

## **Financial Institutions and the development of the Amazon: an application of the regional social accounting matrix**

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### **SUMMARY**

This article investigates the importance of the regional financial institutions for the economic activities in the Amazon and its impacts through matrixes of transference effects, circular, crossed and global ones, as well as it measures the multiplied effects of the income and employment and backward and forward linkages effects through the social accounting matrix.

### **KEY-WORDS**

Financial institutions, transfer effects, circular, crossed and global, and multipliers effects, and linkages effects backward and forward

### **ABSTRACT**

Este artigo investiga a importância das instituições financeiras bancárias regionais e seus impactos sobre as atividades econômicas na Amazônia por intermédio das matrizes de efeitos transferências, circulares, cruzadas e globais, bem como mede os efeitos multiplicadores da renda e do emprego e os efeitos de ligação para trás e para frente através da matriz de contabilidade social.

### **PALAVRAS-CHAVES**

Instituições financeiras, efeitos transferências, circulares, cruzados e globais, efeitos multiplicadores e efeitos de ligação para trás e para frente.

### **1. INTRODUCTION**

In Brazil, the discussion on the social repercussions generated by the deepening of the regional economic differences, in the latest years, is restricted to convergence studies about the federated units' per capita incomes, on polarization reversion and, more recently, about the possibility of local development through the organization of productive chains and, the so called, local productive arrangements.

In this direction, the studies that deal with the question of regional development's financing are relatively scarce in Brazil.<sup>1</sup> The debate on the *regional question* always had as main focus the regional disparities associated to the asymmetries of the product's real variables, the income and the employment, when the performance of periphery regions (Amazon and Northeast) is compared to the economic center (Southeastern). The interference of the monetary and financial variables, in the regional question's quarrel, was duly considered just a few times.<sup>2</sup>

However, the articles of Dow (1982, 1987) and Chick (1994) came to motivate the theoretical debate about the importance of the currency and the banking system for the regional development. Amado (1999), for instance, admits that the scarcity of financial analyses in the scope of the regional economy is partially due to the adoption of an inadequate theoretical financing reference to approach the financial dynamics and its impacts on the regional production apparatus. The following reasons for such behavior can be identified:

- i) The neutral function of the currency as mere way of exchanging goods;
- ii) The neutral function of the financial sector as simple financial intermediary between superavit agents (savers) e deficits agents (investors);

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<sup>1</sup> CARVALHO.(1997); AMADO.(1999).

<sup>2</sup> CARVALHO.(2000, p.1-2).

iii) The function of the Central Bank as mere sanctioned of the currency in course forced to passively accommodate the real aggregate demand.

Thus, a question must guide the discussion of the present article: which should be the most appropriated financing standard of the regional development to overcome the limited capacity of financing strategic projects from the periphery regions of Brazil? which would be the most appropriated model? A regional financial system part of the national financial system, formed by a network of regional bank agencies; or a national financial system model with a wide network of agencies distributed throughout the national territory?

For the conventional theory of the borrowed funds, the formation of a national financial system can create convergent trajectories of economic development between the developed dynamic center and the delayed dependent periphery. This conception is based on the primitive period of the financial system when, supposedly, the “financial” flows equal the savings (deposits) to the investment (loans), as the economists of the orthodox side think. However, nothing assures that this can really happen, because if the financing logic of the investments is of the market, such national financial model with limited level of regional integration, besides the absence of positive externalities and public development banks, could deep even more the regional inequalities due to, especially, the advanced stage in which the current financial Brazilian system is.<sup>3</sup>

Similarly it could be argued that an integrated financial model could be much more advantageous than a regional financial model – mainly due to the efficiency of the organizational and management structures, the positive externalities from technological,

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<sup>3</sup> In the fifth stage of the banking system’s historical evolution, besides the consolidation of the bank deposits generators of reserves and credit, the presence of the bank currency as one of payment, the development of loans between banks in the interbank market and the central bank’s presence admitting the role of the lender of last instance, the banks start to manage the negotiation of debts. See CHICK. (1994).

financial and operational innovations and the earnings from scale and scope economies – as it could provide, from the financial center where the headquarters of banks operating in the peripheral economy are located, a greater ability to finance investment for productive activities from peripheral regions.

