

# Systemically Important Financial Institutions and Macro-prudential Regulation in Korea

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# Contents

**I. Introduction**

**II. Methodology**

**III. Inter-institutional capital flows analysis**

**IV. Identify Systemically Important Financial Institutions  
and Macro-prudential Regulation**

**V. Conclusion**

# I. Introduction

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# 1. Discussions for SIFIs

- ❖ **The global financial crisis put a spotlight on concerns about financial system stability.**
- ❖ **Currently, there are discussions about how to define systemically important financial institutions (SIFI) and how to strengthen regulatory measures for these SIFIs.**
- ❖ **In particular, as seen in the recent financial crisis, we know that inter-institutional (from whom to whom) capital flows are very important and that the interconnectedness and size of financial institutions are critical factors that define SIFIs**
- ❖ **Interconnectedness can be measured by the size of the inter-institutional transactions which can be obtained from information on transactions carried out by numerous financial institutions.**

## 2. Three Assessment Criteria for SIFIs

<i>Size</i>	The importance of a single component for the working of the financial system generally increases with the amount of financial services that the component provides
<i>Lack of substitutability</i>	The systemic importance of a single component increases in cases where it is difficult for other components of the system to provide the same or similar services in the event of a failure.
<i>Interconnectedness</i>	Systemic risk can arise through direct and indirect inter-linkages between the components of the financial system so that individual failure or malfunction has repercussions around the financial system, leading to a reduction in the aggregate amount of services.

Source: Guidance to Assess the Systemic Importance of Financial Institutions, Markets and Instruments: Initial Considerations

## II. Methodology

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# 1. Flow of Funds Table (1)

- ❖ **This study utilizes the flow of funds (FOF) table which systematically records various financial activities that occur within the national economy .**
- ❖ **The FOF table only records the amount of a transaction or the outstanding amount of financial assets and liabilities held by a financial institution.**
- ❖ **It is difficult to directly observe inter-institutional financial transactions and their capital flows or transmission effect in this table.**
- ❖ **Therefore, this paper first estimates the inter-institutional FOF matrix by applying the input output technique to the FOF analysis, and then analyzes the inter-institutional capital flows based on that estimation**

## 2. Flow of Funds Table (2)

- ❖ **Similar to input-output methods, the financial structure of the FOF treats a source of funds as a necessary input for a specific use of funds.**
- ❖ **The amount of each input (source of funds) requires a corresponding per unit of each output (use of funds) because a use of funds in one institution is equal to a source of funds in another institution.**
- ❖ **By definition of the equality of savings and investment, the total use of funds should be equal to the total source of funds for any given time.**
- ❖ **This duality enables the FOF accounts to be transformed into the inter-institutional FOF matrix, which summarizes the inter-dependence by utilizing the linear fixed relationships.**



### 3. inter-institutional coefficient FOF matrix

- ❖ Subsequently an inter-institutional coefficient FOF matrix ( $c$ ) is converted from the asset matrix and the liability matrix by using the formulas below, which are frequently utilized for input-output analysis based on the institutional sector portfolio assumption.

$$c_{ij} = \sum_{k=1}^n e_{ik} l_{kj} \quad c_{ij} t_i = C_{ji}$$

- ❖ Where  $e_{ik}$  stands for the institution  $i$ 's share of a financial instrument  $k$  in its total assets,  $l_{kj}$  stands for the institution  $j$ 's share of a financial instrument  $k$  in its fundraising portfolio. The inter-institutional FOF coefficient matrix indicates the ratio of fund-raising and asset-allocation between economic institutions.
- ❖ If the inter-institutional relationship between the sources and uses of funds in economic institutions exists under two assumptions - equilibrium in ex-ante sense is reached, and the relationships are in fact approximately linear - then the coefficient matrix will be unique and valid for any given vector corresponding to the use of funds.

# 4. Inter-institutional Financial Transaction Matrix



- ❖ Financial sectors and real sectors are used in the below table to analyze the pattern of the inter-institutional financial transactions. The columns indicate the amount of funds raised from an institution (i) to the other institution (j) while the rows show the amount of asset-management from an institution (i) to the other institution (j)

		Financial Sector (FS)							Real Sector (RS)					Total Asset Allocation
		CB	BANK	NBANK	INS	PENS	OFI	FLAUX	Sub Total	GOV	Firm	HH	ROW	
F S	CB													
	Bank													
	NBank													
	INS													
	PENS													
	OFI													
	FLAUX													
	sub-total							1)					2)	
R S	GOV													
	Firm													
	HH													
	ROW													
		sub-total							3)					4)
	Total Fund Raising													5)

