency, the traders are sensitive to a liquidity shortage of the US dollar.
- The shortage was more serious in the Tokyo market than in the London market because the Tokyo market is much thinner than London and New York markets.

Counterparty credit risk

- The perception that the risk of default on the loan had increased and/or the market price of taking on such risk had risen.
- TIBOR – OIS = credit risk in Tokyo
- LIBOR – OIS = credit risk in London.
- We have dollar denominated rates and yen denominated rates for the spreads.
- Std Dev. of FF rate may reflect credit risk in New York.

Basic Statistics
From Sep. 1, 2008 to Oct. 31, 2008

	Eurodollar		Euroyen		FF rate
	LIBOR-OIS	TIBOR-OIS	LIBOR-OIS	TIBOR-OIS	Std Dev.
Mean	216.51	240.17	50.48	39.82	59.47
Median	252.65	279.75	54.25	39.39	44.00
Maximum	363.75	388.60	66.50	59.39	195.00
Minimum	78.20	84.40	38.06	34.09	7.00
Std. Dev.	99.04	105.51	10.14	5.93	46.68

Implications from counterparty credit risk

- Counterparty credit risk depends on currency denomination.
- $Risk(\$, Tokyo)_t < Risk(\$, London)_t$
- $Risk(¥, Tokyo)_t < Risk(¥, London)_t$
- $Liquidity(\$, Tokyo)_t > Liquidity(\$, London)_t$
- $Liquidity(¥, Tokyo)_t \approx Liquidity(¥, London)_t$

$\Rightarrow$ Eurodollar TIBOR–LIBOR > 0

Euroyen TIBOR–LIBOR < 0

Policy action: FRB's Swap Lines

- In the GFC, the central banks made several attempts to improve liquidity premiums in money markets.
- In particular, in order to supply US dollar liquidity, the Federal Reserve Bank (FRB) agreed about Foreign Exchange (FX) Swap Lines with several central banks such as the Bank of Japan (BOJ), European Central Bank (ECB), and the Bank of England (BOE).
- To the extent that the central bank has the ability to reduce the liquidity risk premium effectively, the size of the attempts is a first step toward understanding the nature of the liquidity risk premium in each market.

Which central bank used FRB's FX Swap Lines in the GFC?

- ECB used them most.
- In the GFC, European banks substantially deteriorated their credit quality.

$\Rightarrow$ They faced some difficulty in funding US dollar liquidity.

- However, the BOJ was the second biggest user.
- In the GFC, even though many of Japanese banks were healthy, they faced some difficulty in funding US dollar liquidity.
- Why?
- Because the Tokyo market is much thinner than London and New York markets in the US dollar transactions.

Institution	Amount of Facility	Outstanding as of December 31, 2008
	Millions of U.S. Dollars	
	Federal Reserve System Open Market Account (SOMA)	
Bank of Canada	2,000	0
Banco de México	3,000	0
European Central Bank[a]	Unlimited	291,352
Swiss National Bank[a]	Unlimited	25,175
Bank of Japan[a]	Unlimited	122,716
Bank of Canada[a]	30,000	0
Bank of England[a]	Unlimited	33,080
Danmarks Nationalbank[a]	15,000	15,000
Reserve Bank of Australia[a]	30,000	22,830
Sveriges Riksbank[a]	30,000	25,000
Norges Bank[a]	15,000	8,225
Reserve Bank of New Zealand[a]	15,000	0
Bank of Korea[a]	30,000	10,350
Banco Central do Brasil[a]	30,000	0
Banco de México[a]	30,000	0
Monetary Authority of Singapore[a]	30,000	0
Total	Unlimited	553,728

Summary of our main findings

- Shortage of the US dollar as liquidity becomes vital in the international money markets during the GFC.
- This caused large deviations from CIP condition.
- However, liquidity shortage of the US dollar was serious in Tokyo time.
- Liquidity risk in money markets, rather than credit risk, explain the difference across the markets.
- Central banks' liquidity provisions may be useful in stabilizing US dollar liquidity risk in each local market.

FRB's FX Swap Lines vs Regional Coordination in Asia

- In the GFC, FRB's FX swap lines were useful in stabilizing US dollar liquidity risk in Asian local markets, especially in Japan and South Korea.
- Are they enough?
- No.
- Only three of Asian countries were eligible to FRB's FX swap lines in the GFC.
- It is uncertain whether FRB will agree to the FX swap lines for any of future crises.