However, although this possibility exists, the necessity of consolidating a national pattern of regional financial development, in developing economies, cannot discard the importance of the planning and regulating actions of the State, particularly in regard to the support needed to overcome the delay of the peripheral economies.<sup>4</sup>

In such circumstances, the emptying of financial flows could harm the constitution of the "revolving fund" to *finance* by Keynes, as there would be a trend of declining bank deposits levels in agencies of the underdeveloped areas of the periphery.<sup>5</sup>

In the case of Brazil, the institutional definition of the national standard of funding for regional development must consider, besides the current advanced stage of public and private financial institutions' historical development, the republic entities' interests and its ways of governability and governance.

In this work, it is intended to measure the economic impacts that the regional financial institutions are providing along the chain of values of the productive activities located in the Amazon upstream and downstream according to the perspective of Hirschman. For that, besides this introduction and conclusion, this text was organized into three sections: the first discusses the impact of financial institutions in the Amazon, the second discusses the MCS' methodology, and the third section discusses the MCS' results.

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<sup>4</sup> CARVALHO.(1997a;b).

<sup>5</sup> AMADO.(1999)

## **2. FINANCIAL INSTITUTIONS AND ITS ECONOMIC IMPACTS IN THE AMAZON**

In the Brazilian case and elsewhere in Latin America, experience has shown that, if there is no creation of public financial institutions of pro-economic development, to work within a long term view of strategic planning, the possibilities of a national underdeveloped economy to solve the problems of intersectoral or inter-regional transfer of funds to delayed sectors or regions through the spontaneous development by the exclusive way of the financial market will become very scarce.

The theoretical construction of Gurley & Shaw (1960) innovated on the genesis of financial market's structure and its impact on the operation of the economic system. They had the merit to associate the problem of the economic development to the development of the financial system; to watch the importance of the creditor's risk on the structure of the financial market; and to transfer attention from interest rates to the quantitative and qualitative dimension of the demand and search for capital.<sup>6</sup> However, Gurley & Shaw (1960) associate the financial development only to the balanced economic development, not to unbalanced economic development.<sup>7</sup>

The organization of a modern financial market, comprising the credit and capital markets, enables the domestic savings to be risen to a certain level of the gross domestic product of an economy. In addition, an efficient financial market supposedly allows scarce saving is applied in an excellent way, among the various areas of alternative investment, so that the economy's pace of growth is made at a higher rate than that where it would be an inefficient financial organization.<sup>8</sup>

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<sup>6</sup> FRAY.(1961, p.29-31).

<sup>7</sup> HIRSCHMAN.(1961, 1981).

<sup>8</sup> GURLEY; SHAW.(1960).

In the neoclassic models, the financial market is basically summarized to the market of borrowed funds and, thus, is defined as the locus where it is found the search and the demand of payment ways needed to cross the passed time period between the decisions of the expenses' agents of productive and consumption investment, and the formation of the monetary incomes of the families. (FRAY, 1961). In this point of view, from the offer side, the main resources of funds of borrowed sources are: 1) the current savings generated in a given period; 2) the divestments; 3) the net hoarding; 4) the net loans of additional banks. In contrast, the search for available "funds" may consist of: 1) funds for expenses in the production of fixed capital investments and / or working capital; 2) funds for hoarding; 3) funds for the expense of consumption, individually or collectively, besides the current income.<sup>9</sup>

Fray (1961, p.33), starting from a classification of the demand for credit by customers, also with little bit of arbitrariness, defines the financial market in other way, in dynamic terms, considering all active individuals who make decisions on the financial market: 1) companies; 2) families; banks and credit institutions; 3) other financial institutions; and public banks. These categories may take a mixed financial position of applicants and suppliers of funds in the financial market, including involving the self-financing.

The structure of the financial market, thus, must be characterized in its quantitative and qualitative aspects. In the first group, there is the number of active individuals in the market, the dimensions of the activities performed by them, and the number and volume of "primary" and "secondary" securities. In the second group, it is seen the types of financial institutions (financial monetary institutions and non-monetary institutions), securities and how the financial market reacts to economic activities. In the

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<sup>9</sup> FRAY.(1961).

third group, finally, there are the other private financial institutions and banks and agencies for public fomentation.

In a first step of the development of a financial system, families and companies seek financial intermediaries only to raise their capital-money in the financial movement sphere. In the second step, it is the financial intermediaries that seek credit demanding customers and loans are given based on criteria of profitability, liquidity and applications' risk and not only by their social or developmental projects. The access to resources from financial institutions is determined by the guarantees that the borrower can provide to the creditor, which means that, in general, actors who are already established in areas of higher profitability and can offer "safer" applications are favored.