# 5. Inter-institutional Financial Transaction Matrix

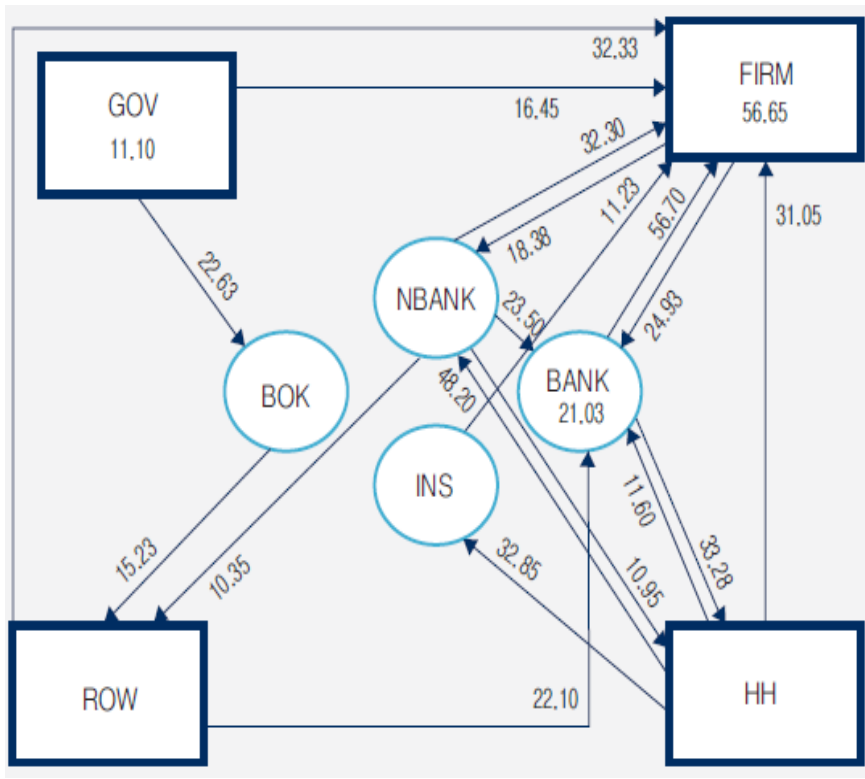
- ❖ **CB: Central Bank, NBANK: Non-bank, INS: Insurance, PENS: Pension, OFI: Other Financial Intermediaries, FIAUX: Financial Auxiliaries, GOV: Government, HH: Household, ROW: Rest of the World**
- ❖ **1) Financial transactions within the financial sector (FTWFS): The total amount of financial transactions between financial institutions.**
- ❖ **2) Asset allocation of the financial sector (AAFS): The total amount of funds the financial sector allocated to the real sector.**
- ❖ **3) Fund raising of the financial sector (FRFS): The total amount of funds the financial sector raised from the real sector.**
- ❖ **4) Financial transactions within the real sector (FTWRS): The total amount of financial transactions within the real sector.**
- ❖ **5) The total amount of all financial transactions (Grand Total) = The sum of 1 to 4.**

## III. Inter-institutional Capital Flows Analysis

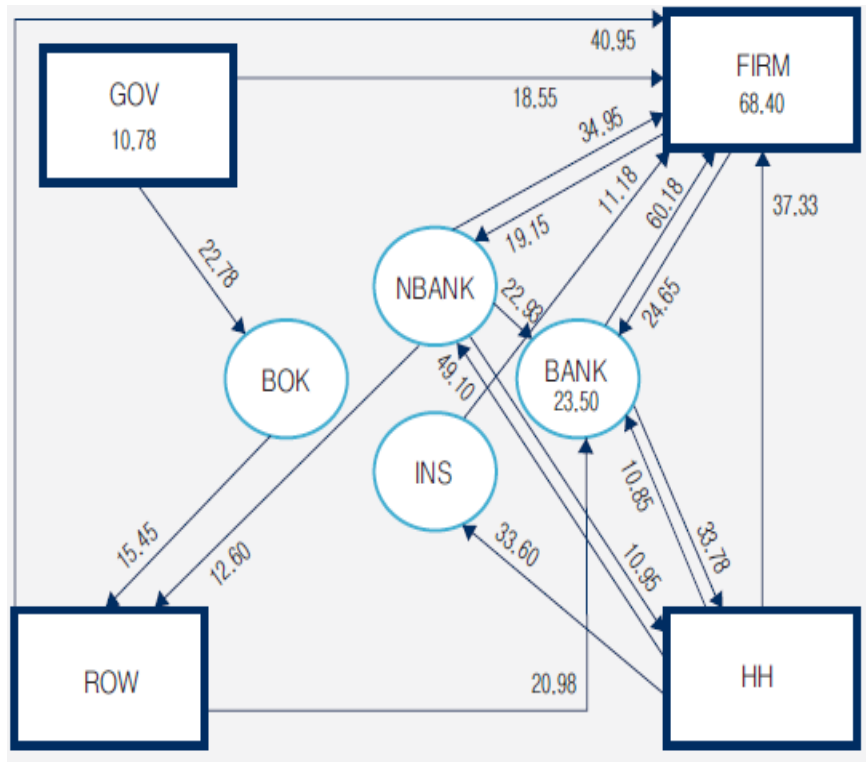
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# 1. The annual average amount of capital flows during 2004-2007 (10 trillion won)

