Is there any interdependence between the real and financial side in the Brazilian economy? A Financial Social Accounting Matrix Approach for 2005 – 2009[1]

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Abstract:

This paper wants to shed light on the linkage between real and financial side of Brazilian economy. Utilizing a Financial Social Accounting Matrix (FSAM) for Brazil, for the period 2005 – 2009. This paper also provides a consistent accounting system for the Brazilian economy. The FSAM allows a close examination on the recent structural characteristics of the Brazilian economy from the perspective of flow of funds. The study goes further in the multiplier analysis and Miyazawa approach. The main results are that financial sector is important to Brazilian economy mainly in lower economic growth periods, the Loans are the prior financial instruments, there are financial constraint in some industries and the financial crisis has impacted changing the flow of funds in the Brazilian economy.

Key-words: Social Accounting Matrix, Multiplier Analyses, Financial Flows

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Introduction

The Financial system plays an important role when do the financial intermediation of resources between the surplus and deficits economic agents, resulting in a growth of productive activity. Its stability is critical to the security of relations between economic agents. This is evident when one observes that these agents relate to each other in their operations of purchase, sale and exchange of goods and services so that every economic fact, whether simple movement, transformation or consumption, corresponds to least one operation of a monetary nature carried out with a financial intermediary, usually a

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commercial bank that receives a deposit, pay a check, deducts a title or anticipates conducting a future credit. (BCB, 2014).

The financial system only assumes the role of financier of consumption and investment, if there is security for savers, strengthening of financial institutions and freedom for innovations in products and services are created. The healthy development of financial intermediation is a necessary condition for the consolidation of economic stabilization of a country, to create essential requirements to the recovery of economic activity on a self -sustaining way.

The recent financial crisis showed that financial market shocks trigger significant effects on the real economy, thus, an approach that captures the linkages (direction and strength) between the financial and real side would be necessary. In other to do that, tradition Input-Output Models can be extended to show how an increment in the production, generated by a final demand shock, would increment the firms and households income, inducing to more consumption and investment (and more production) or saving. This saving, in turn, would be allocated to the productive sector, through financial market, inducing more investment, production and income in a positive cycle. We called this extended approach as Financial and Social Accounting Matrix (F-SAM).

To model a phenomenon that consider the interdependence of financial structure and production process, it would be necessary to align the System of National Accounts (SNA) with Input-Output Matrix, in order to obtain a Social Accounting Matrix (SAM) and implement modifications and improvements to incorporate transactions involving the flows of financial assets and liabilities.

We saw applications of the F-SAM approach in Euro Area, EUA, Canada, China, Japan, Cameron, Pakistan, Turkey, Vietnam, India, Indonesia and Philippines. However, as far as we know, this approach represents a gap in Brazilian literature.

In this paper, we built F-SAMs for the Brazilian economy for the 2005 to 2009 period. The matrixes are disaggregated in 110 goods and services and in 56 production sectors, besides the Current, Capital and Financial Accounts for 4 domestics institutional sectors and rest of the world. The paper also contribute for the impact analyses accessing the real-financial linkages, the impact of the financial instruments in the productive sectors and the behavioral of the multipliers along the mentioned period.

We used the Input-Output Matrices built by the Regional and Urban Economics Nucleus, of São Paulo University (NEREUS/USP) and the System of National Accounts made-disclosed by the Brazilian Institute of Geography and Statistics (IBGE).

In order to have a better picture of the period of analysis we will present briefly the evolution of Financial Instruments and the evolution of Financial Instruments by agents for the period 2005 – 2009.

Table 1 shows the share of each Financial Instrument by year. We observe that there is a certain degree of stability. We can highlight the following results: a) there is a big change in the amount of F2 – Cash and Deposits in 2008; b) the share of F5 – Shares and other equity has an important decrease along the period; c) F3 – Bonds, except shares decreases its participation and d) F4 – Loans increased its participation along the period of analysis.

Table 1: Financial Instruments

Financial Instruments	2005	2006	2007	2008	2009
F1 - Gold and SDR	0,0%	0,0%	0,0%	0,0%	0,0%
F2 - Cash and Deposits	18,7%	19,0%	25,2%	0,9%	26,1%
F3 - Bonds, except Shares	25,4%	23,3%	23,9%	28,9%	19,8%
F4 - Loans	10,2%	22,9%	19,4%	33,4%	31,4%
F5 - Shares and other equity	34,4%	28,8%	17,8%	21,2%	17,9%
F6 - Technical Reserves of Insurance	3,2%	3,6%	2,9%	3,2%	3,1%
F7 - Other Debits and Credits	8,0%	2,4%	10,9%	12,5%	1,7%

Source: elaborated by the authors

Table 2 shows the distribution of Financial Assets by economic agents for 2005 and 2009. We observe that for F2 – Cash and deposits the highest share on both periods is for Financial Institutions. There is an increase in the share along the period. For F3 – Bonds except shares the Financial firms also have the highest share and there is a small increase from 2005 to 2009. For F4 – Loans presented the same picture. We have to call the attention for the degree of increase. From 57,33% at 2005 for 74,80% at 2009. F5 – Shares and other equities present a more equilibrated distribution. Non-financial firms are responsible for more than 30% in both years. F6 – Technical reserves of insurance is highly concentrated on Households and F7 – Other debit and credits is well distributed among the institutions.

Table 2. Distribution of Financial Assets: 2005 and 2009

2005	F1	F2	F3	F4	F5	F6	F7
Non-financial firms		18,73%	5,88%	7,49%	37,47%	1,62%	36,23%
Financial firms		27,68%	76,71%	57,33%	26,40%	0,45%	13,74%
Households		18,20%	3,12%	0,57%	12,51%	97,70%	14,71%
Government		34,80%	2,30%	26,26%	6,62%	0,05%	32,89%
Rest of the word		0,58%	11,99%	8,35%	16,99%	0,18%	2,43%

2009	F1	F2	F3	F4	F5	F6	F7
Non-financial firms		16,72%	6,06%	1,48%	37,88%	1,59%	43,79%
Financial firms		30,82%	78,82%	74,80%	27,55%	0,46%	16,79%
Households		18,32%	5,17%	0,36%	11,12%	97,78%	8,99%
Government		33,78%	1,94%	18,41%	5,63%	0,05%	24,86%
Rest of the word		0,36%	8,01%	4,94%	17,82%	0,12%	5,57%

Source: Elaborated by the authors

A complete SAM can provide both descriptive and prospective analysis of a given economy (Pyatt and Round, 1985). Thus, the product of this work will verify financial market dynamics, its contribution to the increase in the national product, in addition to observing the effects of shocks in the financial structure of the productive sectors and the product in Brazil. Will also allow identifying whether these effects would be differentiated according to characteristics of financial constraint faced by some of these sectors.