Importance of Regional Coordination in Asia

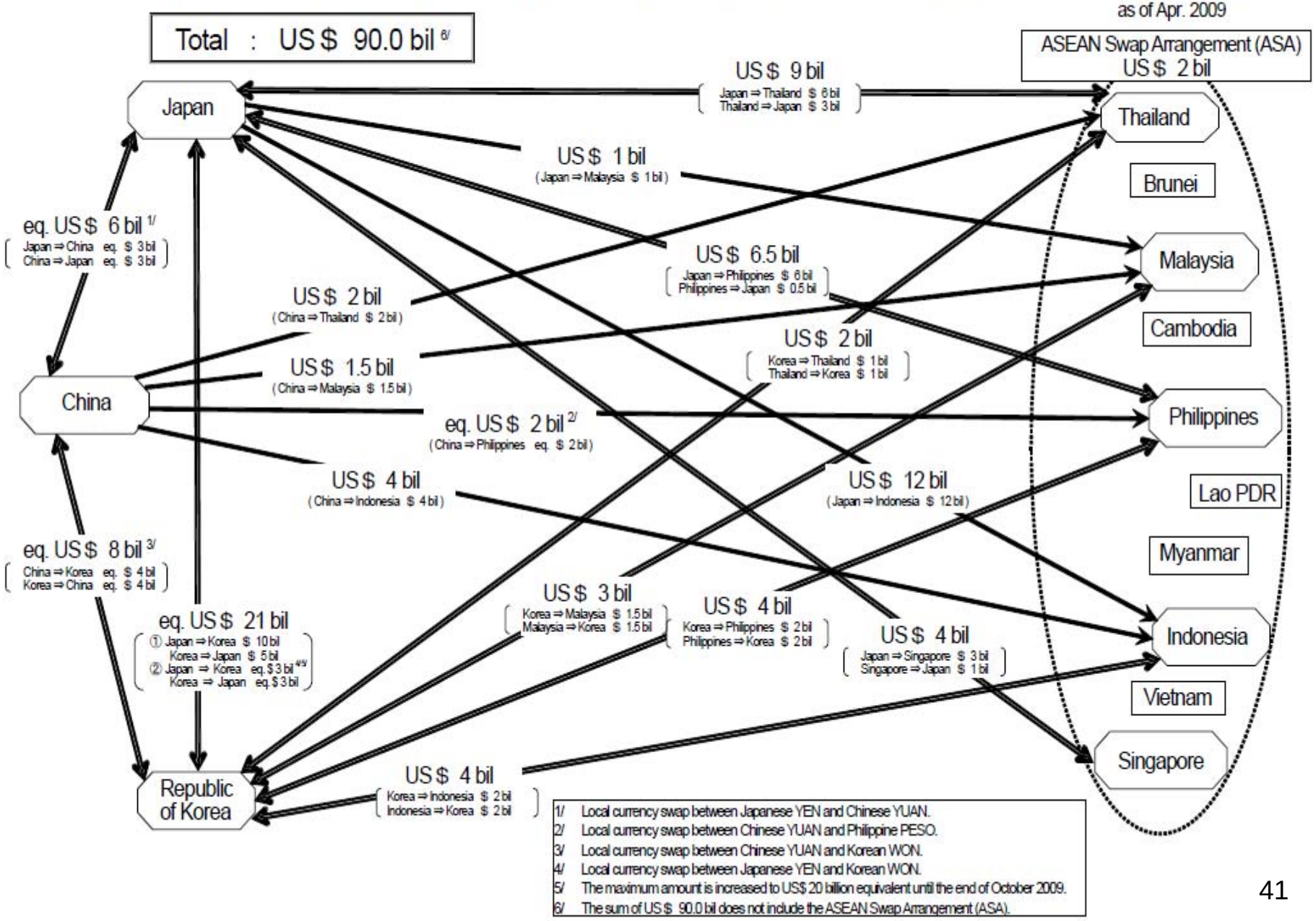
- The Asia-Pacific region is increasing its share in the world GDP.
- However, in terms of the US dollar transactions, Asia & Pacific markets are much thinner than London and New York markets.
- We need special regional coordination in Asia in order to overcome possible US dollar liquidity shortage in the crisis.

Coordinate policy responses in Asia
Chiang Mai Initiative (CMI) Multilateralization

- A multilateral currency swap arrangement among the ten members of the ASEAN, the People's Republic of China (including Hong Kong), Japan, and South Korea.
- It draws from a foreign exchange reserves pool worth US$120 billion and was launched on 24 March 2010.
- That pool has been expanded to $240 billion in 2012.

Network of Bilateral Swap Arrangements (BSAs) under the Chiang Mai Initiative (CMI)

as of Apr. 2009



1/ Local currency swap between Japanese YEN and Chinese YUAN.
2/ Local currency swap between Chinese YUAN and Philippine PESO.
3/ Local currency swap between Chinese YUAN and Korean WON.
4/ Local currency swap between Japanese YEN and Korean WON.
5/ The maximum amount is increased to US$ 20 billion equivalent until the end of October 2009.
6/ The sum of US $ 90.0 bil does not include the ASEAN Swap Arrangement (ASA).

CMI Multilateralization vs Central bank liquidity swaps

- In the GFC, South Korea did not use CMI.
- CMI multilateralization:

- Japan ⇒ Korea : US$ 21.0 billion
- China ⇒ Korea : US$ 8.0 billion

- Central bank liquidity swaps:

- USA ⇒ Japan : unlimited
- USA ⇒ Korea : US$ 30.0 billion
- Total supplied : US$554 billions

But only to Japan, Korean, and Singapore in Asia

Further development of CMI

- Foreign Exchange Reserves in Japan and China
- Japan: US$1,267 billions in Jan. 2013
- China: US$3,310 billions in Dec. 2012
- The sum of them (US$4.5 trillions) is far above the total supply of FRB's central bank liquidity swaps in the world (US$554 billions).
- Asia has enough room for further extension of CMI multilateralization!

$\Rightarrow$ Further development of regional policy coordination is possible.

Some problems of CMI

- CMI stability facility is linked to IMF programs. ⇒ Conditionality of structural reforms.
- But liquidity risk is not caused by structural problems.

<u>15th ASEAN+3 Finance Ministers and Central Bank's Governors' meeting in Manila, Philippines (May 2012).</u>

- It made an agreement about expanding CMIM from current $120 billion to 240 billion.
- The ASEAN+3 also agreed to adopt the CMIM Precautionary Line (CMIM-PL) in order to prevent the financial crisis.
- In addition, IMF de-linked portion is raised from 20 percent to 30 percent and with its future goal of reaching 40 in the year 2014. ⇒ a desirable attempt!