Financial Intermediation in Brazilian Economy from Flow of Funds Analysis

This paper presents the Flow-of-Funds Analysis applied to improve knowledge about financial flows in Brazilian economy. We develop asset-liabilities-matrixes (ALM) to the years 2004 and 2009, which are disaggregated in 10 institutional sectors to obtain a broadly overview of the specific structure of flows in Brazilian financial system. From flow-of-funds indexes we could illustrate the role of each institutional sector in the system, than we could highlight that during the period, there was a movement to increase the participation of others financial firms in financial system, excluding government-sponsored banks, while enterprises and government were working as financial intermediaries in an informal market.

1. Introduction

This paper aims to improve the investigation of the specific financial structure of Brazilian financial system. The Brazilian asset-liability-matrixes showed household behavior like "saving sector", which together with foreign economies provide funds to finance enterprises and governments investments. It is common to an emerging economy, but ALM also revel a slightly problem with the financial intermediation. Financial firms show difficulty to employ funds. Moreover, neither financial firms, neither the Brazilian Central Bank (BCB), could be said to properly work as financial intermediary because of the low sensitive of changes in excess savings and investments from wide economy. However, the government and enterprises show high sensitivity, it means they are ready to supply changes in demand, notwithstanding it should be a behavior of financial intermediary.

The previous ALM (BURKOWSKI & JIYOUNG, 2016) evidence the flow-of-funds of six institutional sectors: households, enterprises, government, Rest of world (Row), Brazilian Central Bank (BCB) and financial firms, which include all of financial institutions who works in Brazilian financial system. In this exercise we try to amplify the disaggregation of ALM. We relate financial assets and liabilities from Balance Sheet of financial institutions: three government-sponsored banks: Banco do Brasil (BB), Caixa Econômica Federal (CEF), Banco Nacional de Desenvolvimento Econômico e Social (BNDES); one private bank (Itau - the largest private bank in Brazil), and all of others financial institutions are aggregated in "other financial firms".

There are some questions that we hope to answer in this paper: i) even with this upper disaggregation, government and enterprises still seems to work as financial

intermediary? ii) what about financial firms, government-sponsored banks show higher or lower ability to financial intermediation?

We will analyze the year 2004 and the year 2009, because this period the period shows initially a great productive growth, following the movement of the world economy. Subsequently a decrease in this productive growth and in fixed investment rates, due to the financial crisis caused by the collapse of the mortgage market Subprime and the subsequent bankruptcy of Lehman Brothers Investment Bank in 2008, which spread a liquidity restriction across all developed and emerging economies.

Following Tsujimura and Mizoshita (2004), we use the Flow-of-Fund analysis. We developed Asset-Liability-Matrixes (ALM), which presents 10 institutional sectors. For them, we calculated Power-of-dispersion index (DPI) and Sensitivity-of-dispersion Index (SDI) for each agent from the perspective of Fund Raising (The Liability-Oriented System) and of Fund Employment (The Asset-Oriented System), in the years 2004 and 2009.

Beyond this introduction, the paper presents in the next section the flow-of-funds analysis, the methodology to develop ALM and to calculate the indexes. Then we present Brazilian data and the results. Finally we highlight some police implication in the conclusion.

2. Flow-of-Funds

The Flow-of-Funds approach was stimulated by the system of four entries proposed by Copeland (1952). This system was called "System of Money Flow" and intended to presents financial transactions using a table that records financial assets and liabilities, organized with financial instruments in the row, held by each institutional sector located in the column (to each agent there are 2 columns: one to assets and other to liabilities). It is possible to visualize the total of assets, the total of liabilities, and the excess of assets and liabilities of institutional sectors and of wide economy.

The Copeland´s four entry system evidences solely the financial assets and liability. Since the Balance Sheet of any individual represent all of his assets (financial and fixed) and liabilities (required and equity) with a double entry of business accounting method), the excess of financial assets and excess of liabilities in the flow-

of-funds accounts, represent respectively excess of savings and investments (the economic result of the current account).

The Flow-of-funds analysis evolves the application of the Input-Output (IO) Methodology to an Asset-Liability-Matrix (ALM). The ALM are square matrixes sector-by-sector (institutional sectors), that represent the financial assets and liabilities transacted between institutional sectors. The ALM behaves as an IO matrix, however, intermediate consumption refers to funds (financial assets and liabilities) rather than goods and services. The IO matrix shows the demand (input) and the supply (output) of goods, services and factors of production (intermediate production flow), while the ALM shows the supply and demand of financial assets and liabilities (financial flow of funds).