To verify the effect of shocks, two types of multipliers are calculated: SAM Multiplier (linkages between production, income generation and consumption are endogenous, but linkages between income generation, savings and investment are exogenous) and F-SAM Multiplier (all linkages, production, generation of income, consumption, savings and investment are endogenous). From this formulation, you can refine the analysis of the financial asset level of interest (e.g., to evaluate the effect of changes in loans and financing of short and long term trade credit and capital markets on the real side economy) and allow the calibration of computable general equilibrium models.

Following, we present the Context, in which are cited the theoretical basis for the development of this work. The Methodology, in which are detailed the structure of the Brazilian F-SAM and the formulation of indicators for impact analysis. In the Results we presents an analysis comparing the SAM and F-SAM multipliers, the impact of changes in financial instruments and the evolution of the multipliers in the period 2005-2009. Lastly, we made Final Considerations, highlighting the contributions of work and prospects for future analysis.

Context

The monetary flow of goods and services between firms and other agents in the economy can be represented in a matrix, named Input-Output (I-O) Matrix. The I-O Matrix shows detail and concise information about the structure of the inter-industry production of the economy, allowing that we have a numeric description to the amount and the structure of this economy about the relationships between the production and consumption agents.

It is possible to review in the literature a number of applications of the Leontief methodology analysis that allows us to measure the impact of changes of the final demand in the production, employment, imports, taxes, wages e value added.

However, the I-O Matrix do not show how is the distribution of the flow of income generated in the production between institutional sectors. Thus, in order to expand the analysis, we have to develop a Social Accounting Matrix (SAM), like an expansion of the I-O Matrix to conciliate the income account and the national production with the industrial accounting in a unified statistic system (SANTOS, 1999).

According to Pyatt and Round (1985), the SAM is a particular representation of the macro, meso and microeconomics account of a socio economic system. It capture the transactions and transfers between all of economic agents and institutions in the system. It represents a picture of the economic system in a particular moment, when it describes the functional and institutional relationships. It is a framework to analyzing how this system operates and to simulate the effects of polices interventions. The main of the SAM is to conciliate the transaction matrix with the transfer matrix of diverse institutional types (PYATT, 1999).

To complete the circular flow of income, the agents transfer their savings to the financial market, who will allow new flow of investment and funding. However, in the SAM this financial flow is not detailed. It showed it as a balance (positive or negative) between the domestic economy and the rest of the world.

To develop a research with consider the financial side it is necessary to enlarge the SAM in order to show the financial assets and liabilities. We named this expanded framework as Financial and Social Accounting Matrix (FSAM).

According to Wong et al. (2009), the difference of the SAM and the FSAM is the goal of the Capital Account (CC). The SAM's CC records the saving of the agents (firms, households and government) and it corresponds to the total investment of those agents in fixed assets, in other words, investments in gross fixed capital formation. In the FSAM, the creation of a distinct CC to each one of the agents allow to analyses details to the amount of assets they hold (fixed and financial). The Financial Account (FC) presents the detail of nature and structures of the financial sources. It shows how the agents use them and how the savings could not be invested in fixed assets, because there is the possibility to invest in financial assets from the surplus agents. The financial institutions received these investments and later we could converted it into fixed assets through loans to deficit agents and application in bonds and stocks. Figure 1 highlights the main relationships between SAM and FSAM.

The first area (AREA 1) showed in the figure 1 represents the Real-SAM , without savings and capital account. The second area (AREA 2) shows the transformation of the agents saving and the contribution of each one to the gross fixed capital formation. The last area (AREA 3) shows the financial module, in with the shaded cells indicates the flow of assets and liabilities. These cells represents the linkage of the real and financial side (WONG et al, 2009).

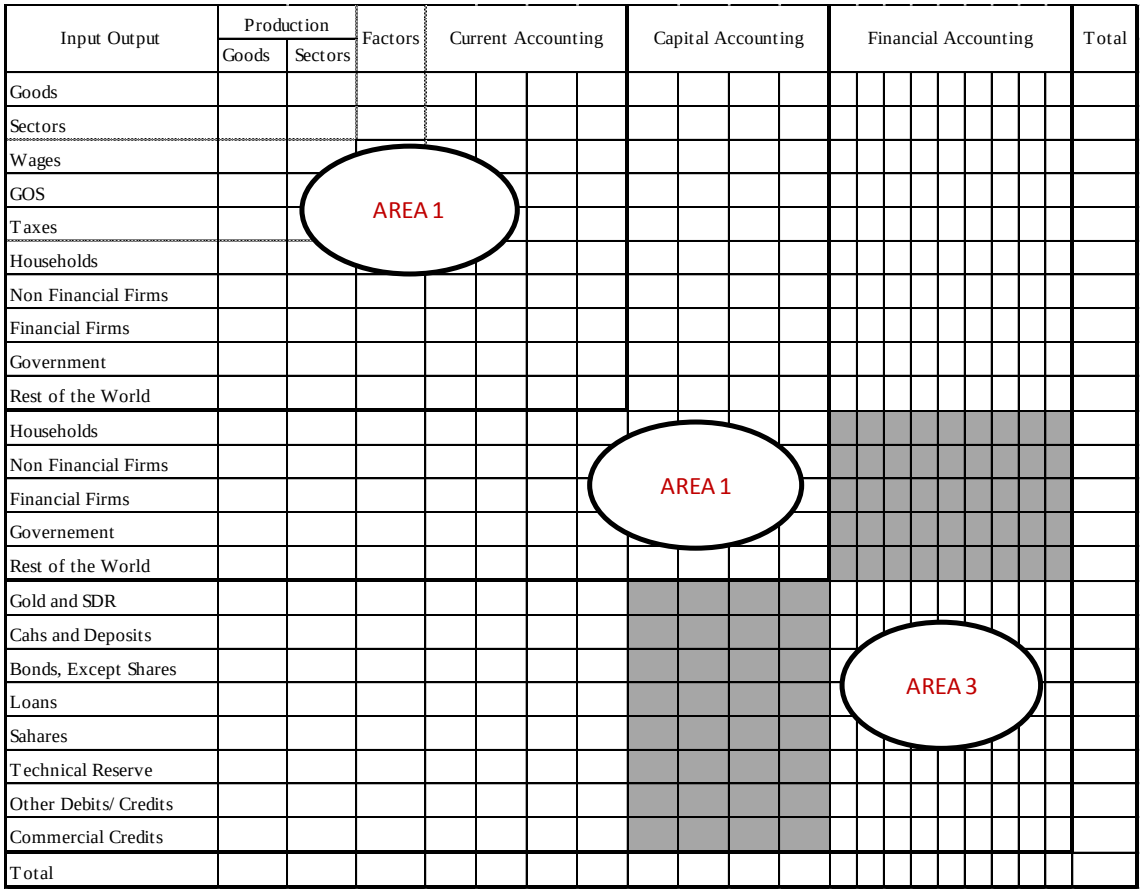

Figure 1: SAM and F-SAM linkages

Source: Adapted from Wong et al. (2009)

As can be seen in the figure 1, the four first blocs with the FSAM are the same as the SAM, referring to the rows and columns that shows the flows of goods and services, the value added, or production factors, and current account. The FSAM presents in more detailed the capital account and the last bloc is the financial account.

