The Determinants of Portfolio Investment flows in East Asia

July 30, 2005

Jung Sik Kim
(Yonsei University)

Prepared for the Conference of
Asia-Pacific Economic Association

Background

* Portfolio Flows : Complicated Dilemma

– Merits : Finance productive investment opportunity

– Demerits :
(1) Lead to excess volatility in interest rate and real exchange rate etc. : negative impact on export, investment and growth
(2) Inflationary pressure
(3) Real exchange rate appreciation : Current account deficit
(4) Debt Crisis : Flow reversed

2

Motivation

- Increased portfolio investment inflow in East Asia
- Minimized Dilemma : Finding the determinants of portfolio investment flows.

- Causes of portfolio investment flows
(1) Global factors (push factors): world interest rate, world economic growth, exchange rates
(2) Country specific factors (pull factors) : interest rate, economic growth, exchange rate, exchange rate volatility, credit ratings, secondary market price, stock market returns

3

Portfolio flows and Global Factors

- High U.S. GDP Growth Rate :
– Decrease Capital Inflows to Emerging Market Economies (EMEs)
– Increase Capital Inflow to Asia (High trade Dependent on U.S. economy)
- Low U.S. Interest Rate : Increase Capital Inflows to EMEs

4

Portfolio Flows and Country Specific Factors

- High GDP Growth Rate : Increase Capital Inflows to EMEs.
- High Interest Rate : Increase Capital Inflows to EMEs.
- High Stock Price Index or Secondary Bond Market Price : Increase Capital Flows to EMEs

5

Portfolio Flows and Exchange Rates

- Exchange rate depreciation results massive capital outflows. (During 1999 2001, the correlation coefficient between euro and net capital export is 0.8 in the euro area.)
- Asymmetric Behavior in the short run and in the long run in the cases of EMU and Germany.
- Expected Depreciation : decrease Capital inflow

6

Portfolio Flows and Exchange Rate Regime

- McKinnon(1999) : Under the floatings, capital inflows result appreciation of exchange rate and decrease of export competitiveness. (floatings decrease portfolio (equity) and FDI flows.)
- Floatings increase exchange rate volatility (uncertainty) and portfolio investors reduce the purchasing equity.

7

Portfolio Flows and Investment Risk

- High exchange rate volatility (High Risk) : decrease portfolio inflows
- High risk of real exchange rate (export) : decrease portfolio inflows
- High political risk : decrease portfolio inflows

8

Research Purpose

- Find the role of U.S.GDP growth rate and U.S. Interest rates : Global or country specific factors
- Role of investment risk (exchange rate) in the short run and in the long run
- Asymmetric behavior in equity and bond investments : Asymmetric behavior during pre-and post the crisis

9

Previous Empirical Results

- Calvo, Leiderman and Reinhart(1993, 1996) : Only Global factors are important in capital inflows.
- Yoonbai Kim(2000) : 1970s-1990s, Mexco, Korea, Chile and Malaysia
  - Global factors are important while country specific factors are less important.

10

Previous Empirical Results

- Bohn and Tesar(1998) Asia :
  - Global Factor (U.S. growth rate) is not important, while country Specific factor (domestic market return) is important.
- Carlson and Hernandez(2002) : 1988 1998 :
  - Global (U.S. growth rate) factor has no effect while Country specific factor (High growth rate) increase equity flow.
  - Analyze the role of exchange rate regime.

11

Previous Empirical Results

- Chuhan et.al.(1998) : 1988-1992 (monthly) panel data : Asia and Latin America
  - Both global and country specific factors are important.
  - Equity flows are more sensitive than bond flows to global factors.
- Sammo Kang et. al.(2002) : 1990-2001, Korea
  - Both global and country specific factors are important.(Current account imbalance significantly affect portfolio investment.)
  - Positive sign for the U.S growth rate