Although there are "two sides of the coin": assets and liabilities represent counterparts of the same accounting entry, however the changes of assets and liabilities have distinct effects on institutional sectors. This is one of the most important properties of Flow-of-funds analysis (MIZOSHITA and TSUJIMURA, 2003).

3. Methodology

To develop the asset-liability-matrix and analyze the structure of financial flows is necessary first obtaining the Asset-Table and the Liability-Table.

3.1 E & R-Table

The Table of Assets is composed by one matrix (E-Matrix) with various assets negotiated by various sectors and by additional vectors, which represent the excess of liabilities in relation to the assets and the total by instrument and by sector.

Where n is the number of financial instruments and m is the number of institutional sectors, the equation 1 expresses the elements contained in the Table of Assets (TSUJIMARA & MISOSHITA, 2004)[3]:

$$E = \begin{bmatrix} e_{11} & e_{12} & \cdots & e_{1m} \\ e_{21} & e_{22} & \cdots & e_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ e_{n1} & e_{n2} & \cdots & e_{nm} \end{bmatrix} \varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_m \end{bmatrix} S^E = \begin{bmatrix} s_1^E \\ s_2^E \\ \vdots \\ s_n^E \end{bmatrix} z = \begin{bmatrix} z_1 \\ z_2 \\ \vdots \\ z_m \end{bmatrix} \qquad (E.1)$$

Where:

e_{ij} = amount of funds allocated to the i-th financial instrument by the j-th institutional sector.

ε_j = excess of liabilities in the j-th sector. It is calculated as follows: the Liability minus the Asset and insert the value of difference. If the difference is negative, that is, if the total of assets is bigger than of liability, we must inset a value of zero (because there is not excess of liabilities);

s_i^E= total quantity of financial instruments in terms of assets;

z_j = sum of assets or liabilities of sector j, which is bigger. We sum the total of assets and the excess of liabilities;

Similarly, the Table of Liabilities consists of a matrix (R-Matrix) which represents the quantity of funds obtained from financial liabilities by the institutional sectors and additional vectors: excess of assets in relation to the liabilities and the totals by instrument and by sector. The elements of the Liabilities Table are expressed in the equation 2:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1m} \\ r_{21} & r_{22} & \cdots & r_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ r_{n1} & r_{n2} & \cdots & r_{nm} \end{bmatrix} \rho = \begin{bmatrix} \rho_1 \\ \rho_2 \\ \vdots \\ \rho_m \end{bmatrix} S^R = \begin{bmatrix} s_1^R \\ s_2^R \\ \vdots \\ s_n^R \end{bmatrix} z = \begin{bmatrix} z_1 \\ z_2 \\ \vdots \\ z_m \end{bmatrix} \qquad \text{(E.2)}$$

Where:

r_{ij}= quantity of collected funds by the j-th institutional sector via i-th financial instrument;

ρ_j = excess of assets in the sector j;

s_i^R= total quantity of each financial instrument in terms of liabilities;

z_j = sum of assets or liabilities of sector j, which is bigger;

3.2 ALM in the liability-oriented & asset-oriented system

To the development of the Flow-of-Funds Matrixes named Asset-Liability-Matrix (ALM), these two presented Tables: Table of Assets (E) and Table of Liabilities (R) are combined to make two ALM. One is the ALM in the liability-oriented system or fund raising (Y), and the other is the ALM in the asset-oriented system or fund employment (Y*).

The Make and Use of the E and R matrixes (specified in the equations 1 and 2, respectively) are expressed in percentage (column share), to generate two matrixes of technical coefficients.

In the liability-oriented system, we define the matrixes B and D. The matrix B is the matrix of technical coefficients of "Use" (use of liabilities) can be expressed by the equation 3 and the Matrix D is the matrix of technical coefficients of "Make" (resources of liabilities = assets), can be expressed by the equation 4:

$$b_{ij} = r_{ij}/z_j \qquad \text{(E.3)}$$

$$d_{ji} = \frac{e'_{ij}}{S_i^E} \qquad \text{(E.4)}$$

Using the "portfolio assumption of the institutional sector" we define the matrix C, where C = DB. C is a square matrix formed by technical coefficients, which indicate in proportional terms, the quantity of funds that the sector j (sector located in the column) obtains from the sector i (sector located in the line).

The "portfolio assumption of the institutional sector" corresponds to the "technology based in the industry" in the IO methodology, while the "portfolio assumption of financial sector" corresponds to the "technology based on product".

The "technology based in the industry" reflects an industry producing always with the same structure of production whatever is the type of product. In the FOF analysis, it means that sectors allocate (or raises) funds according to a portfolio of assets (or liabilities) of the same sector.