The FSAM also allows accessing the performance and contributions of the financial market, the study of public debit and the analyses of police impact.

This kind of framework was applied in Cameron for the 1996 period, were Emini and Fofack (2004) built an FSAM in order to use in the Integrated Poverty Analyses Macroeconomic Model. They use the impact analyses to assess government polices effects.

The first FSAM for Euro Area was prepared from 1999 data by Jellema et al. (2004). This matrix shows the relations between Euro regions and analyses the economic structure, including the development of the financial transactions.

For Turkey in 1996, Aslan (2005), compiled the FSAM using Input-Output Tables, income and consumption research and the Turkey Central Bank balance sheet. In the Pakistan Waheed and Mitsuo (2006) built a FSAM for the period 1999 to 2000. They wanted to build a core database to use in a general equilibrium model in order to analyze the behavioral of public debt.

In China, Li (2008) built a 2002 FSAM. She presents and applies the impact analysis comparing 2 kinds of multipliers: Real-SAM and FSAM, to access the real-financial linkages. Also aiming to access real-financial linkages, Leung and Secrieru (2012) used a 2004 FSAM from Canada. In addition, they analyzed the sensitivity of the multipliers and the effect of the recent global crisis.

The FSAMs approach was also applied for India (DEB PAL et al., 2012), in other to analyze the production structure and the income distribution between households groups.

Dakila et al. (2013) built the Philippines FSAM for 2009. They apply the multiplier analysis in 3 stages: direct, indirect and induced effect. They calculate the forward and backward multipliers and the value added multipliers.

Methodology

We elaborated the Brazilians FSAMs from the economics transactions dada of Brazilian Geography and Statistical Institute (IBGE) and from Regional and Urban Economics Nucleus of São Paulo University (NEREUS/USP).

The Make and Use Tables (TRU) from IBGE and from NEREUS/USP were used to reorganize the I-O Matrix in SAM`s format, providing information about the detail of the goods and services supply and demand from productive sectors. Complementarily, we used the Integrated Economics Accounts (CEI), disclosed from IBGE, to build the bloc

of the transactions of Current Account, Capital Account and Financial Account, providing information about the transaction between institutional sectors. Thus, the TRU provided the flow of goods and services information while the CEI provided the flow of income and funds information[2]. We present the semantic structure of the Brazilian Financial and Social Accounting Matrix (F-SAM) in Annex 1[3].

The FSAM was organized in seven account groups that match different kind of transaction, they are: Goods Account, Sector Account, Factor Account, Current Account, Capital Account, Financial Account and Rest of the World. We presented below the description of the macroeconomics relations preserved in the FSAM:

Goods Account: Production = Intermediary Consumption + Final Consumption + Investments + Exports

Sector Account: Production = Intermediary Consumption + Value Added + Imports

Factor Account: Value Added Paid by Productive Sectors = Value Added Received by Institutional Sectors

Current Account: Value Added Received by Institutional Sectors + Property Income and Income from Current Transfers + Transfers Received from Abroad = Final Consumption + Current Transfers Payments + Saving + Current Transfers Paid Abroad

Capital Account: Saving + Received Capital Transfers + Changes in Liabilities = Investments + Paid Capital Transfers + Changes in Financial Assets

Financial Account: Changes in Domestic Financial Assets + Changes in Financial Assets from Abroad = Changes in Domestic Liabilities + Changes in External Liabilities

The articulated Brazilian FSAM has 185 rows and columns4. The Goods Account involves the 110 first rows and columns of the matrix. On the columns it shows de goods and services supply, and on the rows the demand. The demand, in other words, the destination of the production will be: Intermediary Consumption, Final Consumption, Investments and Exports.

The Sectors Accounts comprises the 111-166 rows and columns. On the rows are the goods and services production from the sectors, consumption price5. It indicates the revenue generated in the productive sectors and is detailed in 110 goods and services from 56 productive sectors. On the columns, it shows the spent of the productive sectors and it is classified in Intermediary Consumption, Value Added and Imports.

The Factor Account involves the rows and columns 167-169. On the rows, it shows the Value Added paid from de productive activity, with, from expenditure side represents the

[2] The IBGE have recently released the Financial Account and Financial Balance Sheet Account results as part of the Integrated Economics Accounts (CEI).

[3] A detailed description of the building procedures of the Brazilian Financial and Social Accounting Matrix (FSAM) can be seen in Burkowski, et al. 2014.

[4] The articulated Brazilian FSAM (2005-2009) were omitted for reasons of space limitation, they can be obtained with authors.

[5] Consumption price includes margins and taxes.

sectors spent with productive factors, they are classified in Wages, Gross Operating Surplus and Taxes less subsidies. They are the sectors spent and the factors income. On the column, it shows the production income generated allocated to institutional sectors. They are the factors spent and the income of the agents.

The rows and columns 170-173 indicate the Current Account and it is classified in the following institutional agents: non financial firms, financial firms, government and households. The Current Account represents, on the row, the source of income of each one of the agents and on the column represents the income allocation from them. The income agents can comes from the production, from transfers between the agents and from abroad. Under the use side, the Current Account represent the income allocation. We classified these spent in Final Consumption, Current Transfers and Saving.

We presented the Capital Account on the 174-177 rows and columns. The rows reflects all the investments funds: saving, capital transfers and the financial funds. On the column, it shows all of the resources application from the agents. These applications can be in fixed and financial assets.

On the rows and columns, 178-184 is the Financial Account. On the row we have the changes in the financial assets, with represents the surplus resources application. On the columns, we have the changes in liabilities, with represents source of funds. We classified the Financial Account in seven financial instruments that are detailed bellow.

The Rest of the World Account, with shows the transaction between the Brazilian economy and foreign market, is on the row and column 185. On the row, we have the Brazilian spent and on the column, we have the foreign spent in the Brazilian economy.

The figure 2 presents the classification of the financial instruments.

Monetary gold includes gold held by Brazilian Central Bank and kept as a reserve. Special Drawing Rights (SDR) are international reserve assets crated by the International Monetary Fund (IMF).

Cash includes notes and coins in circulation. We divide the deposits into transferable deposits and other deposits. The transferable are those that can be immediately convertible into cash or easily transferable by check, money orders, credit card or similar. We cannot use Other deposits to make payments, such as savings deposits and term deposits.