In a developing economy, such as Brazilian, a significant parcel of many commercial banks and multiples' resource is directed to financing the families' capital goods and the working capital of enterprises, and less to the financing of investments in new activities or key strategic sectors for development.

In the specific case of small companies, the solution in a greater or lesser extent, has been the establishment of a specific financial intermediation that is disconnected from the formal financial market. Alternatively, for strategic investments in productive sectors and economic and social infrastructure, it has been directed to public funds and / or public-private partnerships. The elements highlighted here will anchor the empirical analysis of the indicators from the Social Accounting Matrix (SAM).

### 3. MCS APPLICATION METHODOLOGY

The construction of the Social Accounting Matrix (SAM) is made from the Input-Output matrix (IOM) developed by Leontief.<sup>10</sup> A IOM is an analytical tool which has been widely used in the intersectorial analysis. The economic theory tries to explain the transactions and economic relations existing in a market economy in terms of the cause and effect interactions between endogenous and exogenous variables. However, despite the recognition of the importance of the input-output model, the results obtained from the application of the original models by Leontief input-output, or input-output model modified by Miyazawa (1966), may underestimate the impacts of activities that comprise the economy of the Amazon region.<sup>11</sup>

To avoid this problem, new matrices generation was constructed by Pyatt & Round. (1979) and Stone. (1985), more disaggregated and consistent with the macroeconomic analysis of a country or region, in order to allow an appropriate structure to the circular flow of any market economy at national or regional contexts.<sup>12</sup>

These are the reasons that justify the use of SAM to analyze not only the global multiplier effects of the sector, but also the chaining effects of backward and forward *Financial Institutions'* services on the production structure of the Amazon region.

#### 3.1. HYPOTHESIS OF THE MODEL

The accounts recorded by the double entry method, applied in the construction of the input-output matrix, allows the IOP to reveal the *economic structure* of a regional economy from the commercial flow that connects each segment and industry in a

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<sup>10</sup> LEONTIEF. (1966; 1970)

<sup>11</sup> MIYAZAWA.(1966)

<sup>12</sup> STONE.(1985, p.145-185); FOCHEZATTO; CURZEL.(2002).



particular sector to all others. However, both IOP and the SAM are subject to some general and specific hypothesis described below:

a) the hypothesis that the technical coefficients of these matrices are fixed. This means to assume that the technical coefficients do not change in the short term and therefore, there is no substitution of production factors when their relative prices change;

b) the hypothesis of the economy sectors aggregation. This implies that there may be errors on aggregation when the industries of a productive sector are combined. To avoid this problem, it is admitted that enterprises located in an industry produce the same kind of product and that the industries located in the same sector are homogeneous and different from the other industry sectors. This problem is mitigated as the economic structure can be presented in a more disaggregated way, with a larger number of economic activities;

c) the hypothesis of constant scale returns to all sectors of the economy in general. This means that if the inputs vary in the same proportion,  $k$ , the production varies exactly alike, in the same proportion.

Beyond these basic hypotheses, the SAM presents two others that are needed so a regional economy structure is appropriate. One is that the economy operates with idle capacity. This implies that an unexpected demand increase can be answered, at the same cost levels, by increasing the production scale; Another hypothesis, a Keynesian, is that the market for goods and services are set via quantity. It means that the market disproportions for goods and services are revealed by an involuntary stock accumulation or not accumulation. Finally, there is the Neokeynesian hypothesis of institutional price rigidities due to *menu* costs, the externalities and information asymmetries. As a result, the prices of goods of this regional economy remain fixed, at least in the short term.<sup>13</sup>

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<sup>13</sup> MANKIW.(1992, p.220-221).

Based on the hypotheses set, the SAM will be used to capture the effect on chain back and forth, as well as the effects of exogenous injections, by product multipliers of income and employment to the Amazon economy.