The "technology based on product" in the IO methodology, indicates that a product has the same structures of inputs in whatever industry it is produced. To the financial flows it would indicate that each financial instrument would have its own portfolio, no matter the institutional sector that was allocating (or raising) funds.

To obtain the matrix of monetary values (effectively the Flow-of-funds matrix), pre-multiplies the matrix C by the vector that represents the total of financial resources moved by the sectors j (z_j), coming up with the matrix Y, Flow-of-funds matrix or asset-liability-matrix in the liability-oriented system, as can be expressed in equation 5:

$$Y = \begin{bmatrix} y_{11} & \cdots & y_{1m} \\ \vdots & \ddots & \vdots \\ y_{n1} & \cdots & y_{nm} \end{bmatrix} \qquad \text{(E.5)}$$

Where:

$y_{ij} = c_{ij}z_j$, how many funds the sector i obtains from sector j (in monetary values).

The procedure to obtain the Flow-of-funds matrix (asset-liability-matrix in the asset-oriented system - ALM*), defined as Y*, is similar to what is described in the liability-oriented system.

We define, D* and B*, according to what is expressed in equations 6 and 7:

$$d_{ji}^{*} = r_{ij}^{'}/s_i^R \quad \text{(E.6)}$$

$$b_{ij}^{*} = e_{ij}/z_j \quad \text{(E.7)}$$

Based on the "portfolio assumption of the institutional sector", we define C*=D*B*, to obtain the Flow-of-funds matrix or ALM* in the asset-oriented system (Y*), as expressed in equation 8:

$$Y^{*} = \begin{bmatrix} y_{11}^{*} & \cdots & y_{1m}^{*} \\ \vdots & \ddots & \vdots \\ y_{n1}^{*} & \cdots & y_{nm}^{*} \end{bmatrix} \quad \text{(E.8)}$$

Where:

$y_{ij}^{*} = c_{ij}^{*}z_j$, how many funds sector j employs in sector i (in monetary values).

3.3 *Power of dispersion and Sensitivity of dispersion Indexes*

From the two Flow-of-funds matrices (Asset-liability-matrices: Y and Y *), presented in the previous section, we can examine the direct and indirect effect of changes in flow of funds.

When one agent raises new liabilities, for example, when a company obtains new bank loans, there is an increase in financial liabilities of the company and, on the other hand, an increase (of equal value) in financial assets of the other agent, in this case the bank. This would be the direct effect. To increase their financial investments (increase in banks assets), banks seek new sources of funding (increase in banks liabilities), for example, sell securities to other financial firm, rediscount with the Central Bank. By the way, this operation needs a counterpart, which is registered as an increase on the amount of assets of other agent. Therefore, the direct effect of raising liabilities is the increase on bank assets, which will generate another effect on the financial structure of other agents. This would be the indirect effect.

To analyze the direct and indirect effect of the financial transactions of a particular institutional sector we calculate indexes from the Leontief inverse of the two ALM (Y e Y*). The four indexes calculated are:

i) Power of Dispersion Index Fund-Raising;

ii) Sensibility-of-Dispersion Index Fund-Raising;

iii) Dispersion-Power Index Fund-Employ;

iv) Sensibility-of-Dispersion Index Fund-Employ;

To calculate the indexes, we will derive the Leontief inverse of Y, and the Leontief inverse of Y*. First, begin from the ALM in the liability-oriented system. The equation 9 establish the relation behind the ALM in matrix notation:

$$C.z + \varepsilon^Y = z \qquad \text{(E.9)}$$

Where:

C = matrix of technical coefficient fund-raising;

Z^Y = vector with sum of assets and liabilities, whichever is greater;

ε^Y = vector of excess of liabilities.

Solving the equation 9 by Z^Y(analog to IO methodology), we find the equation 10:

$$z = (I - C)^{-1}\varepsilon^Y \qquad \text{(E. 10)}$$

We can highlight the Leontief inverse for the ALM in the liability-oriented system, expressed by equation 11:

$$\Gamma = (I - C)^{-1} = \begin{bmatrix} \gamma_{11} & \cdots & \gamma_{1m} \\ \vdots & \ddots & \vdots \\ \gamma_{m1} & \cdots & \gamma_{mm} \end{bmatrix} \qquad \text{(E.11)}$$

From the Leontief inverse of the ALM in the liability system, we can derive Power-of-dispersion index fund-raising (expressed in the equation 12) and the Sensibility-of-dispersion index fund-raising (expressed in the equation 13):

$$\omega_j^Y = \frac{\sum_{i=1}^{m} \gamma ij}{\frac{1}{m}\sum_{j=1}^{m}\sum_{i=1}^{m} \gamma ij} \qquad \text{(E.12)}$$

$$\varphi_j^Y = \frac{\sum_{j=1}^{m} \gamma ji}{\frac{1}{m}\sum_{i=1}^{m}\sum_{j=1}^{m} \gamma ij} \qquad \text{(E.13)}$$

Where:

m = is the number of Institutional Sectors;

γ_{ij} = are elements of Leontief Inverse ALM (Y);

According to Mizoshita and Tsujimura (2003), the power-of-dispersion index fund-raising (DPI-FR) indicates the total demand for funds, direct and indirect, induced by an increase in demand for funds of a given sector j (excess of investments in terms of the real economy).