The bonds are negotiable instruments that serves as proof of the existence of a debt, including letters, bonds, deposits negotiable certificates, bonds, debentures, financial derivatives, commercial papers and instruments normally traded in the financial market.

F.1	Gold and SDR
F.2	Cash and Deposits
F.21	Cash
F.22	Transferable Deposits
F.29	Others Deposits
F.3	Bonds, except Shares
F.331	Short term
F.332	Long term
F.34	Financial Derivatives
F.4	Loans
F.41	Short term
F.42	Long term
F.5	Shares and other equity
F.511	Listed Shares
F.512	Unlisted Shares and other equity
F.52	Mutual Funds
F.6	Technical Reserves of Insurance
F.61	Life Technical Reserves and Pension Funds
F.62	Premium Reserves
F.7	Other Debits and Credits
F.71	Commercial Credits and Advances
F.72	Others

Figure 2: Financial Instruments Classification
Source: IBGE, Conta Financeira, 2011

Loans are financial assets that are created when creditors lend funds directly to borrowers and are recorded in non-negotiable documents.

Shares and other equity comprise all instruments and records in which rights are recognized on the residual value of the companies. It include shares listed on stock exchanges, unlisted shares, mutual funds and other equity investments, these consist of all forms own capital except share capital.

Technical reserves of insurance refers to life insurance, which are the rights of families on net technical provisions set aside to cover compensation and benefits of pension funds and other reserves, which include reserves for premiums not received operations, provisions for accident and other non-life insurance.

Other debits and credits comprise trade credits and advances and a residual category of other. Trade credits and advances refer to transactions in financial law arising from credit extended by suppliers of goods and services and advance payments for work in progress or work to be undertaken.

To the FSAM´s analysis we used an approach similar to Li (2008) and Leung and Serieru (2012) with compares the Real-SAM multipliers with the FSAM multipliers, in addition, we analyzed the impact of the financial instrument listed above in the productive sectors and the behavioral of the multipliers from 2005 to 2009.

We considered the government and rest of the world exogenous in order to analyze the effects of public police and external chocks.

We established the relationship of the Real-SAM and FSAM multipliers in the equation 1:

$$A^{FSAM} = \begin{pmatrix} A^{SAM} & A_{12} \\ A_{21} & 0 \end{pmatrix}, \quad (1)$$

Were:

A^{SAM} represents the multipliers matrix without the financial flows, excluding the rows and columns of government and rest of the world that are exogenous. Define A_{12} e A_{21} as the boundary matrixes of the A^{SAM} when extend to the financial bloc. A_{12} includes the changes in liabilities of all of the agents and A_{21} contains the changes in financial assets.

The Leontief Inverse of the A^{FSAM}, $(I - A^{FSAM})^{-1}$, is the matrix formed by technical coefficients, with the partitioned can be written for the equation 2:

$$(I - A^{MCSF})^{-1} = \begin{pmatrix} (I - A^{MCS}) & -A_{12} \\ -A_{21} & I \end{pmatrix}^{-1} \quad (2)$$

To simplify the analysis, the equation 2 will be denoted by the terms of the equation 3, following, and it will be called the Leontief Inverse of the A^{FSAM}:

$$(I - A^{FSAM})^{-1} = \begin{pmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{pmatrix}^{-1} \quad (3)$$

This equation holds important relations. The proposition 1 shows how the FSAMs multipliers are linked with the SAMs multipliers (LEUNG and SECRIERU, 2012):

Proposição 1: a inversa de Leontief da A^{FSAM} , $(I - A^{FSAM})^{-1}$, é relacionada à inversa de Leontief da A^{SAM}, $(I - A^{SAM})^{-1}$, pelas equações 4 a 7, a seguir:

$$F_{11} = [I - (I - A^{SAM})^{-1} A_{12} A_{21}]^{-1} (I - A^{SAM})^{-1} \quad (4)$$

$$F_{22} = [I - A_{21}(I - A^{SAM})^{-1} A_{12}]^{-1} \quad (5)$$

$$F_{12} = F_{11} A_{12} \quad (6)$$

$$F_{21} = F_{22} A_{21} (I - A^{SAM})^{-1} \quad (7)$$

The proposition 1 shows how the FSAMs multipliers can be obtained from the SAMs partitions. The equation 4 shows that financial multipliers are obtained expanding the matrix of SAMs multipliers, $(I - A^{SAM})^{-1}$, by the factor $[I - (I - A^{SAM})^{-1} A_{12} A_{21}]^{-1}$. This factor is referred as External Miyazawa Multiplier6. The External Multiplier shows

[6]Proposed by Miyazawa (1976) in order to investigate the directs and indirects income distribution effects.

the effect of the changes in financial assets and liabilities, A_{12} and A_{21}, in the real economy, $(I - A^{SAM})^{-1}$.

The equations 5 to 7 characterize the consolidated multipliers, with includes the direct productions requirements $(I - A^{SAM})^{-1}$and also the induced requirements from the financial flow on the economy, A_{12} and A_{21}.

Calculating the FSAM multipliers and comparing them with the SAM multipliers, we can evaluate the impact of the financial side in the real economy side. We compared the group of multipliers generated from the equation 4 with the SAM multipliers in order to access the impact of the financial flows on the product of the productive sectors and on the economics agents. We will use the group of multipliers generated from the equation 6 in order to access the impact of the financial instruments on the productive sectors and on the economics agents.

Results Analysis

The idea of interdependence between the real and financial side in the Brazilian economy will be analyzed using three indicators: a) the difference between the SAM and F-SAM multipliers; b) the difference between the SAM and F-SAM multipliers by institutional agents; and c) the impact of the different financial instruments upon sectors.

Sectorial Multipliers:

The main idea behind the multipliers is the possibility to measure the impact upon the sectorial product due to exogenous changes in the final demand of each productive sector. For SAM multiplier it captures the relation between production and income distribution. For F-SAM multiplier it captures the relation between the production flows, income distribution and financial flows (assets and financial liabilities),

When we are considering the financial flows, there is an increase in the average of multipliers and a small variation in the hierarchy. The average impact calculated from F-SAM multipliers is 3.45. On the other hand, for SAM multiplier the average result is 3.23. The Real Estate and Rental sector present the smallest multiplier (SAM equal to 2.38 and F-SAM equal to 2.71). The highest multiplier is for the Food and Beverages sector (SAM equal to 3.73 and F-SAM 3.96). Table 3 presents the results for all productive sectors.

Table 3 enables us to observe the difference between the average multiplier for F-SAM and the average multiplier for SAM. For 2005, this difference is around 6.82%. For the whole period, we have an increase in this difference (2009 equal to 9.24%). Figure 3 and Table 4 enable us to visualize the evolution of the F-SAM and SAM multipliers for the period 2005 to 2009. We presented the average values and we observer that the F-SAM multiplier is greater than SAM multiplier for all the period.