market value



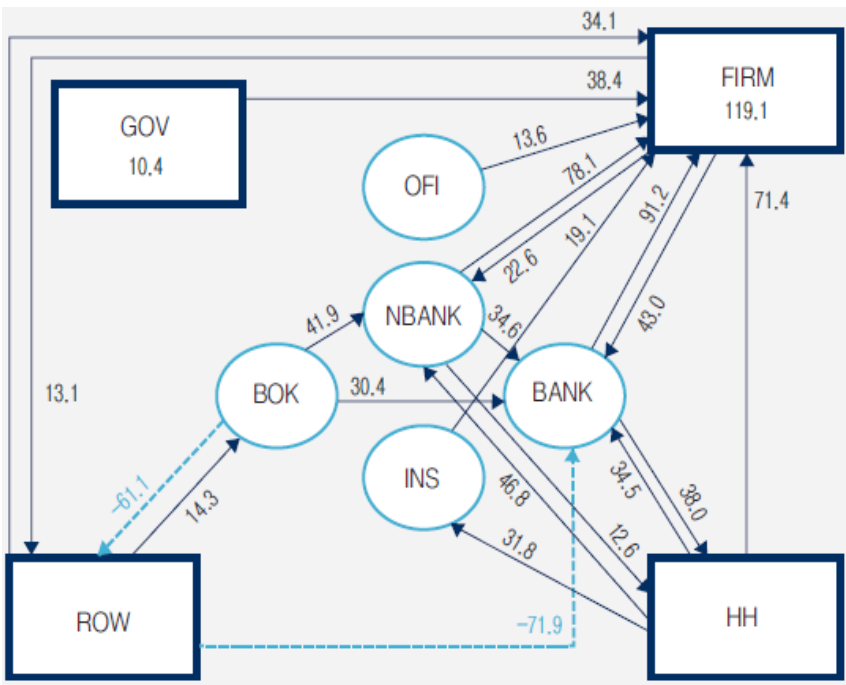
book value



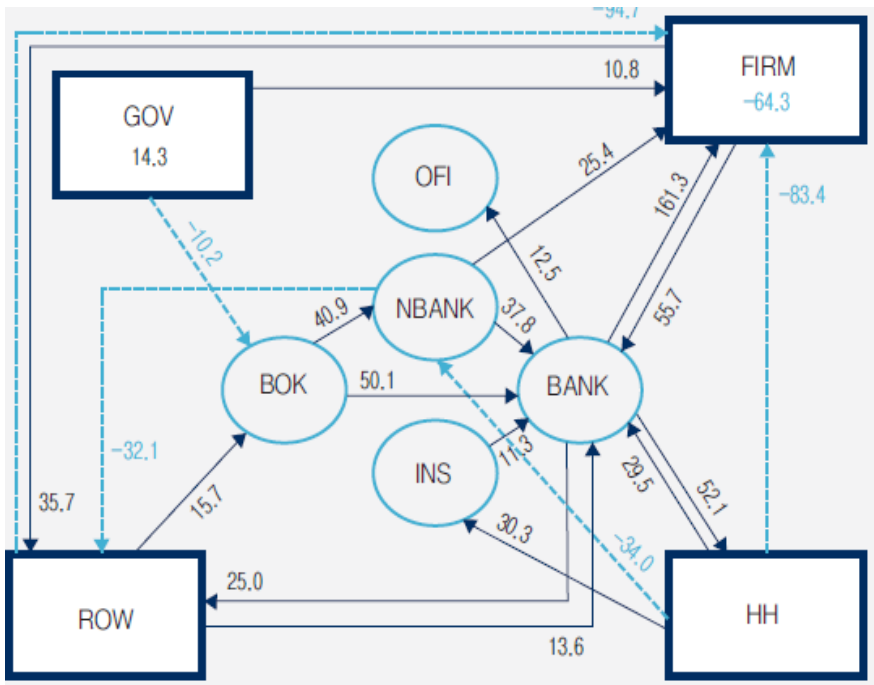
- ❖ **For the annual average of capital flows during 2004 to 2007, the bank sector borrowed 22.1 (20.98) trillion won and the firm sector borrowed 32.33 (40.95) trillion won respectively from overseas.**
- ❖ **Meanwhile, the household sector allocated 48.2 (49.1) trillion won to the non-bank sector and 11.6 (10.8) trillion won to the bank sector because the household sector preferred equity funds to bank deposits during this period.**
- ❖ **Consequently, capital flows shifted to the non-bank sector which includes asset management companies (mainly investment trust companies). Out of the capital which went to the non-bank sector, 10.35 (12.6) trillion won was invested in overseas assets during the overseas fund boom while the bank sector borrowed 22.1 (20.98) trillion won from overseas.**
- ❖ **In addition, the household sector allocated 32.85 (33.6) trillion won annually to the insurance sector from 2004 to 2007.**

# 2. The annual average amount of capital flows during 2008 (10 trillion won)

market value



book value



- ❖ **As for changes in inter-institutional capital flows, 34.5 trillion won was injected to the bank sector due to fund redemption and investors' preference over safe assets, and 71.9 trillion won flowed out of the bank sector to overseas.**
- ❖ **In response to the global financial crisis, the Bank of Korea injected 41.9 (40.9) trillion won to the non-bank sector and 30.4 (50.1) trillion won to the bank sector.**
- ❖ **Meanwhile, households allocated 38 (52.1) trillion won to the bank sector and 12.6 trillion won to the non-bank sector in 2008.**