The Sensibility-of-dispersion index fund-raising indicates the direct and indirect demand for funds in a given sector j induced by increases in demand for funds from wide economy.

These indicators show "how far" the influence spreads when a certain economic agent raises new money in the financial market (JIYOUNG, 2014).

The liability system shows the spreading effect of funds when there are variations in the demand for funds. On the other hand, in the asset system, it shows the effect of scattering funds when there are variations in supply of funds.

To the asset system, we will apply the same algebraic procedure developed for the liability system, however it will start with the ALM in the asset system (Y*). We present the Leontief inverse of Y* (Γ^*) in the equation 14, the power-of-dispersion index fund-employ (ω^*) in the equation 15 and, the sensitivity-of-dispersion index fund-employ (φ^*) in the equation 16, respectively:

$$\Gamma^* = (I - C^*)^{-1} = \begin{bmatrix} {\gamma_{11}}^* & \cdots & {\gamma_{m1}}^* \\ \vdots & \ddots & \vdots \\ {\gamma_{1m}}^* & \cdots & {\gamma_{mm}}^* \end{bmatrix} \qquad \text{(E.14)}$$

$$\omega_j^{Y^*} = \frac{\sum_{i=1}^{m} \gamma^* ij}{\frac{1}{m}\sum_{j=1}^{m}\sum_{i=1}^{m} \gamma^* ij} \qquad \text{(E.15)}$$

$$\varphi_j^{Y^*} = \frac{\sum_{i=1}^{m} \gamma^* ji}{\frac{1}{m}\sum_{i=1}^{m}\sum_{j=1}^{m} \gamma^* ij} \qquad \text{(E.16)}$$

Where:

y_{ij}^*= elements of the Leontief inverse of the ALM in the asset system.

Mizoshita and Tsujimura (2003) point that the power-of-dispersion index fund-employ (DPI-FE) indicates the supply of funds of total economy, direct and indirectly, induced by increases in fund supply of a given sector j (excess savings in relation to current account).

The sensitivity-of-dispersion index fund employ shows the direct and indirect effect on funds of a given sector i, induced by increases in the supply of funds from wide economy.

In the liability system, the indexes represent the reaction caused by demand for funds (excesses of investment in terms of the real economy) and in the asset system, the indices represent the reaction originated by the supply of funds (excess savings in terms of the real economy).

3.4 Brazilian Data

The data used to apply the FOF analysis in to Brazilian economy are[1]:

- Financial Equity Account;
- Balance Sheet of Central Bank of Brazil;
- Balance Sheet of selected Financial Institutions.

The Financial Equity Account is an Accounting Statement that presents the stock of financial assets and liabilities detained by economic agents in a beginning date, the variations occurred in these assets and liabilities during the period of one year and the assets and liabilities detained in the final date of ascertainment of the balance sheet. This Financial Equity Account was published for the years of 2004 to 2009, as a part of the Integrated Economic Accounts (CEI) by Central Bank of Brazil (BCB) together with Brazilian Institute of Geography and Statistics (IBGE)[2]. The financial assets and liabilities are detailed in seven (7) financial instruments detained by five (5) institutional sectors: Non-Financial Enterprises, Financial Enterprises, Households, Government and Rest of the World[3].

First, we disaggregate the "Financial Enterprises" in to two "subgroups": the "Central Bank" and "Other Financial Enterprises", subtracting the flows of assets and

[1] All of these accounts are available in Central Bank of Brazil web site (www.bcb.gov.br).
[2] IBGE is official organization responsible to collect, organize and publish information and data to Brazilian economy. Brazilian Input-Output Matrix are published from IBGE.
[3] The definition of each institutional sectors are detailed in the Methodological Notes, IBGE (2008).

liabilities of the Central Bank of Brazil (obtained on its Balance Sheet) from the flows of financial assets and liabilities of the "Financial Enterprises" in the Financial Equity Account.