12

Portfolio Inflows in East Asia

	1995	1996	1997	2000	2001	2002	2003
Japan	59,790	66,790	79,190	47,386	60,502	-20,043	81,181
Korea	14,619	21,514	13,308	12,697	12,227	5,378	22,652
HongKong	n.a.	n.a.	n.a.	46,507	-1,160	-1,083	1,385
Indonesia	4,100	5,005	-2,632	-1,910	-243	1,221	2,251
Malaysia	-435	-268	-247	-2,145	-665	-836	1,174
Philippine	2,619	5,126	600	1,019	997	1,571	880
Singapore	-239	1,026	-457	-1,832	471	-762	362
Thailand	4,082	3,585	4,597	-545	-525	-694	258
Total	**84,536**	**102,778**	**94,359**	**101,177**	**71,604**	**-15,248**	**120,713**

Unit : Million US dollar

13

Equity Inflows in East Asia

year	2000	2001	2002	2003
Japan	– 1,285	39,100	– 16,689	87,775
Korea	13,093	10,265	3,953	14,213
Hong Kong	46,975	– 855	1,391	5,770
Indonesia	– 1,021	442	876	1,130
Malaysia	n.a.	n.a.	– 55	1,339
Philippine	– 183	383	404	457
Singapore	– 1,835	446	– 815	303
Thailand	900	351	538	1,193
Total	56,644	50,132	– 10,397	112,180

Unit : Million US dollar

14

Debt Inflows in East Asia

year	2000	2001	2002	2003
Japan	48,672	21,401	– 3,354	– 6,593
Korea	– 336	1,961	4,982	8,439
Hong Kong	– 467	– 305	– 2,474	– 4,384
Indonesia	– 889	– 685	345	1,120
Malaysia	n.a.	n.a.	– 780	– 165
Philippine	1,202	614	1,167	423
Singapore	3	25	53	59
Thailand	– 1,446	– 876	– 1,233	– 935
Total	46,679	22,135	– 1,294	– 2,036

Unit : Million US dollar

15

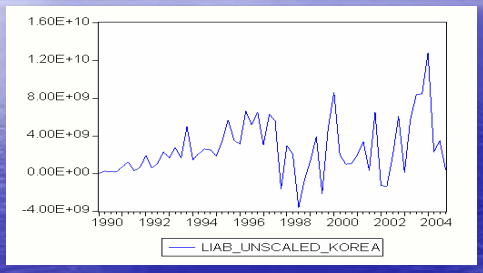
Portfolio Flows in East Asia

<1990년 ~ 2004년>

	Japan	Korea	Hong Kong	Malaysia	Philippine	Singapore	Indonesia	Thailand
Mean	15.30	2.66	4.52	-0.17	0.41	0.08	0.21	0.34
SD	24.60	2.99	8.27	0.77	0.71	0.57	1.20	0.74
<1990년 ~1997년>								
Mean	14.00	2.46	N.A	N.A	0.32	0.03	0.46	0.66
SD	19.30	2.17	N.A	N.A	0.55	0.39	1.33	0.82
<1998년 ~2004년>								
Mean	17.00	2.88	4.52	-0.17	0.51	0.10	-0.02	-0.02
SD	30.10	3.74	8.27	0.77	0.87	0.64	1.03	0.42