- ❖ **As the crisis subdued in 2009, the Bank of Korea decreased its asset allocation to the bank sector by 20.2 (24) trillion won and to the non-bank sector by 36.7 (35.4) trillion won respectively.**
- ❖ **On the other hand, financial transactions within the bank sector and the non-bank sector increased by 99.6 trillion won and 20.1 trillion won respectively.**
- ❖ **Financial transactions between the Bank of Korea and overseas also increased to 164.7 (62.5) trillion won, and transactions between the household sector and other financial institutions such as credit specialized financial institutions went up because of increasing consumer financing.**
- ❖ **In general, the size of financial transactions has increased and become more complicated compared with the pre-crisis situation.**

## **IV. Identify Systemically Important Financial Institutions and Macro-prudential Regulation**

# 1. Methodology for Identifying SIFIs

- ❖ **The biggest advantage of the input output analysis is what helps analyze the effect of one sector's demand on another sector's demand by using the Leontief inverse matrix.**
- ❖ **Likewise, converting the FOF table into a square matrix enables us to analyze the effect of a specific institution's financing demand on other institution's financing demand**
- ❖ **Through the analysis, we attempt to propose a new method to identify which financial institution exerts a bigger transmission effect than others as a systemically important financial sector**

$$c_{ij}t_j + \varepsilon_j = t_j$$

$$t_j = (1 - c_{ij})^{-1} \varepsilon_j$$

$$\Gamma = (I - c)^{-1} = \begin{bmatrix} \gamma_{11} & \dots & \gamma_{1m} \\ \vdots & \dots & \vdots \\ \gamma_{m1} & \dots & \gamma_{mm} \end{bmatrix}$$

The total assets (liabilities) of an institution  $j$ ,  $t_j$  consists of inter-institutional transactions ( $c_{ij} = c_{ij}t_j$ ) and excessive liabilities ( $\varepsilon_j$ ). By solving the equation for  $t_j$ , we can obtain the Leontief inverse matrix of the FOF version,  $(1 - c_{ij})^{-1}$ , which shows the direct and indirect impact that one unit of extra financing demand from one institution imposes on other institutions' demand.

## 2. PDI and SDI

- ❖ **The power-of-dispersion index (PDI) indicates the direct as well as indirect financing demand in total induced by one unit of shock, which is an extra financing demand from a certain institutional sector (j).**

$$\omega_j^C = \frac{\sum_{i=1}^m \gamma_{ij}}{\frac{1}{m} \sum_{j=1}^m \sum_{i=1}^m \gamma_{ij}}$$

- ❖ **The sensitivity-of-dispersion index (SDI) indicates the direct as well as indirect financing demand from a certain institutional sector (i) induced by one unit of shock, which means an extra financing demand from all of each institutional sector**

$$\omega_i^C = \frac{\sum_{j=1}^m \gamma_{ij}}{\frac{1}{m} \sum_{j=1}^m \sum_{i=1}^m \gamma_{ij}}$$