Table 3: SAM and F-SAM multiplier comparison: Industries

Industry	SAM	FSAM	Var.%	Industry	SAM	FSAM	Var.%
Cars, vans and utilities	3,7090	3,8784	4,5687	Public education	3,1599	3,3761	6,8415
Office machinery and computer equipment	3,0502	3,1957	4,7721	Livestock and fisheries	3,3767	3,6079	6,8447
Trucks and buses	3,6432	3,8202	4,8564	Wearing apparel and accessories	3,3244	3,5528	6,8712
Electronic material and communication equipment	3,2442	3,4060	4,9861	Cement	3,2408	3,4636	6,8758
Other transport equipment	3,3247	3,4991	5,2450	Public administration and social security	3,2106	3,4326	6,9139
Leather goods and footwear	3,6484	3,8468	5,4370	Furniture and products of various industries	3,2538	3,4800	6,9519
Parts and accessories for motor vehicles	3,4756	3,6693	5,5735	Metal products - except machinery and equipment	3,2200	3,4440	6,9546
Chemicals products	3,3136	3,4986	5,5833	Other mining and quarrying	3,1551	3,3745	6,9549
Appliances	3,4158	3,6076	5,6146	Accommodation services and meals	3,3147	3,5469	7,0050
Agrochemicals	3,4350	3,6283	5,6288	textiles	3,2773	3,5081	7,0418
Rubber and plastic	3,2996	3,4865	5,6640	Commercial health	3,1525	3,3783	7,1626
Petroleum refining and coke	3,2770	3,4633	5,6836	Newspapers, magazines, records	3,1729	3,4016	7,2089
Manufacture of resin and elastomers	3,2278	3,4119	5,7036	Services to household and associative	3,1683	3,3976	7,2350
Miscellaneous chemical products and preparations	3,3214	3,5117	5,7285	Pharmaceutical product	3,1109	3,3397	7,3533
Paints, varnishes, enamels and lacquers	3,3571	3,5503	5,7552	Transportation, storage and postal services	3,1247	3,3568	7,4268
Machinery and equipment, including maintenance and repairs	3,3913	3,5887	5,8201	Appliances / hospital medical instruments, optical and measuring	2,9462	3,1742	7,7374
Food and Beverage	3,7407	3,9641	5,9735	Oil and natural gas	3,1084	3,3532	7,8749
Tobacco product	3,5742	3,7943	6,1573	alcohol	3,2703	3,5280	7,8802
Pulp and paper products	3,3660	3,5740	6,1785	Business services	3,0406	3,2815	7,9217
Machinery, appliances and equipment	3,2446	3,4476	6,2550	Agriculture, forestry, extractive	3,0663	3,3095	7,9316
Perfumery, hygiene and cleaning	3,3101	3,5207	6,3641	construction	3,0953	3,3411	7,9405
Public health	3,2268	3,4344	6,4345	Iron ore	3,1134	3,3633	8,0256
Other products of non-metallic minerals	3,2577	3,4692	6,4918	Information Services	2,9753	3,2222	8,2987
Manufacture of steel and derivatives	3,2504	3,4638	6,5646	Trade	2,9151	3,1682	8,6817
Metallurgy of non-ferrous metals	3,1829	3,3921	6,5747	Electricity, gas, water, sewage and urban sanitation	2,9155	3,1698	8,7235
Mercantile education	3,2092	3,4204	6,5828	Financial intermediation and insurance	2,9483	3,2067	8,7642
Wood products - exclusive furniture	3,4003	3,6272	6,6759	Maintenance and repair	2,8039	3,0614	9,1847
Domestic services	3,0678	3,2753	6,7632	Real estate services and rental	2,3883	2,7135	13,6185

Source: Elaborated by the authors

It is important to call the attention for this difference and it help us to answer the question about the interdependence between the real and financial side of the economy. This difference shows the relative importance of financial system. When we calculate the SAM multipliers, the endogenous institutional agent's savings (financial companies, non-financial companies and households) when not used for Gross Fixed Capital Formation are considered leaks in the system. When the F-SAM are calculated, the savings not used

for Gross Fixed Capital Formation can be borrowed for deficit agents through financial market and return to the system, increasing the product of the economy. When this applications are in financial assets in the economy, this resources return directly to the economy as investments in securities, shares and loans and indirectly in the form of bank deposits, which provide increase in money creation becoming sources of additional funds for the agents.

Table 4: Percentage Variation between SAM and F-SAM Multipliers from 2005 to 2009

Year	2005	2006	2007	2008	2009
SAM	3,2288	3,2411	3,2478	3,1363	3,2418
F-SAM	3,4464	3,3997	3,3678	3,3242	3,539
Variation %	6,819	4,9365	3,7296	6,0533	9,2458

Source: Elaborated by the authors

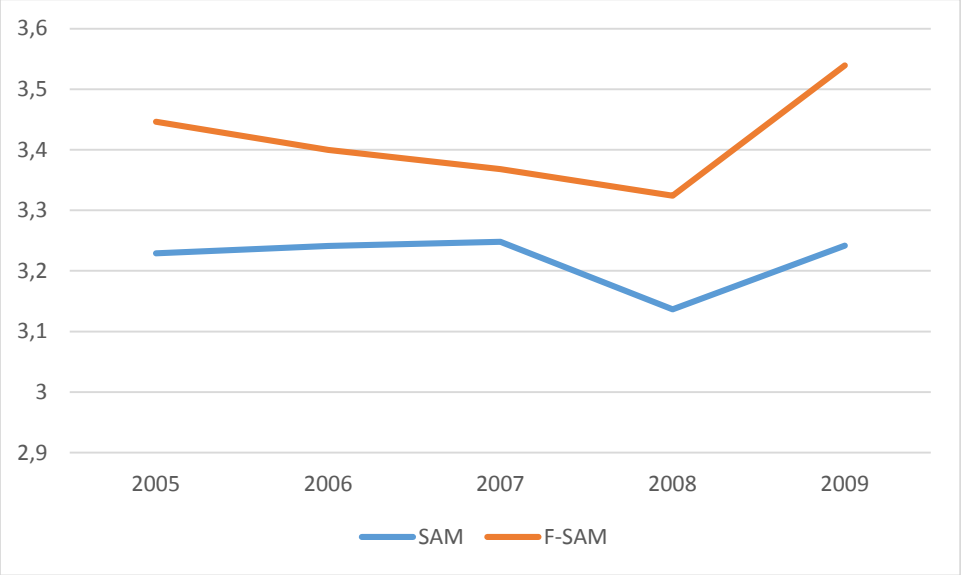

Figure 3: Brazilian SAM and F-SAM Multiplier Evolution, 2005-2009

Source: Elaborated by the authors

What we can learn from the results presented at Table 4 and Figure 3? We observe that the financial sector play a more important role during the period of smallest growth. During this period, the financial sector plays the role of main resource provider to productive sector. The savings from financial sector will be used to stimulate the productive sector. This process generates income and consumption.