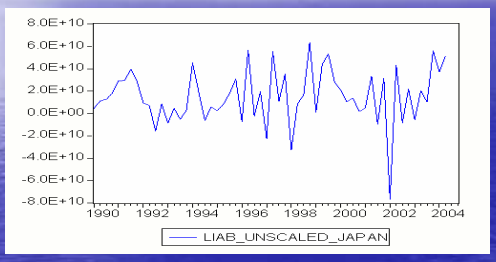
16

Portfolio Flows in Korea



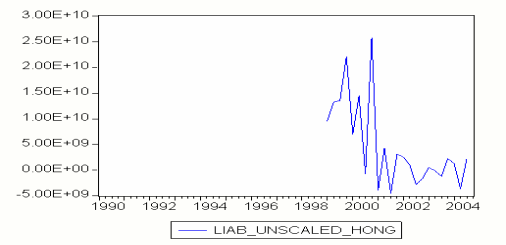
17

Portfolio Flows in Japan



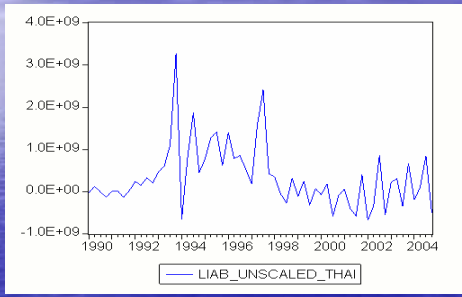
18

Portfolio Flows in Hong Kong



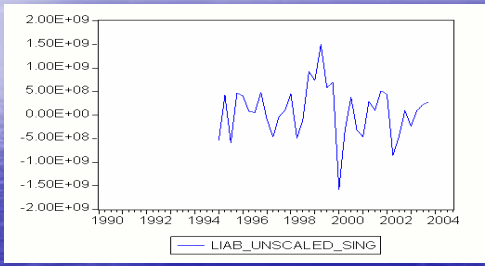
19

Portfolio Flows in Thailand



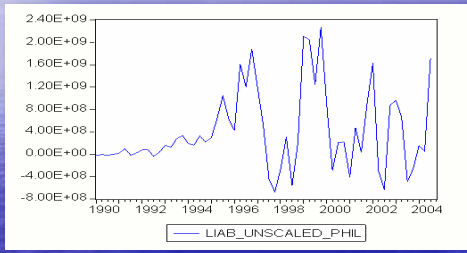
20

Portfolio Flows in Singapore



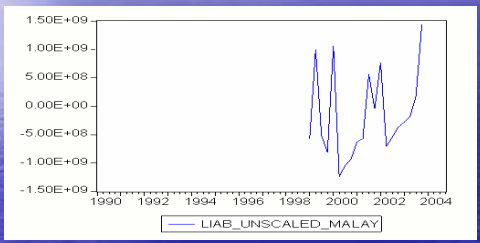
21

Portfolio Flows in Philippine



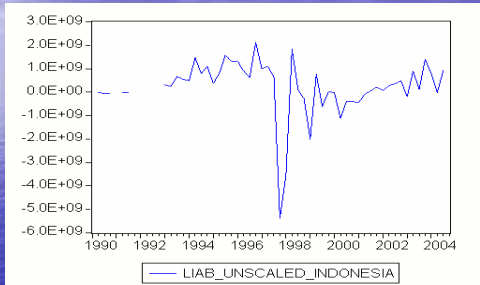
22

Portfolio Flows in Malaysia



23

Portfolio Flows in Indonesia



24

Testable Model

$$Y_{it} = a_i + X_{it}\, b + u_{it} \quad \cdots.(1)$$

where Y_{it} is net portfolio inflow,
X_{it} is a set of explanatory variables,
a_i is the country specific constant and u_{it} is the random disturbance.

25

Testable Model

Panel Estimation :

$$Y_{it} = a_{it} + x_{it}\, c + z_t\, d + u_{it} \quad \cdots.(2)$$

Country Estimation :

$$Y_{it} = a_{it} + x_{it}\, c + z_t\, d + Y_{it-1} + u_{it} \quad \cdots.(3)$$

Where x_{it} is a set of country specific factors and z_t is global factors.

26

Variables

- Dependant variable : (Portfolio Inflows/ current price GDP)
- Global factors : U.S. GDP growth rate, U.S. nominal or real interest rates
- Domestic factors : Country's GDP growth rate, country's real or nominal interest rates, exchange rate, exchange rate volatility

27

Data I (from IFS)

- 1990 – 2004 Quarterly Data : Two sub periods : 1990– 1997, 1998 – 2004
- Portfolio = Equity + Debt
- Debt = Bond + Notes + Financial derivatives
- Group : Japan, Korea, Indonesia, Philippine, Thailand, Hong Kong, Singapore, Malaysia

28

Data II (from IFS)

- Portfolio investment= equity + debt
- Portfolio investment inflow= portfolio liability
- Equity inflows = equity liability
- Debt inflows = debt liability