The Balance Sheet of the Central Bank of Brazil (BCB) is published monthly together with other financial statements and explanatory notes. We used the annual data related to the exercises closed in December 31th of each year between 2004 and 2009. The Balance Sheet is a Statement Accounting that represents stock accounts, indicating the stock of assets (physical and financial assets) and liabilities (obligations and equity) held by the entity in a certain date. The elaboration of Balance Sheet of Central Bank of Brazil follow the Central Bank General Accounting Plan (Plano Geral de Contas do Banco Central - PGC).

Second, we disaggregate the "Other Financial Enterprises" in four (4) financial institutions. Tree (3) of them are government-sponsored financial institutions: Banco do Brasil (BB), Caixa Econômica Federal (CEF), Banco Nacional de Desenvolvimento Econômico e Social (BNDES); and one (1) is the largest private bank, in terms of total assets in Brazil, the Itaú Bank. All of these financial institutions play important roles in the Brazilian economy.

The assets and the liabilities of these Institutions, presented in their Balance Sheets, were subtracted from the flows of "Other Financial Enterprises". The financial statements of financial institutions operating in Brazil are monthly published by BCB. Their structure follows the Financial Institutions Accounting Plan (COSIF), wich is in according to PGP. We also used the annual data related to the exercises closed in December 31th of each year from 2004 to 2009.

A "Plan of Codification" was made to link the asset and liability accounts of the Central Bank and financial institutions Balance Sheet, and the financial instruments of the Financial Equity Account, from the PGC, COSIF and the Methodological Notes of Financial Equity Account (IBGE, 2011). The "Plan of Codification" proposed is presented in Table 1.

Table 1: Plan of Codification between Financial Instruments in the Financial Equity Account, Balance Sheet of the Central Bank and the Balance Sheet of Financial Institutions.

FINANCIAL EQUITY ACCOUNT	BALANCE SHEET ACCOUNT OF THE CENTRAL BANK OF BRAZIL	BALANCE SHEET ACCOUNT OF FINANCIAL INSTITUTIONS
ASSETS		

F1 - Cash and Deposits	Availability Deposits Deposits in terms in financial Institutions Resale Commitment	Availability
F2 – Bonds	Derivative Bonds Federal Government Bonds	Liquity Interbank Investments Bonds and Underlying Securities and Derivatives
F3 - Loans	Receivable Credits Credits to the Federal Government	Interbank Operations Credit Operations
F4 - Shares		Investments
F5 - Technical Insurance		
F6 - Other Deb./Credit	Other credit	Other credit
	LIABILITY	
F1 - Cash and Deposits	Contracted Operation to be settled Deposits in Financial Institutions Repurchase Commitment	Deposits Repurchase Agreements obligations
F2 – Bonds	Derivatives	Derivative Financial Instruments Funds, Accetable Exchange, Mortgage Notes, Debentures and Similiar
F3 - Loans	Credits to pay Obligations to the Federal Government	Interdependence Relations Onlending Obligations
F4 - Shares		Net Worth
F5 - Technical Insurance	Provisions	
F6 - Other Deb./Credit	Others	Other Obligations

Source: Elaborated by authors.

4. Results

The institutional sectors play specific roles in Brazilian financial system. The power-of-dispersion-index fund-raising and fund-employment confirm that household and Rest-of-world (ROW) are "Saving Sectors" (DPI-FE higher than DPI-FR). They are saving and accumulating financial assets, while enterprises and government are "Investor Sectors" (DPI-FE lower than DPI-FR), they raise funds to finance excess investments in real assets.

Financial intermediary usually shows both DPI close to 1. Highest indexes indicates better ability in borrowing and lending funds (intermediating funds). Financial firms, including Brazilian Central Bank (BCB) show index near and higher than 1, although, both indexes were slightly upper than 1. Furthermore, it is clear that government-sponsored banks develop better the financial intermediation than others financial firms, who had increased their ability of collecting funds along the years.

This photography of Brazilian flow-of-funds is presented in the Picture 1 and 2, which plots the graphics with the power-of-dispersion-indexes to the years 2004 and 2009, respectively. The DPI-FR assumes values in the abscissa (horizontal axis) and the DPI-FE in the ordinate (vertical axis). The center of the graphic assumes the value of 1.

As we can see, almost of financial institutions are in the first quadrant (financial intermediation), government-sponsored banks are upper than others financial firms; household and Row are in the second quadrant (saving sector); enterprises and government are in the fourth quadrant (investor sector).

[Insert Picture 1]

[Insert Picture 2]

These pictures illustrate the households are in the second quadrant in both years, confirming that they provide funds to the economy, as we should expect since household have savings in the real economy, which is reflected in the excess of assets. However, if we take a closer look, we can see that the DPI-FE is only slightly above 1, suggesting that household sector is not a big lender.