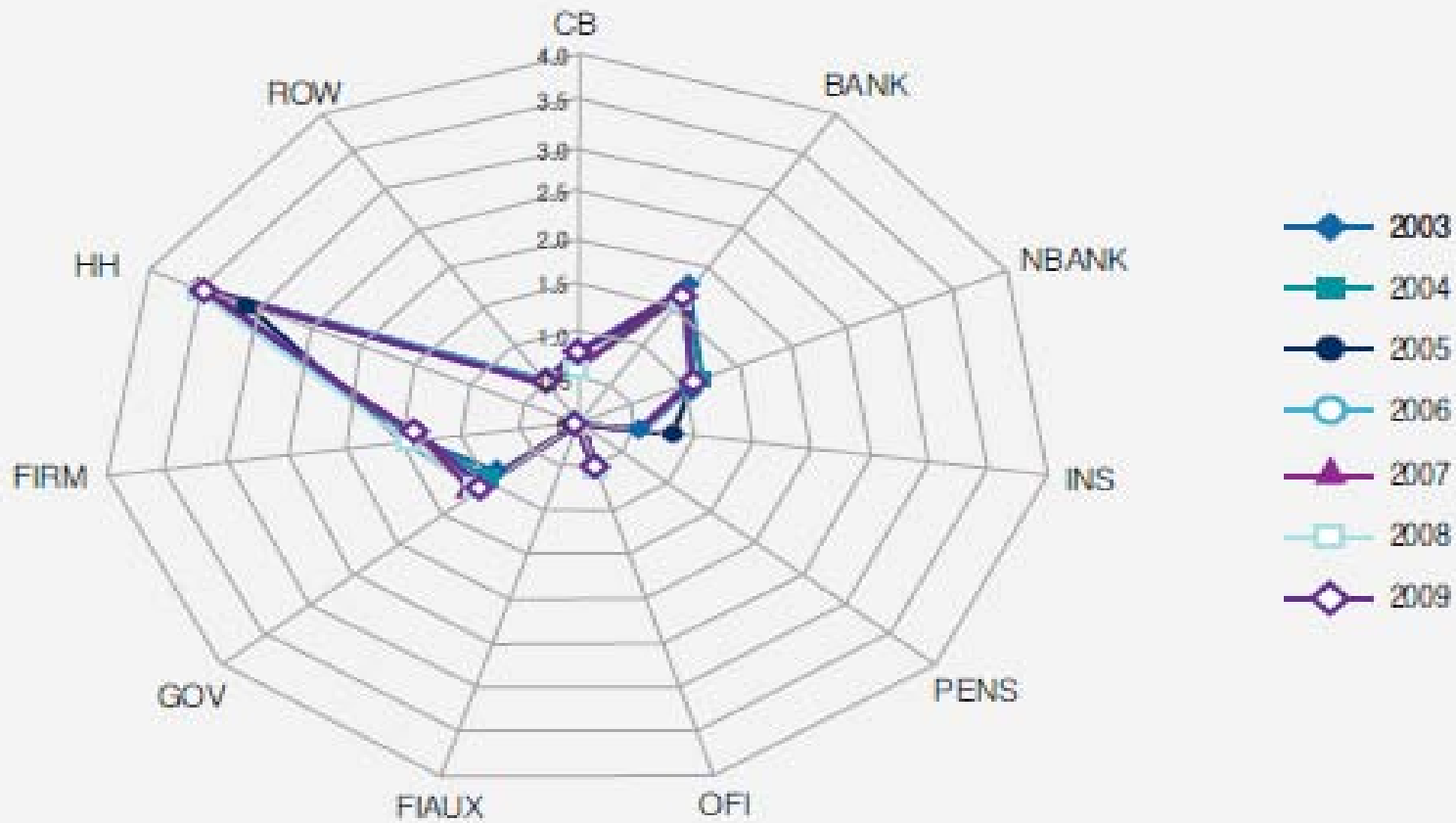
# 3. Power-of-dispersion index in liability