29

Methodology

- Panel Stationary test
- Panel regression : Fixed effect model
- Correlation Analysis
- Country regressions

30

Panel Stationary Test

- Levin, Lin and Chu (2002) : Panel Unit Root Test
- $Y_{it} = ry_{it-1} + X_{it}\, a_i + e_{it}$

Where i=1,2,...N and t= 1,2...Ti
X_{it} : exogenous variables including fixed effect
r_i : autoregressive coefficient
e_{it} : iid

If $|r_i| < 1$: y_{it} is weakly (trend) stationary
If $|r_i| = 1$: y_{it} contains a unit root

31

Panel Regression

- Panel Estimation : Zellner's SUR (Seemingly Unrelated Regression) Method.
- Pooled OLS vs. Fixed Effect Model : Fixed Effect Model (F-Test).
- Fixed Effect Model vs. Random Effect Model : Hausman Specification Test (Chi-Square Test) : Fixed Effect Model.

32

Panel Unit Root Test

	Ho : Unit Root (Levin, Lin and Chu)
Portfolio flow/GDP	-9.4518**
dlog(USGDP)	-3.0738**
log(usint)	-2.4977*
dlog(GDP)	-3.6926**
log(int)	-1.9537**
dlog(EX)	-14.6411**

33

Portfolio Flows (Panel Estimation)

- Both global and country specific factors are important.
- U.S. GDP Growth rate is very significant factor with positive sign.
- Difference between Asian country's and U.S. interest rates is also important variable with expected positive sign.
- Domestic GDP growth rate is significant, while it is not significant when we exclude Japan.
- Significant negative relationship between depreciation rate of domestic currency and portfolio flows after the crisis period.
- Increased exchange rate risk does not reduce portfolio inflows.

34

Panel Estimation Results 1-1 (Portfolio Flows)

	1990 I-2004 IV	1990 I-1997 II	1998 I-2004 IV
C	-0.0036 (-0.4408)	-0.0001 (-0.0237)	-0.0003 (-0.0254)
USGDP	0.6992** (3.2573)	0.2668* (1.8242)	0.8952** (2.6581)
INT/USINT	0.0177** (2.9980)	0.0003 (0.1341)	0.0358** (3.1982)
GDP	0.1085* (1.9354)	0.1778** (1.9894)	0.1434* (1.9107)
dEX	-0.0697** (-2.8149)	0.0234 (0.4693)	-0.0714** (-2.0991)

•USGDP= USGDP growth rate, INT=Asian Countries nominal interest rate, USINT= U.S. nominal interest rate, GDP= Asian Countri es GDP growth rate, dEX=dlog(EX)

35

Panel Estimation Results 1-2 (Portfolio Flows)

	1990 I-2004 IV	1990 I-1997 II	1998 I-2004 IV
C	-0.0143 (-1.2043)	0.0145 (1.4322)	-0.0109 (-1.2740)
USGDP	0.7950** (2.4873)	0.2214* (1.8723)	0.6154** (2.8445)
INT/USINT	0.0319** (2.6531)	-0.0166 (-1.3489)	0.0254** (2.5114)
GDP	0.1179 (1.4629)	0.1421* (1.6378)	0.1124* (1.8040)
dEX	-0.1080** (-4.0141)	-0.0049 (-0.1053)	-0.0937** (-4.3997)
Exchange rate Risk	0.0487** (3.1994)	-2.1490 (-1.5452)	0.0458** (3.3742)

* Exchange risk is estimated by GARCH-M (1,1) or GARCH(1,1).

36

Panel Estimation Results 2* (Portfolio Flows)

	1990 I–2004 IV	1990 I–1997 II	1998 I–2004 IV
C	−0.0257** (−2.3960)	0.0206 (1.3627)	−0.0322** (−2.3119)
USGDP	0.9209** (3.7848)	0.4547** (2.4549)	1.2091** (3.4975)
INT/USINT	0.0412** (2.9782)	−0.0433* (−1.8273)	0.0442** (3.0591)
GDP	0.0779 (1.3888)	0.1043 (1.1428)	0.0580 (0.7974)
dEX	−0.0757** (−2.5385)	0.0645 (0.6611)	−0.0783** (−2.0654)

* Japan is excluded.