### 3.2. THE ALGEBRAIC MODEL OF SAM

The SAM can be presented in a model consisting of algebraic equations, expressed in matrix form, involving all elements of the model, the SAM matrix of the regional economy may be so specified as:

$$X_a = t_a \cdot X_a + t_c \cdot R + Y_a \quad (1)$$

$$X_v = t_v \cdot X_a$$

$$X_i = t_r \cdot X_v$$

$$E = t_e \cdot X_e + t_i \cdot X_v$$

Or better:

$$\begin{bmatrix} I - t_a & -t_c & 0 \\ 0 & I & -t_r \\ -t_v & 0 & I \end{bmatrix} \begin{bmatrix} X_a \\ X_i \\ X_v \end{bmatrix} = \begin{bmatrix} Y_a \\ Y_i \\ Y_v \end{bmatrix}$$

The method to solve this model of SAM is the same used for the IOP and the basic equation representing the final result is given by:

$$X = (I - A)^{-1} \cdot Y = M_g \cdot Y \quad (2)$$

Where:

$X_a$  = is the product vector of productive activities;

$X_i$  = is the vector of institutional income;

$X_v$  = is the remuneration production factors' vector;

$(I - A)^{-1}$  = is the matrix of global impacts;

$I$  = is the identity matrix;

$A$  = is the technologic matrix;

$Y_a$  = is the vector of exogenous income of productive activities;

$Y_i$  = is the vector of exogenous institutional income;

$Y_v$  = is the vector of value added exogenous.

The partitioned social accounting matrix, containing only the endogenous accounts and indicating the average propensity to spend, is structured as a *A matrix* with

size  $(n + m + p, n + m + p)$  obtained from the division between the sector values

contained in each column by the corresponding value of total expenditure, such that:

$$A \begin{bmatrix} Y_a \\ Y_i \\ Y_v \end{bmatrix} = \begin{bmatrix} X_a \\ X_i \\ X_v \end{bmatrix}; \quad A = \begin{bmatrix} t_a & t_c & 0 \\ 0 & t_i & t_r \\ t_v & 0 & 0 \end{bmatrix}$$

In this partitioned of matrix, there is:

$t_a$  = matrix of input-output coefficients with dimension  $(n, n)$ ;;

$t_c$  = matrix of dimensions costs coefficients  $(n, m)$ ; ;

$t_r$  = matrix of institutional dimension transfer coefficients  $(m, p)$ ;;

$t_v$  = matrix of added dimension value coefficients  $(p, n)$ ;

$m$  = in the number of endogenous institutions;

$n$  = is the number of productive activities;

$p$  = is the categories number of added value.

The derivation of the partitioned matrix has as starting point the basic matrix of Leontief:

$$X = A.X + Y \quad (1)$$

Or:

$$(I - A).X = Y$$

$$X = (I - A)^{-1}.Y = M_g.Y \quad (2)$$

$$X = M_g.Y \quad (3)$$

The above expression represents the sector income of the endogenous activities as a result of injections in X multiplied by the matrix of the global effects. The A matrix

above, can be partitioned into two matrices, represented by B and C, so that  $A = B + C$ .

The matrices B and C can be written as follows:

$$B = \begin{bmatrix} t_a & 0 & 0 \\ 0 & t_i & 0 \\ 0 & 0 & 0 \end{bmatrix}; \quad C = \begin{bmatrix} 0 & t_c & 0 \\ 0 & 0 & t_r \\ t_v & 0 & 0 \end{bmatrix}$$

The matrices B and C are derived from the matrix or the matrix of average propensity to spend or matrix of technical coefficients. Based on this partition, the basic equation of Leontief can be modified as follows:

$$X = A.X + Y \quad (\text{Leontief Basic Matrix})$$

$$X = (A + B - B).X + Y \quad (4)$$

$$X = (A - B).X + B.X + Y$$

$$X - B.X = (A - B).X + Y$$

$$(I - B).X = (A - B).X + Y$$

$$X = (I - B)^{-1}(A - B).X + (I - B)^{-1}Y \quad (5)$$

Making  $D = (I - B)^{-1} \cdot (A - B) = M_{ai} \cdot C$  and replacing in (10), we have:

$$X = D \cdot X + (I - B)^{-1} \cdot Y \quad (6)$$

This is the first interactive movement of the matrix process. Multiplying the equation (6) by  $D$ , we have:

$$D \cdot X = D^2 \cdot X + (I - B)^{-1} \cdot D \cdot Y \quad (7)$$

Replacing the equation (7) in equation (6), we have:

$$X = D^2 \cdot X + (I - B)^{-1} \cdot D \cdot Y + (I - B)^{-1} \cdot Y$$

$$X = D^2 \cdot X + (I - B)^{-1} \cdot Y + (I - B)^{-1} \cdot D \cdot Y$$

Highlighting the common factors in terms of  $Y$ , we have:

$$X = D^2 \cdot X + (I + D) \cdot (I - B)^{-1} \cdot Y \quad (8)$$

This is the second movement of the interactive matrix process. Multiplying the equation (7) by  $D^2$  and replacing (8) in (7) and then isolating the value of  $Y$ , we have:

$$X = (I - D^3)^{-1} \cdot (I + D + D^2) \cdot (I - B)^{-1} \cdot Y \quad (9)$$

This is the third and final movement of the interactive matrix process. Naming the effect-transfer matrix (ETM) by  $Ma_1$ , the cross-effect matrix (CEM) by  $Ma_2$  and the circular-effect matrix (CEM) as  $Ma_3$ , we have:

$$M_{a1} = (I - B)^{-1}; \quad M_{a2} = (I + D + D^2); \quad M_{a3} = (I - D^3)^{-1}$$

The global multiplier (Mg) is given by the product of the three above mentioned multipliers, so as:

$$M_g = M_{a3} \cdot M_{a2} \cdot M_{a1} \quad (10)$$

Replacing (10) in (2), we have the Leontief's fundamental equation changed in:

$$Y = M_{a3} \cdot M_{a2} \cdot M_{a1} \cdot Y = M_g \cdot Y \quad (11)$$

These three multipliers, created by Pyatt & Round (1979), represent the following effects: the direct and indirect effects from the transfer between activities from the same account set, therefore called by transfer-effect ( $Ma_1$ ); the effects from the transactions between different account blocks, therefore called crossover-effect ( $Ma_2$ ); and the effects from the transactions between blocks, therefore called circle-effect ( $Ma_3$ ). An alternative model was developed by Stone (1985) that, unlike the model by Pyatt & Round (1979), presents his model with four additive components. This additive equation is derived from three substitution operations which development can be found at Santana (1994).

$$M_g = I + (M_{a3} - I) + (M_{a2} - I).M_{a1} + (M_{a3} - I).M_{a2}.M_{a1} \quad (12)$$

In wich:

I = is the matrix of initial impulses;

(M – I) = is the matrix of effect- net transfer by Stone (METs);

(M – I).Ma<sub>1</sub> = is the matrix of cross-effect by Stone (MECZs);

(M – I).Ma<sub>2</sub>.Ma<sub>1</sub> = is the matrix of net cross-effect by Stone (MECs).

The effect-transfer matrix (METs) of Stone allows calculating the indicators that capture the transfer input-output effects between productive activities and is the matrix that captures the global effects of intersectoral relationships (Leontief Matrix). The cross-effect matrix (MECZs) by Stone captures the economic impacts that result from the interactions happening inside and between the three blocks of endogenous productive activities accounts and added value, between the added value and institutions and finally, between institutions and productive activities. The circular-effects matrix (MECs) captures the effects of exogenous incentive in productive activities that are transmitted to the added values and from these to the institutions and their return to productive activities, closing the cycle.

### 3.4. DATA SOURCES

The database to measure the effects of the product multipliers, income and employment, as well as the effects of chaining (*linkages*) back and forward generated by financial institutions in the Amazon is the IOM of Legal Amazon (1999), which was prepared by Guilhoto (1999) as a product of the agreement between BASA and IPEA. The used methodology took as reference the new system of national accounts that has been used in Brazil since 1990.

The close connection of chain effects concept in the production process with SAM is known. However, the concept chain effects, which is essentially a dynamic concept, can be used in a very mechanical way when it interprets the indicators derived from a

SAM without the appropriate restriction, as this is an analysis of input-and output-and, therefore, from synchronous nature. It is known, consequently, that this is a problem that has hampered the understanding in *cross-section* or *panel* analysis, of the extension of dynamic effects in the production chain. The technical-economic forces that facilitate the achievement of the first steps can block the occurrence of the following, making a somewhat extended the deployment of the chain effects due to the observed fact to "rely more than usually on public policy in the new process of industrialization "(HIRSCHMAN, 1961).

#### **4. RESULTS ANALYSIS OF APPLYING THE MCS MODEL**

Financial Institutions (FIs) include a number of banks and non-bank institutions providers of financial services. Bank financial institutions develop their own activities to capture funds from superavit (surplus) agents and loans application or financing to deficit agents.<sup>14</sup> The resources gap given by the value between the capture and application, correspond to the profit from FI bank due to of one of its functions that is to provide information. A second function of FI banks is to reduce risk, as the lenders aim to receive more so they are at risk. A third function of the FI bank is the issuing of any eventual rights on themselves, in order to meet the demand of these rights by lenders.