During the periods of strongest economic growth, the financial system plays a minor role. This is due to, in part, because the circular flow of income provides a reinvestment in the economic system. The liquidity of agents goes directly to the productive sector, with higher production. There is an increase in the income from productive factors, an increase in the household consumption and in the investments. Thus, there is a stimulus to the productive sector. We can call this situation as a natural or virtuous cycle.

The evolution of the multipliers of F-SAM over the years show that the Brazilian economy was reducing its ability to increase output since 2005, i.e., before the crisis, the Brazilian economy has showed signs of economic recession. With and without including the financial sector in the analysis, in 2008, the multipliers have the lowest value in the series; this is an indicator of the negative impact of the crisis on the Brazilian economy product.

The year 2008 is the year that the multipliers have lower value of the reporting period. The industries that had the largest reduction this year, compared to the previous year, i.e., the sectors that were most affected by the crisis were: Iron ore, Office machines and computer equipment, Manufacture of steel and steel products, Other transport equipment and Electronic material and communication equipment.

On the other hand, some sectors had their multipliers increased between 2007 and 2008, they are: Electricity, gas, water, sewage and urban cleaning, Petroleum refining and coking, Financial intermediation and insurance, Metallurgy of non-ferrous metals, Foods and beverages, Real estate and rental and Alcohol. The fact of financial intermediation be among the few sectors that have increased the multiplier in 2008, reinforces the importance of the sector as needed to stimulate economic output in the turbulent period of the study period.

Impact upon Institutional Sectors:

This section presents multipliers that measures the impact upon the sectorial product due to an increase of a unit in the flow of funds for investments of endogenous institutional agents (Non-financial corporations, Financial corporations and households).

The difference between the SAM multipliers and F-SAM multipliers is even more relevant when considering the effects generated by increases in capital account, which refer to flows of funds for investments.

The difference between the multipliers related to the flow of capital is much greater than the difference between multipliers related to the increased demand of productive sectors. This shows that the financial sector plays an essential role in the allocation of funds for investment, both for the ability to mediate between deficit and surplus agents, as the ability to intertemporal allocation of resources.

Table 5 presents these multipliers, the percentage difference between them and the evolution over the years 2005 and 2009.

Table 5: Percentage Variation between SAM and F-SAM Multipliers from 2005 to 2009 – Institutional Sectors

Capital Account			
2005	F-SAM	SAM	Variation %
Non Financial Firms	2,0584	1,1264	82,7381
Financial Firms	1,2405	0,0122	10029,0794
Households	1,9381	1,2606	53,7415
2006			
Non Financial Firms	1,7409	1,3889	25,3424
Financial Firms	0,8856	0,0108	8130,6131
Households	2,8511	1,549	84,0534
2007			
Non Financial Firms	2,1665	1,7154	26,2981
Financial Firms	0,6562	0,0082	7935,2065
Households	1,5892	1,1825	34,3954
2008			
Non Financial Firms	1,991	1,3322	49,4587
Financial Firms	1,243	0,0112	11011,4412
Households	1,9977	1,0547	89,4217
2009			
Non Financial Firms	2,9296	1,6327	79,4302
Financial Firms	1,6468	0,0096	17006,6383
Households	2,2002	1,2707	73,1502

Source: Elaborated by the authors

The results enables us to show the increase in the multipliers when considering the endogenous financial structure. As for the flow of funds for investment by Non-financial companies, the increase varies between 25 % and 82 % over the years. Regarding the flow of funds to the households, the difference ranges from 34% to 73%. Analyzing the data of the year 2005, an important observation that must be highlighted is that in F-SAM the increase of one unit on the demand flow of funds for investment by Non-financial companies creates greater impact on the product than the similar increase in the flow of funds to investments of households. On the SAM multiplier, the effect is greater in households.

In other words, the effect of corporate investment in the economy, considering the dynamics of the financial market is greater than the effect of household investment, since the first stimulate the production with the acquisition of machinery and equipment (fixed assets) that will increase the production level. As the F-SAM is able to capture the financial flows, the increase in the multiplier suggests that corporate savings not invested in fixed assets is invested in financial assets and shows that these resources return to the economy as a source of funds for new investments.

The Figure 4 presents the evolution of the investments in fixed assets, by institutional agents, from 2005 to 2009.

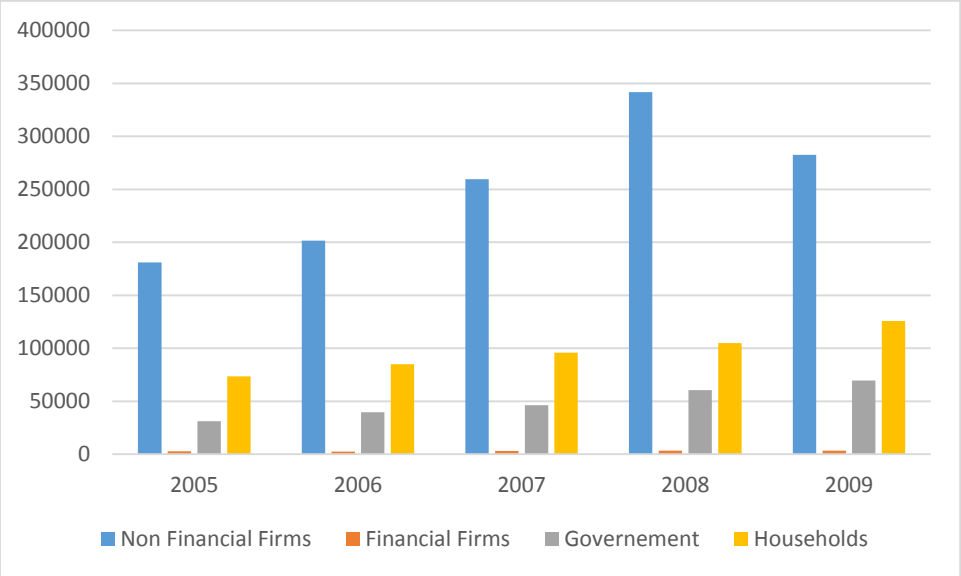

Figure 4: Brazilian Investments Evolution, 2005 a 2009
Source: Elaborated by the authors

As can be seen, Non-financial companies are responsible for most of the fixed investments in the Brazilian economy. These investments in fixed assets that create capacity to increase output of the economy. Over the years 2005 and 2008 there was an increase in the volume of investments of Non-financial corporations, but as seen in Table 5, the multiplier related to these investments, decreases in 2006, increases in 2007 and decreases in 2008. In 2006 and 2008, the impact of investments in the product, did not follow the growth of investment in fixed assets.