37

Correlation between portfolio inflows and U.S. GDP growth rate

	1990 I–2004 IV	1990 I–1997 IV	1998 I–2004 IV
Japan	0.02	− 039	0.44
Korea	0.22	0.31	0.16
Hong Kong	0.40	n.a.	0.31
Indonesia	− 018	n.a.	− 005
Malaysia	− 001	n.a.	0.04
Philippine	0.11	0.18	0.11
Singapore	0.21	− 008	0.30
Thailand	0.26	0.07	0.22

38

- Equity Flows (Panel Estimation)
  - Both global and country specific factors are important.
  - Positive significant sign of U.S. GDP growth rate.
  - Expected positive significant sign of interest rate difference.
  - Domestic GDP growth rate is important while it is insignificant when we exclude Japan.
  - Exchange rate depreciation is insignificant since the crisis.

39

Panel Estimation Results 3 (Equity Flows)

	1990 I–2004 IV	1990 I–1997 II	1998 I–2004 IV
C	0.0018 (0.1005)	0.0089* (1.8455)	0.0490 (1.6049)
USGDP	1.1780** (3.0327)	0.0369 (0.4837)	1.6958** (2.8247)
INT/USINT	0.0212** (3.0908)	0.0002 (0.2648)	0.0460** (3.2208)
GDP	0.3184 (1.5957)	−0.0897 (−1.1845)	0.3763* (1.7000)
dEX	0.0752 (1.3962)	0.0385** (1.9612)	0.1368 (1.5179)

40

Panel Estimation Results 4* (Equity Flows)

	1990 I–2004 IV	1990 I–1997 II	1998 I–2004 IV
C	−0.0467* (−1.8676)	−0.0126 (−0.6012)	−0.0454 (−1.4865)
USGDP	2.1166** (3.7881)	0.1708 (1.2345)	3.3666** (3.8386)
INT/USINT	0.0552** (3.2543)	0.0252 (1.3138)	0.0587** (3.4488)
GDP	0.3800* (1.8413)	0.0552 (0.3613)	0.2375 (0.9945)
dEX	0.0466 (0.5866)	0.1310 (1.5793)	0.1120 (0.8045)

*Japan is excluded

41

- Debt Flows (Panel Estimation)
  - Global factors are not important in both sub periods
  - Current account imbalance is important during the both sub-periods.
  - Exchange rate depreciation is significant with expected negative sign since the crisis.
  - When we exclude Japan, U.S. growth rate is significant with positive sign before the crisis.

42

Panel Estimation Results 5 (Debt Flows)

	1990 I–2004 IV	1990 I–1997 II	1998 I–2004 IV
C	0.0061 (1.4973)	0.0030 (0.4721)	0.0054 (0.8677)
USGDP	0.0083 (0.9224)	0.0889 (1.3152)	0.0723 (0.4032)
INT/USRINT	0.0004 (0.2041)	−0.0002 (−0.0328)	0.0008 (0.2783)
GDP	−0.0324 (−0.5943)	0.0352 (0.4607)	− 0.0355 (−0.4995)
CUR(−1)	−0.2286** (−4.0018)	−0.2405** (−2.5859)	−0.2018* (−1.7788)
dEX	−0.0467** (−2.5277)	−0.0129 (−0.6111)	−0.0532* (−1.7117)

* CUR = current account/GDP

Panel Estimation Results 6* (Debt Flows)

	1990 I–2004 IV	1990 I–1997 II	1998 I–2004 IV
C	0.0090 (1.3350)	0.0274 (1.3074)	0.0073 (0.7906)
USGDP	0.1888 (1.1908)	0.2529** (2.1482)	0.1297 (0.4422)
INT/USRINT	0.0005 (0.1251)	−0.0333 (−1.5944)	0.0009 (0.2113)
GDP	−0.0602 (−0.9138)	−0.0586 (−0.4411)	− 0.0524 (−0.6213)
CUR(−1)	−0.2603** (−3.8540)	−0.1309** (−0.9731)	−0.2213* (−1.6074)
dEX	−0.0809** (−2.4556)	−0.0168 (−0.1834)	−0.0675 (−1.3318)

*Japan is excluded

- Korean case

(Portfolio Flows)
- U.S. growth rate is significant factor with positive sign during both sub-periods.
- Since the crisis, the interest rate difference is important.