According to the Asset-Table, households employ funds mainly in the form of Shares, Other Credit and Insurance Technical Reserve; the ratio of Cash & Deposits is relatively low.

Shares includes listed stocks and shares in investments funds (the biggest part), Insurance Technical Reserve includes life insurance and pension funds. Most part of these financial instruments are available from financial institutions.

Since there is little difference between the amount of banknote issuance by the central bank and the household holdings, we may conclude that households have only small amount of bank deposit. Moreover, Other Credit includes trade credit and advances, the high ratio of Other Credit together with the low ratio of Cash & Deposits must mean there is a huge informal financial activity.

As well as households, ROW is surplus agent in Brazilian economy. We could say that, even with the restriction in the world liquidity in 2008 crisis, the Rest of the world continue to heavily investing in Brazilian Shares; although DPI-FE are not far above 1; it means that Brazil is not too heavily depending on the foreign countries.

From PDI we confirm that enterprises are the primarily "Investor sector" in the economy, according to liability-table they are raising funds mainly through Shares (between 50% and 60% of enterprises liabilities), and Other Debt (trade debits and advances).

We can see in the ALM that more than 30% of enterprises liabilities came from other enterprises (intrasectoral flow, flow within enterprises). Moreover, the ratio of Other Debts to Other Credit of the enterprises is around 2 so that about half of the sector's Other Debts are financed either from the Government or from the Households through the informal market.

It calls attention to the fact that enterprises could be working as financial intermediary and this configuration is confirmed in the picture 3 and 4.

As well as enterprises, the government is also situated in the fourth quadrant in picture 1 and 2; the sector is also borrowing heavily from other sectors and busy investing in real economy.

According to liability-table, treasury bonds (i.e., bonds issued by the government) is the main fund raising instrument of the government. (e.g., 62.0% in 2004 and 64.9% in 2009). The ALM revels that these funds came from foreign funds (the first in 2004), from BCB (which increased its investments in governments bonds), and from Government-sponsored banks increased their employment of funds in governments bonds more than other financial firms.

On the other hand, government employs their funds in all of other agents in the economy, including other government levels, and other credits are the main instrument. It help us to understand how the informal activity works in financial system. Both Enterprises and the Government are playing the role of financial intermediary whenever it is necessary, Other Debit and Credit are the main financial instrument which flows from household through government and enterprises. We can see in Picture 3 and 4 where these sectors are in the first quadrant in both years;

[Insert Picture 3]

[Insert Picture 4]

The proper functioning of the economy depends on the capacity of financial intermediaries to collect saving from the household and from Row, and allocate them to the investment sectors, especially enterprises.

All financial firms show power-of-dispersion indexes (illustrated in picture 1 and 2) close to 1. BCB, government-sponsored banks (BB, BNDES and CEF) and the private bank (Itaú) presented DPI higher than 1, however it was, slightly upper than 1.

However, in relation to sensibility-of-dispersion indexes (picture 3 and 4) all of these financial institutions are found in the third quadrant indicating that they are not properly working as financial intermediaries, because they do not have ability to supply an excess of demand for funds neither to absorb excess saving.

On the other hand, other financial firms show high sensibility-of-dispersion indexes (SDI). It means that they are supplying excess demand whenever it is necessary. However the power-of-dispersion indexes (PDI) of the other financial firms have showed lower ability to spreads funds. Therefore the excess demand is supply by other financial firms and stands there.

At least, we can observe that their PDI-FE have reveled a slightly increase along the years. Moreover, the magnitude of total financial transaction has grown 87% (from 12 to 22 million reals) between 2004 and 2009. While the proportion of Cash & Deposits has dramatically risen, that of Other Debt/Credit has shrunk. We can observe that there was a shift from the informal finances to the organized financial market.

Another movement, we observe between picture 1 and 2, is that Banco Itaú, the largest privately-owned bank in Brazil, moved from the first quadrant in 2004 to the fourth quadrant in 2009. It revel a change in its market strategy there, was a merge with other smaller bank in this period. As we can confirm in the liability-table, Itaú bank has growth exponentially along the period (deserver a separate study).

The Central Bank of Brazil (BCB) presents excess savings in the whole period. Bonds are the main financial investment in the asset-portfolio of the BCB (government bonds). Along the years, investments in other financial firms increased more than the investments in government and in government-sponsored banks (it also deserver a separate study).

4.1 Concluding Remarks

With the increase in disaggregation of institutional sectors in asset-liability-matrix to Brazilian economy, we could confirm that government and enterprises seems to work as financial intermediary in an informal market where others debts and credits are the main financial instrument.