Investments in fixed assets by households is the second most expressive among the economic agents. We observed that these investments have increased during the whole period. In particular, in the years 2006 and 2008, the impact of household investment in the product was greater than the impact of investments of non-financial companies. Returning to the data of Table 5, we observe that the difference between the multipliers of the SAM and F-SAM is greater when referring to the flow of funds to households than for Non-financial companies in recent years. This highlights the difficulty of Non-financial companies make investments in order to, significantly, affect output in the years 2006 and 2008, showing that investments of households were more efficient in these periods.

An increase in funds for investments in financial companies produces the biggest difference observed between the multipliers of SAM and F-SAM. The increase of one unit in the investment funds to financial firms in 2005 generates 0.01 increase in output in SAM - compared to an increase of 1.24 units in the F-SAM. The difference over the years is extraordinary, ranging from nearly 8,000 % to more than 17,000 %. The reason for this difference is that the Financial corporations, invest most of their funds in financial assets. In SAM this effect is completely deleted and is captured in the F-SAM. The years 2008 and 2009 are the years in which the difference is more significant, reflecting the importance of the financial sector in periods of greater economic problems.

The size of the impact of an increase in the availability of funds for investment depends

on the portfolio decisions of financial firms. If financial firms invest additional funds in financial assets in the domestic economy, there will be an impact on the product larger than if they made these investments in financial assets abroad. Investments in financial assets abroad would be resource leaks in the domestic economy, which would cushion the effect of expansionary investment policy.

Financial Flows Impacts:

We calculate F-SAM multipliers that show the effect that shocks in financial instruments (listed in Figure 2, Methodology section) cause in the product of the sectors and the flow of current income and funds for investments of institutional agents.

The impact of shocks on the demand for loans is the one that produces the greatest effect upon the product. The increase of an additional unit in the demand for loans induces an increase of 2.03 units in the productive sectors distributed in increments of 0.35 in the Construction, 0.18 in Retail, 0.09 in Transportation, storage and postal services, 0.09 in the machinery and equipment sector and 0.08 in Foods and beverages and the remainder in other sectors.

As you can see the impact of shocks on the demand for loans is positive in all sectors, i.e., increases in loan demand induce increases in the production of all sectors. Another important observation is that the effect is diverse in different sectors, showing that each sector responds differently to the increase in demand for loans. The most affected sectors are Construction, Commerce, Transport, Machinery and equipment, Food and beverage, and Financial intermediation. The sectors that suffer less impact are the Public health, Tobacco products, Agrochemicals and Alcohol.

These findings may reveal characteristics of financial constraint of the productive sectors. Those sectors whose multiplier has greater magnitude are the sectors that use more this type of financing, so they are the sectors that have greater access to credit in the form of loans. Expansionary credit policy will have greater effect on these sectors. Similarly, those sectors whose multipliers are smaller are the sectors with lower use of this financial instrument, i.e., are the sectors that suffer the most restricting credit.

Over the years, the effect of the financial instruments on the product sectors varies. The loans had the highest multiplier in the years 2005, 2006 and 2009. In 2007, Shares and other equity were the instruments that caused more impact on productive sectors and in 2008 the assets with greater liquidity, were currency and deposits.

The sectors that had the greatest variation in the multiplier related to the shares between 2006 and 2007 were Agrochemicals, Alcohol, Chemicals, Clothing and accessories, Parts and accessories for motor vehicles and cars and Trucks and utilities.

Table 6: Financial Instruments Impacts on Industries - 2005 a 2009

	Cash and deposits	Bonds, except shares	Loans	Shares and other equity	Techinical Reserves of securities	Other Credits and Debits
2005	1,2845	0,4706	2,0341	1,5397	1,2405	1,6688
2006	0,8473	0,432	1,5217	0,9582	0,8856	-1,3435
2007	0,6217	0,2144	0,898	1,203	0,6562	1,0489
2008	2,4268	0,9527	1,5512	1,5658	1,243	0,9685
2009	1,7052	0,6249	2,6464	2,1224	1,6468	2,1712

Source: Elaborated by the authors

From 2007 to 2008, the sectors that contributed most to the increase in the multiplier related to currency and deposits were Trucks & Buses, Public Health, Agriculture, Forestry and Logging, Manufacturing of steel and derivatives and Agrochemicals.

Regarding the flow of funds for investment, from households and non-financial companies, the evolution of the importance of financial instruments is similar to the productive sectors. Loan is the main instrument as a source of funds for investments over the years.

In 2007 the instrument that has more impact on the flow of funds for investment by non-financial companies are stocks and in 2008 are currency and deposits, confirming the evidences concerning the direct impact on sectors. Regarding the flow of funds for households in 2007 and in 2008, currency and deposits are the most important.

Economic agents use both savings as financial liabilities to finance their investments. Figure 5 shows the share of financial liabilities and savings over the period 2005-2009.

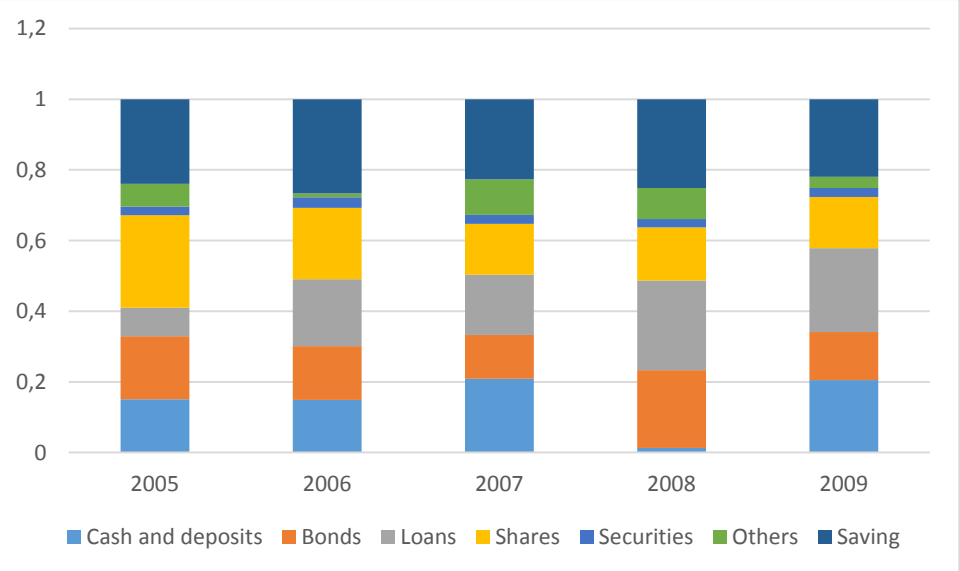

Figure 5: Shares of Brazilian Financing Sources, 2005 a 2009
Source: Elaborated by the authors

The saving is on average 24% of total resources. Over the years, the change in the share of savings in total assets is very small (coefficient of variation equal to 7). The sources of funds, which represent on average 76% of all sources of financing, have higher percentage change in each instrument separately. The coefficient of variation in financial instruments goes from 9 to 63.