(Equity Flows)
- During the whole period, the Korean stock price index is significant, while U.S. growth rate is important since the crisis.

(Debt Flows)
- During the whole period, U.S. growth rate, interest rate difference and current account are significant.
- During the pre-crisis period, U.S. growth rate is significant with positive sign and
- Since the crisis, interest rate difference is important factor.

Korea (Portfolio Flows)

	1990 I–2004IV	1990 I–1997 II	1998 I–2004 IV
C	−0.0091 (−0.8556)	0.0200 (0.6036)	−0.0153 (−0.9143)
USGDP	0.3767* (1.8557)	0.3704* (1.6126)	0.3756 (1.0610)
KINT/USINT	0.0215** (1.9936)	−0.0168 (−0.5600)	0.0294* (1.9408)
KGDP	0.1510** (2.1887)	−0.0123 (−0.0522)	0.1340 (1.4563)
dEX	0.0184** (0.3857)	0.1739 (1.3650)	0.0584 (0.8291)
Portfo(−1)	−0.0107 (−0.0782)	0.1344 (0.6309)	−0.0495 (−0.2593)

Korea (Equity Flows)

	1993 I–2004IV	1993 I–1997 II	1998 I–2004 IV
C	0.0023 (0.2608)	0.0200* (2.1949)	0.0031 (0.2636)
USGDP	0.2809 (1.4526)	−0.3247* (−2.0399)	0.4726* (1.8562)
KINT/USINT	0.0055 (0.6744)	0.0007 (0.0596)	0.0004 (0.0428)
KSTOCK	0.0348** (2.0239)	0.0685** (4.5267)	0.0123 (0.5240)
dEX	0.0255 (0.6820)	0.2659** (4.4393)	0.0563 (1.1087)

KSTOCK = Rate of change of Korean stock index

Korea (Debt Flows)

	1990 I–2004IV	1990 I–1997 II	1998 I–2004 IV
C	0.0016 (0.2719)	0.0225 (1.0560)	−0.0185* (−1.7382)
USGDP	0.2415** (2.0320)	0.2520** (2.1799)	−0.2776 (−0.8669)
KINT/USINT	0.0106* (1.7376)	−0.0272 (−1.2607)	0.0307** (3.1362)
KGDP	−0.0435 (−0.9186)	−0.0410 (−0.3101)	0.0941 (1.0700)
KCUR	−0.2406** (−4.9836)	−0.1574 (−1.2990)	0.1140 (0.7130)
dEX	0.0089 (0.3234)	0.0079 (0.1074)	−0.0176 (−0.4240)

KCUR= Korea's current account/GDP

- Japan
  - During the pre-crisis period, global factor such as U.S. growth rate is important, while domestic factors (domestic growth rate and exchange rate) are significant since the crisis.
  - U.S. growth rate has negative sign.

49

Japan (Portfolio Flows)

	1990 I-2004IV	1990 I-1997 II	1998 I-2004 IV
C	0.0023 (1.3533)	0.0095 (0.6036)	0.0016 (-0.9143)
USGDP	-0.0011 (-0.0235)	-0.1875** (-2.3155)	0.0953 (1.1515)
JINT/USINT	-0.0001 (-0.2175)	-0.0064 (-0.9357)	0.0008 (0.7056)
JGDP	0.0982** (2.4412)	-0.0011 (-0.0133)	0.1238** (2.2592)
dEX	-0.0234 (-1.5452)	-0.0018 (-0.0834)	-0.0585** (-2.5609)
Portfo(-1)	-0.0961 (-0.6793)	-0.1245 (-0.5597)	-0.3766* (-1.9952)

50

(Hong Kong, Malaysia and Thailand)

- U.S growth rate and interest rate difference are important.
- U.S. growth rate has positive sign.