Figure 6. Power-of-dispersion index in liability



# 4. Sensitivity-of-dispersion index in liability

Figure 7. The sensitivity-of-dispersion index in liability



# 5. Rank of Systemically Important Institutions



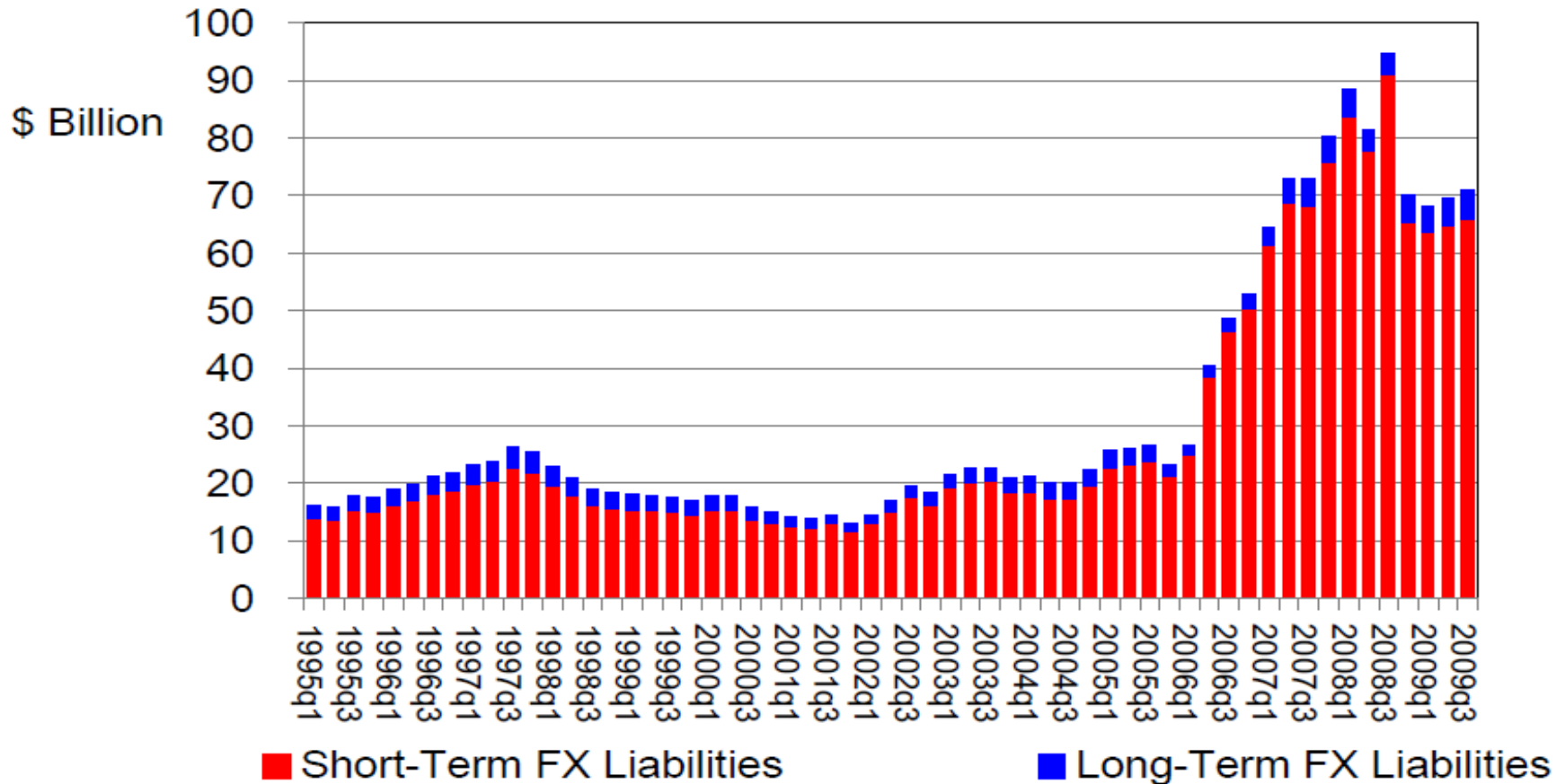
Year	Inter-connectedness								Size			
	SDI				PDI				Total Liabilities			
	02	03	08	09	02	03	08	09	02	03	08	09
HH	1	1	1	1	20	20	20	19	3	3	3	3
Firm	2	2	2	2	2	3	4	3	1	1	1	1
Bank	3	3	3	3	12	12	8	8	2	2	2	2
GOV	4	4	5	5	21	21	21	21	11	11	10	10
ROW	5	5	4	4	15	16	11	13	5	4	4	4
SPBank	6	6	6	7	13	14	9	11	4	5	5	6
INS	7	7	7	6	19	19	17	18	6	6	6	5
INVINS	8	10	9	9	9	10	12	14	7	9	8	9
MFI	10	9	10	10	17	17	14	16	8	7	9	7
CB	9	8	8	8	11	13	13	12	10	8	7	8
Trust	11	11	13	13	8	7	3	4	12	12	14	14
CSI	12	16	14	15	1	1	2	2	13	16	15	16
OFI	13	14	17	17	4	5	6	7	14	13	17	18
PFI	14	15	15	14	10	11	15	15	9	10	13	11
FBB	16	12	11	12	5	2	1	1	16	14	11	12
SECU	15	13	12	11	6	9	5	5	15	15	12	13
ODI	17	17	16	16	16	15	10	9	17	17	16	17
PENS	18	18	19	19	18	18	16	17	18	18	19	19
FIAUX	19	19	20	20	3	4	19	20	19	19	21	21
BHC	20	20	18	18	14	6	18	6	20	20	18	15
MUTUAL	21	21	21	21	7	8	7	10	21	21	21	21



- ❖ **CB: Central Bank, NBANK: Non-bank, INS: Insurance, MFI: Micro Finance Institution, PENS: Pension, OFI: Other Financial Intermediaries, FIAUX: Financial Auxiliaries, GOV: Government, HH: Household, ROW: Rest of the World, BHC: Bank Holding Company, MUTUAL: Mutual Fund, SECU: Securities Company, FBB: Foreign Bank Branch, CSI: Credit Specialized Institution, TRUST: Trust Company, PFI: Public Finance Institution, SPBank: Special Bank, INVINS: Investment Institution, ODI: Other Depository Institution**

# 6. FX Liabilities of FBB in Korea (1)

FX Liabilities of Foreign Bank Branches in Korea



# 7. FX Liabilities of FBB in Korea (2)

- ❖ **Foreign bank branches in Korea played an important role in channeling foreign currency funding to local borrowers.**
- ❖ **Figure shows the foreign currency liabilities of the foreign bank branches in Korea. Foreign bank branches raise funding either from their headquarters through the interoffice account or by borrowing unsecured in the interbank market.**
- ❖ **They then enter the currency swap market in Korea, thereby selling dollars to buy Korean won on the spot market and simultaneously buying dollars in the forward market.**
- ❖ **Before the swap matures, foreign banks buy government bonds, MSBs and other fixed income instruments denominated in won to engage in the “carry trade” of lending at the higher Korean interest rate by borrowing at the lower dollar or yen interest rate.**

# 8. Macro-prudential Stability Levy

- ❖ **Macro-prudential stability levy (the levy) will be imposed on the non-deposit foreign currency liabilities appeared in balance sheet of banks.**
- ❖ **The levy will first apply to banks including domestic banks and foreign banks branches.**
- ❖ **The levy rate will vary according to the debt maturity.**
- ❖ **The levy will collected in foreign currencies to stabilize the financial markets.**