Loans and shares are the main financial instruments that finance investments in Brazil. They account for, on average, 18.61% and 18.08% of the total.

In Figure 5, it is clearly seen that the amount of currency in circulation (F2 - currency and deposits) show greater variation, with an average participation of 19 % of the total. There was a drastic reduction for currency in the form of cash and deposits outstanding in the Brazilian economy in 2008. Moreover, in the same period, there was an increase in securities and loans, which will represent 21 % and 25 % of the total.

These observations help us to explain the behavior of the multipliers of F-SAM over the years. Loans seem to be the most important financial instrument in directing resources to the productive sector and the financing. It has the highest multiplier in most years.

In 2007, many companies went public in Brazil (ALDRIGHI et al, 2010[7]). This injection of funds was directly applied to investments in the productive sector, which caused the shares to become the main instrument to increase output in the period. This also reflected in the increase of the multiplier associated with the cash flows for investments of non-financial firms, reported in previous section.

The product multiplier reflects the global financial crisis. The year 2008 represents the period in which the Brazilian economy showed smaller multipliers (related to the productive sectors, investments and financial instruments). There was a growing shortage of liquidity in the world and in Brazil (seen a drastic reduction in currency and deposits). In this period, we observe an increase in percentage ownership of securities and loans. This evidence reveals the liquidity preference of economic agents, which in times of crisis agents tend to prefer less liquidity and move their applications for interest-earning assets. The scarcity of resources in circulation caused the currency and deposits become the main financial instrument in the period.

Conclusions

This study aimed to present the Financial and Social Accounting Matrices for Brazil and make a longitudinal analysis of the financial side impact on the real economy between 2005 and 2009.

[7] Between 2005 and 2008, 102 companies firms made IPO (Inicial Public Offering) in Brazil, with 9 in 2005, 26 in 2006, 64 in 2007 and 3 in 2008. The amount raised in 2007 was R$55.140.000. It represents more than 66% with the total in the period.

We believe to contribute with the development of these matrices, standing out in this process the union database of Input-Output Matrices and System of National Accounts provided by IBGE and NEREUS/USP. It is noteworthy the linkages between Production, Current Accounts, Capital Account and Financial Account.

It could be observed that the matrix improved the financial information of the previous matrices, especially with regard to the opening of the current, capital and financial accounts. With the financial matrix is possible to verify the relationship between the productive sector and the financial sector. Furthermore, it is possible to show the pattern of transfer of capital and saving the economy.

Through multiplier analysis, we show that the financial side impact is positive with increasing multipliers in all industries and in all of the years. The longitudinal analysis revealed that the Brazilian economy came reducing the capability to increment the output since 2005 and the lowest year was 2008. The comparison between SAM and F-SAM multiplier along the time revealed that the financial sector has main role in lower growing economics years.

We presented the SAM and F-SAM multiplier for all industries by which we could see that the impact differs between industries. We highlighted which industries were more and less, influenced by the financial side, which one were more affected by the crisis and which one, in the other hand, grew between 2007 and 2008.

It was possible to observe that the impact of the financial sector is still more relevant when analyzed the flow of investments funds. To households the increase reaches 73% and to non financial firms, the increase reaches 82%. Brought to light an important issue in the sense that, in some years, if do not consider the financial flows, the importance of the agents is altered.

We could observe that in 2006 and 2008 the effect of the investments upon the outputs did not follow the physical investments made by non financial firms. In these years, the household investments were more effective.

The most extraordinary change was due to the impact on flows of investment funds of financial firms. It is because in the formulation of the SAM multiplier, savings not invested in fixed assets are leakages of the economy, while in the F-SAM multiplier savings not invested in fixed assets are invested in financial assets. These assets represented by financial instruments listed in Figure 2 return to economy, both directly in the application in Shares and Bonds as increasing the availability of resources with the bank deposits, which are source of funds for new investments.

At the beginning of the paper, we presented the composition of financial assets by the economy and by the agents to give an overview of the preference and the evolution of the financial investments in the Brazilian economy. In the last part of the results we analyses the multiplier related to shocks on the financial instruments and an overview of funding used in the economy.

We found that the most important financial instrument to Brazilian economy was Loans. Also revealed that the industries react differently to shocks, which may indicate financial constraints characteristic of the industries. Over the years changes occurred. Shares were

very much important in 2007 due to the large funding in the capital markets. In 2008, Cash and deposits were the most important. We believe that it is effects of the global financial crisis, given the large reduction in liquidity. It was also highlighted the industries which had more variation in their capital structure.

Therefore, it must be borne in mind that the construction and understanding of the structure of the Brazilian F-SAM is a contribution to the literature because the relationship between the financial industry and the real economy are detailed, allowing the analysis of the interrelationship between these sectors.

The limitations of the work are related to Input-Output approach, with fixed coefficients and to the arbitrary definition of endogenous and exogenous sectors. As a natural extension of this work, are expected to use the database of the Brazilian F-SAM to make new impact analysis with other types of multipliers, to studies of industrial impacts and to calibration of computable general equilibrium models for the Brazilian economy. It also can be used to verify the performance of the financial market and the contribution of the national product, income distribution, poverty analysis, and as a basis for specific studies, with details of financial assets/liabilities of interest.

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ANNEX 1 – Semantic Structure of Financial and Social Accounting Matrix for Brazil

Source: Elaborated by the authors

		Production					Institutional Agents									Rest of the World
				Factors			Current Account				Capital account				Financial Account	
		Goods	Industry	Wages	Capital	Taxes	Nom Financial Firms	Financial Firms	Governemnt	Household	Nom Financial Firms	Financial Firms	Governemnt	Household	Financial Instruments	
Production	Goods		Intermediate Consumptio						Final Consumption		Investmnts					Exports
	Industry	Production														
Factors	Wages		Added Vallue													Income from aboard
	Capital															
	Taxes						Taxes				Taxes					
Current Account	Nom Financial Firms				Gross Operation Surplus and Mixed Income		Property Income and Current Transfers									Current Transfers from aboard
	Financial Firms															
	Governemnt					Taxes										
	Households			Wages												
Capital Account	Nom Financial Firms						Saving				Capital Transfers				Change in Liabilities	Capital Transfers from aboard
	Financial Firms							Saving								
	Governemnt								Saving							
	Households									Saving						
Financial Account	Financial Instruments										Change in Assets					Change in Assets
Rest of the World			Imports	Income to aboard			Current Transfers to aboard				Capital Transfers to aboard				Change in Liabilities	