Household and Row are saving sector, their funds are allocated to enterprises, government and to financial firms by shares (investment funds and direct foreign investments), but it is also going to investor sectors through an in to informal market by other debts and credits.

We could not conclude if government-sponsored banks show higher or lower ability to financial intermediation than other financial firms. However we could highlight that there is a strong possibility that the household saving is not fully mobilized. Government-sponsored banks showed ability to spreads funds, but they did not showed ability to absorb changes in demand, while other financial firms showed ability to absorb demand but not to spreads funds.

Therefore, one part of demand is supplied by other financial firms, who do not effectively pass on these funds, and another part of demand is supplied by informal market.

On the other hand, we could see that there was a relevant change in financial market in the period, with a high monetization of assets and in the same way, other financial firms show an increase in the ability of colleting funds.

Without regard to government financial deficit (this is an important and much more complex issue), our adviser is that police makers should pay attention in this results. Improve financial intermediation in Brazilian financial system has to be a target to get a sustainable growth. One of the primarily concern is to look for financial instruments that could facilitate the mobilization of household savings and allocation to enterprises.

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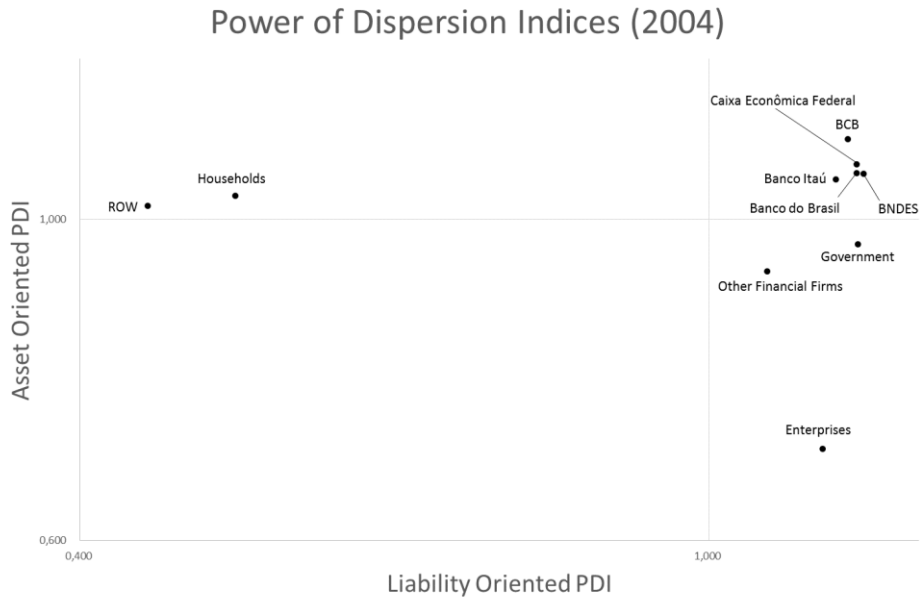
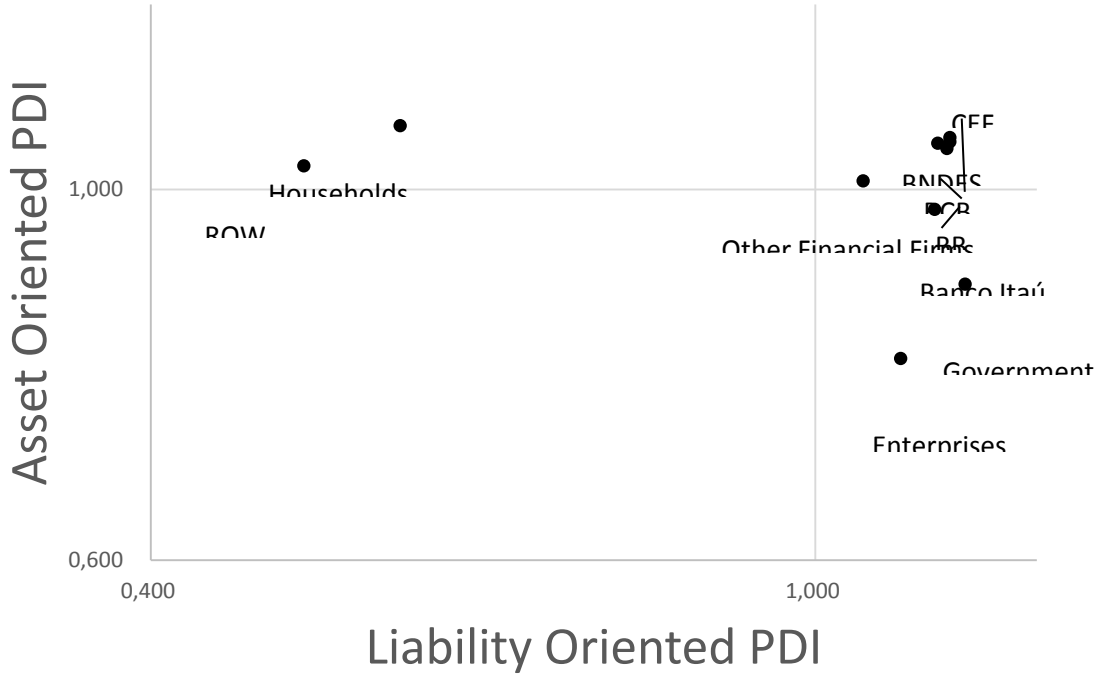
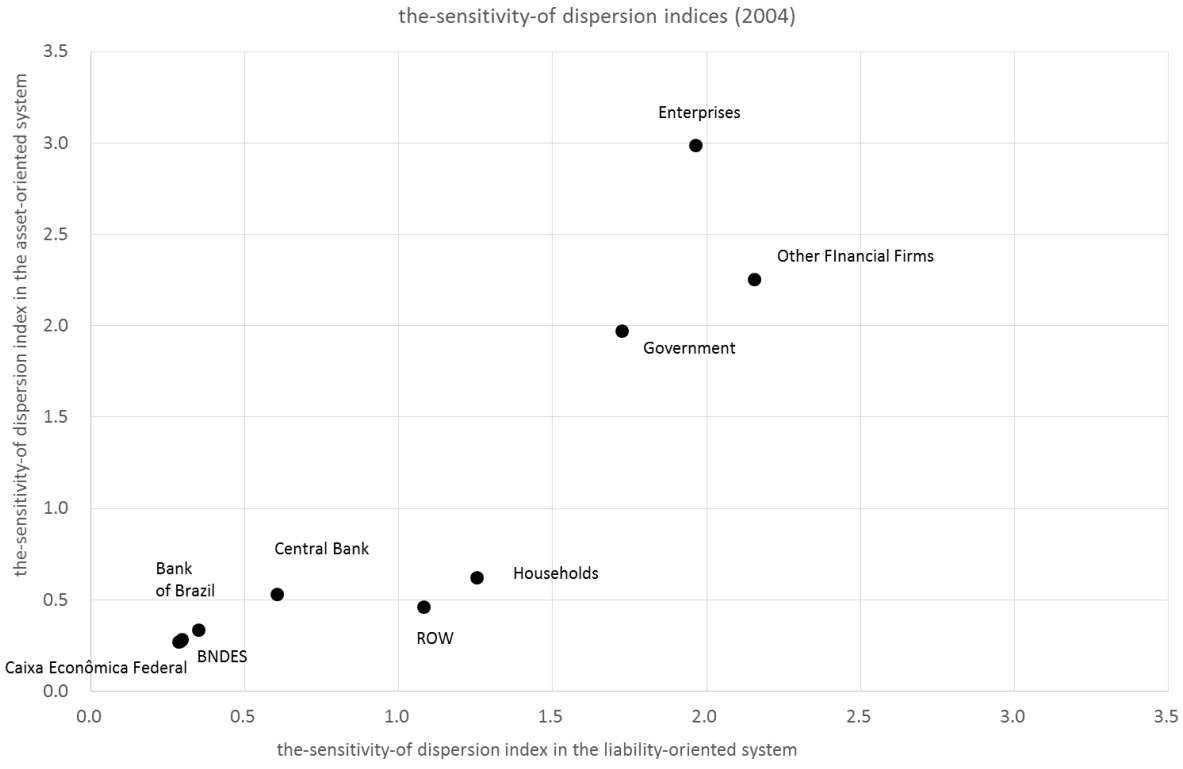
Picture 1: Graphic of the dispersion-power-index funds-employment x fund-raising, Brazil, 2004
Source: Elaborated by authors, from PDI-FR and PDI-FE, Brazil, 2004.



Picture 2: Graphic of the dispersion-power-index funds-employment x fund-raising, Brazil, 2009
Source: Elaborated by authors, from PDI-FR and PDI-FE, Brazil, 2009.



Picture 3: Sensitivity-of-dispersion index, Brazil, 2004
Source: Elaborated by authors, from SDI-FR and PDI-FE, Brazil, 2009.



Picture 4: Sensitivity-of-dispersion index, Brazil, 2009
Source: Elaborated by authors, from SDI-FR and PDI-FE, Brazil, 2004.