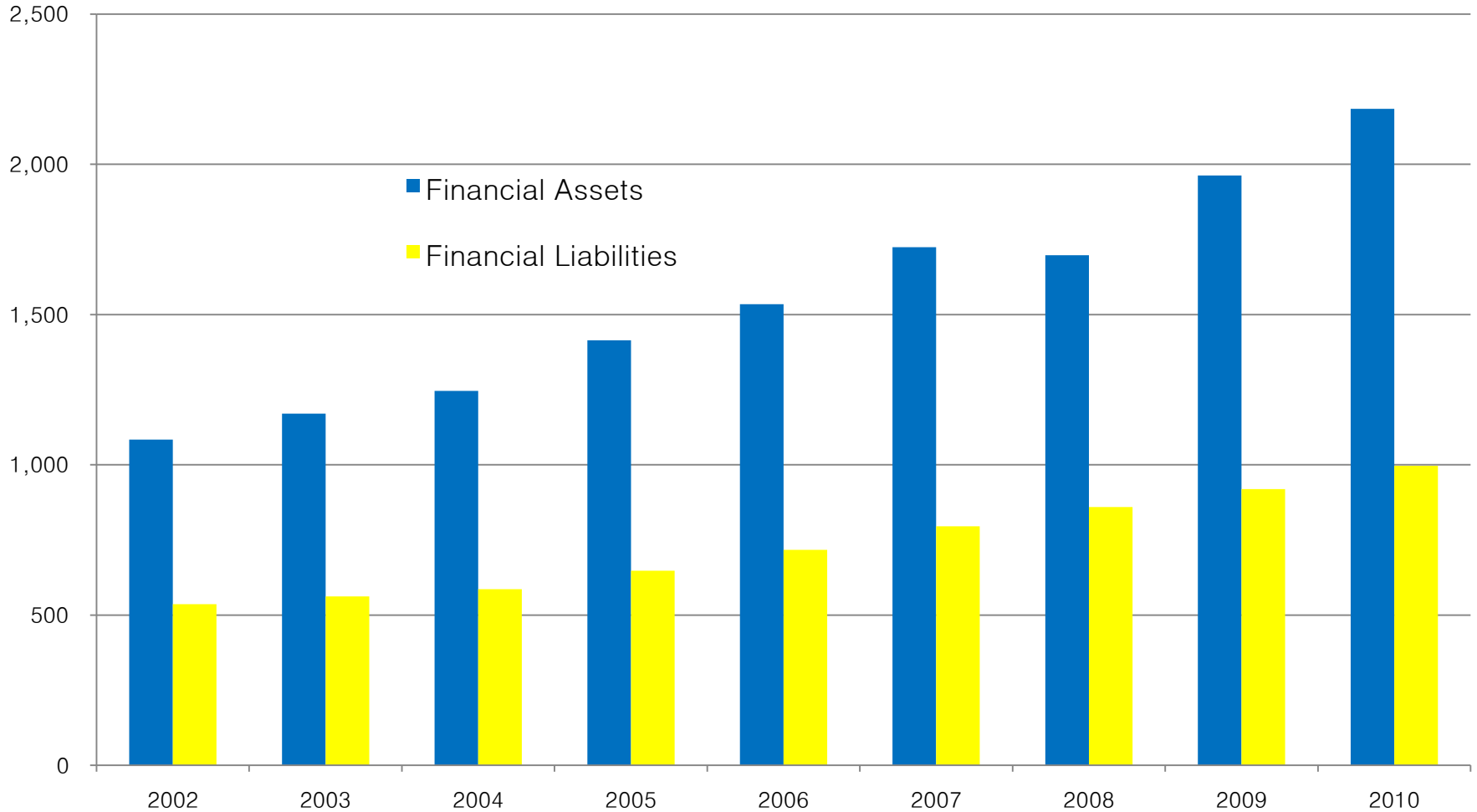
## IV. Conclusion

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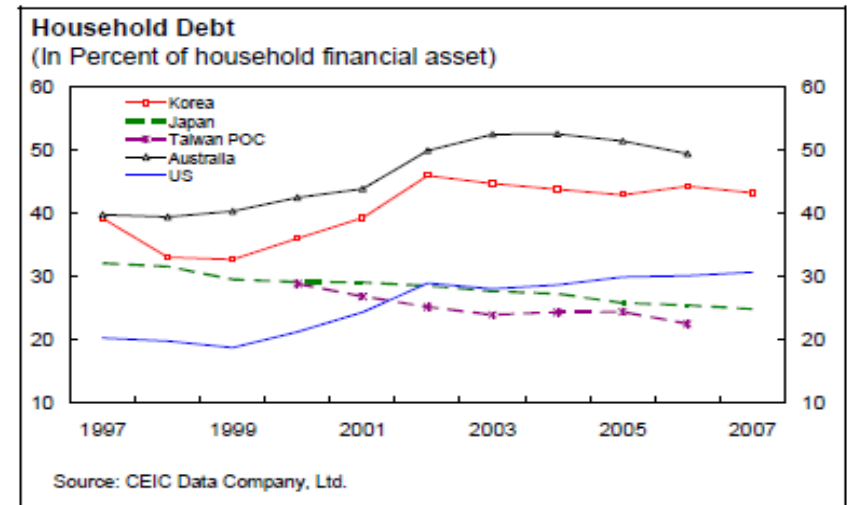
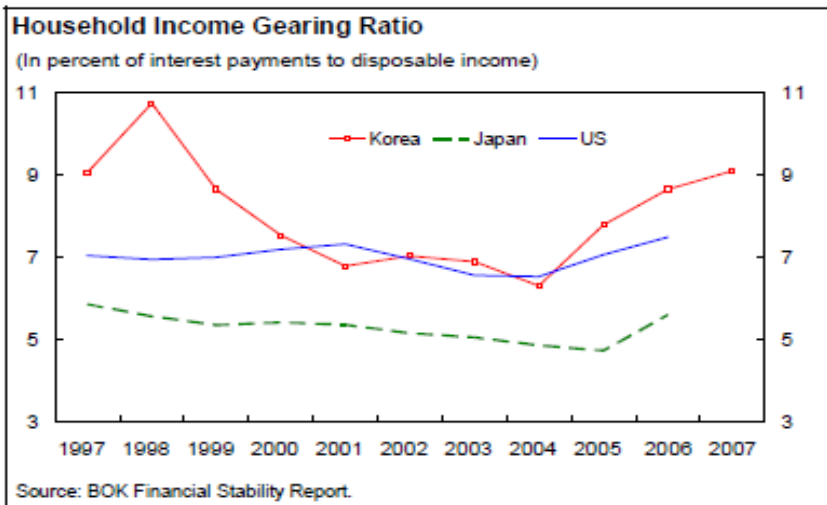
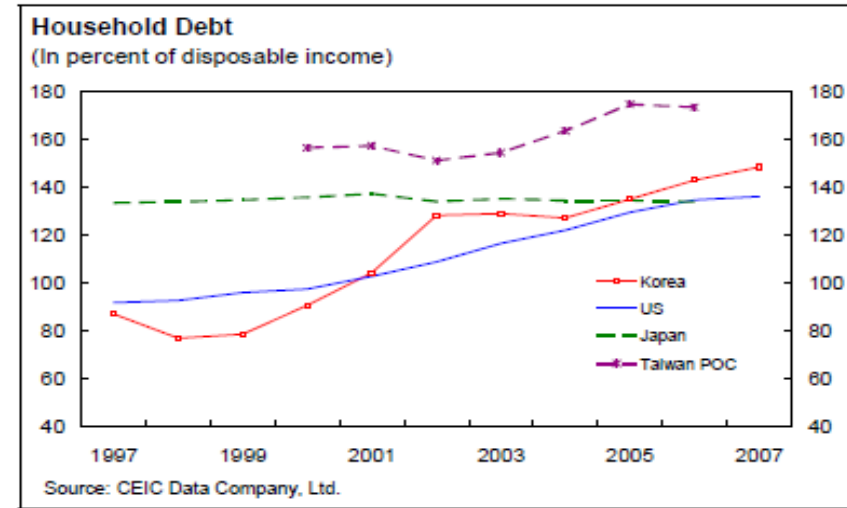
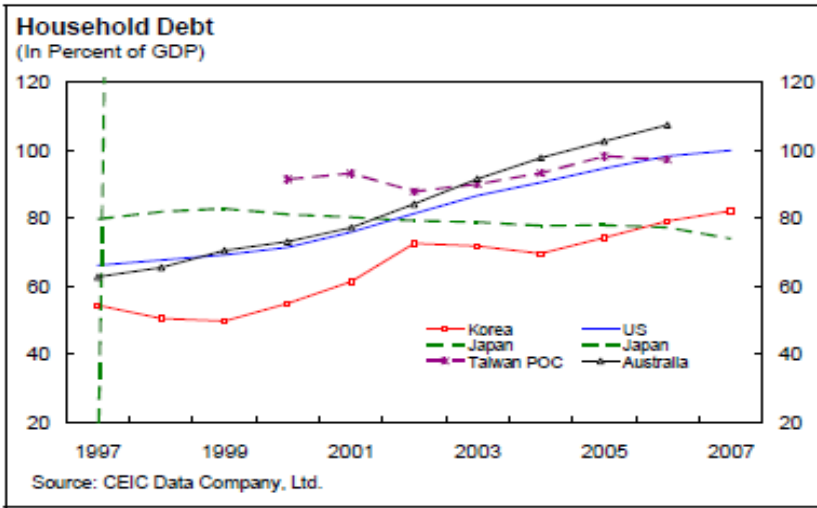
# Conclusion

- ❖ **In reality, it is very difficult to supervise and regulate all financial institutions. Therefore, this analysis framework should help regulators identify which financial institutions should be subject to tighter supervision.**
- ❖ **In addition, the methodology adopted in this study is expected to contribute to the wider use of the flow of funds table and the estimation of inter-connectedness which helps study systemic risks.**
- ❖ **According to the estimates in this study, the bank sector which has been generally considered as systemically important is important only in terms of size.**
- ❖ **However, foreign banks' branches or credit-specialized institutions can be SIFIs if their inter-connectedness and Korea's economic situation is taken into account. Therefore, Korea needs to devise its appropriate regulatory measures for these financial institutions.**

# Appendix 1) Financial Assets and Liabilities of Household



# Appendix 2) International Comparison of Household Debt





*Thank you.*