(Singapore)

- During the whole period, U.S. growth rate, interest rate difference, domestic growth rate and exchange rate are significant while U.S. growth rate is important since the crisis.

51

Hong Kong (Portfolio Flows)

	1998 I-2004 IV
C	-0.0494 (-0.9112)
USGDP	12.0617** (4.1145)
HINT/USINT	0.1182** (4.8465)
HGDP	-0.4447 (-0.5925)
dEX	14.4519 (0.7104)
Portfo(-1)	-0.5110** (-2.3867)

52

Thailand (Portfolio Flows)

	1993 I-2004IV	1998 I-2004 IV
C	-0.0349** (-3.0565)	-0.0206* (-1.7824)
USGDP	0.5792** (2.7156)	0.4453** (2.1869)
TINT/USINT	0.0654** (3.2935)	0.0191 (0.8527)
TGDP	0.0919* (1.9252)	0.0272 (0.5034)
dEX	0.0799* (1.8280)	-0.0085 (0.1705)
Portfo(-1)	-0.2096 (-1.5518)	-0.3894* (-1.9285)

53

Malaysia (Portfolio Flows)

	1998 I-2004 IV
C	-0.0319 (-1.4090)
USGDP	2.0025* (1.9938)
MINT/USINT	0.0330 (1.3004)
MGDP	-0.8625* (-1.8992)
dEX	-0.1687 (-0.2125)
Portfo(-1)	-0.1747 (-0.7013)

54

Singapore (Portfolio Flows)

	1994 I–2004IV	1998 I–2004 IV
C	−0.0349 (0.6036)	−0.0206 (−1.7824)
USGDP	0.5792** (2.7156)	0.4453** (2.1869)
SINT/USINT	0.0654** (3.2935)	0.0191 (0.8527)
SGDP	0.0919* (1.9252)	0.0272 (0.5034)
dEX	0.0799* (1.8260)	0.0085 (0.1705)
Portfo(−1)	−0.2096 (−1.5518)	−0.3894* (−1.9285)

55

Conclusion

- Both global and country specific factors are important in East Asia (in the case of portfolio flows and equity flows).
- Positive relationship between U.S. growth rate and portfolio flows.
- Domestic GDP growth rate is significant, while it is not significant when we exclude Japan.
- Significant negative relationship between depreciation rate of domestic currency and portfolio flows after the crisis period.
- High exchange rate risk does not reduce portfolio inflows.

56

- Asymmetric behavior between equity and debt Flows.
  - U.S. growth rate, interest rate difference and domestic growth rate are important for the equity, while current account imbalance and exchange rate are important for the debt.

57

- Asymmetric behavior between pre and post crisis
  - Since the crisis, interest rate difference has the expected positive sign, while it is insignificant or negative signs.
  - Domestic growth rate has significant since the crisis, while it is insignificant.
  - Exchange rate depreciation also significant since the crisis.

58

(Korea)

- Asymmetric behavior between pre and post crisis periods.
- U.S. growth rate is significant with positive sign while interest rate difference is important since the crisis.
- Asymmetric behavior between equity and debt flows.
- U.S. growth rate and Korean stock price index are important in the case of equity, while current account and interest rate difference are more significant.

59

(Japan)

- During the pre-crisis period, global factor such as U.S. growth rate is important, while domestic factors (domestic growth rate and exchange rate) are significant since the crisis.
  - U.S. growth rate has negative sign.

60

(Hong Kong, Malaysia, Singapore and Thailand)

- U.S. growth rate and interest rate difference are important.
- U.S. growth rate has positive sign.
- Most of the countries have maintained U.S. dollar pegged exchange rate regime in practice.

61

Thank you!

62