The deposits are nominal obligations that generate a checking account which deposits may be drawn at any time by check. In principle, the deposits create titles that can be traded in financial markets. However, the same way that banks operate in the credit market, credit, financing and investment societies - which are not banks - do the same. Moreover, investment banks do not act in the credit market, but in the capital market. Especially now when *multiple banks* have diversified the activities and provided

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<sup>14</sup> CARVALHO et alli.(2000)

services. Regarding the financial services, there are a variety of them: banking services, trust services, brokerage services and custody of securities (custody).

#### 4.1. SECTORAL ANALYSIS OF TRANSFER-EFFECTS

The SAM is important for structural analysis because makes endogenous social institutions and added value appropriated by them, but to measure the effects of exogenous variables on endogenous variables is necessary to partition the A matrix in order to specify at least one of the accounts as exogenous, as previously shown. In the case of the Amazon economy, the exogenous accounts include flows from the exports of the region with the rest of the world and of Brazil, as well as the flow of net subsidies taxes.

The matrix of transfer- effects of Stone, which derives from partitioned MCS, is important to sector analysis because it gets the multiplier effects resulting from the transfer of the input-output relations between and among the productive activities matrix. Taking the table 1 (Annex), as analytical reference, it is noticed that the Financial Institutions of the Amazon economy affected other regional economies and were also impacted by them. In fact, it is noticed that so the regional financial sector could meet the incremental stimulus of exogenous demand of \$ 1,000.00 in 1999, the **IF** would need to buy inputs (financial services) within the financial sector itself in the value of R\$ 85,60 and R\$ 914,40 from the other sectors of the Amazon economy, as shows Table 1 (Annex).

Another way to analyze the transfer-effects of **IF** on the other activities of the region is through the sector multiplier effects. The Financial Institutions of the Amazon, in terms of inputs purchases from other sectors in 1999, responded to a extern demand variation of U.S. \$ 1 billion acquiring inputs from suppliers in the construction sector; the

amount of R \$ 2.3, R.\$ 6.3 from trade sector; of R \$ 7.3 million of the storage sector; R \$ 9.7 million for power sector; R \$ 15.9 million from the transportation sector, R \$ 20.4 million of telecommunications sector; R \$ 176.1 million in the sector of "other services" and more R \$ 762.0 million of other economic sectors, as shows table 1. This only confirms the intersectorial connection of the Amazon economy and the existence of financial relationships that should be considered by sectoral policy-makers tailored to local production.

#### 4.2. SECTORAL ANALYSIS OF CROSS-EFFECTS

The cross-effects results are presented in table 2 (Appendix). The coefficients of this matrix represent the multiplier sector resulting from cross injection between productive activities, institutions and added value as there was no interaction of economic flows within the block of the cross-effects matrix of Stone.

The obtained result, therefore, are considered as direct and indirect overflow that goes from productive activities in the form of added value. The added values are appropriated by social institutions (households and government) that define the functional distribution of income and therefore the structure of effective demand in the expenditures that are held by economic agents along with productive activities. However, as these accounts do not appear on the referred matrix its cross-effects were not taken, the inter-blocks effects can be taken.

In fact, through table 2, it is noticed that in 1999 the regional financial sector spent, to an initial injection of \$ 1.0 billion of exogenous demand, R\$ 784.6 million paying the families and about R\$ 150, 2 million for enterprises. On the other hand 55.87% of FI revenues were from the purchase of assets and / or financial services paid to



the financial sector with working class' wages, and about 30, 13% of those revenues owned to the financial sector were originated in the profits of the companies.

From the point of the aggregate income (added value), we find that 100% of the working class' wages are spent on financing the purchase of consumer goods. Meanwhile, the profits earned by companies in 1999, about 50.16% finance the purchase of consumer goods and 49.84% fund gross capital goods investment (FBCF), as shown in table 2. In the same table, analyzing the economic behavior of institutions, regarding the expenses with consumer goods and capital goods, it is observed that 47.06% of workers' wages are spent in the purchase of consumer goods and only 8.89 % on the purchase of new non-productive capital goods (housing properties); in the meantime, 28,45% of the companies' profit are spent buying consumer goods and 32,93% in capital goods (FBCF).

#### 4.2. SECTORAL ANALYSIS OF CIRCULAR-EFFECTS

The circular-effects matrix results are placed in the table 3 (Annex). It is advised to notice that these results show the circular flow of the referred matrix. Meaning, this matrix shows the effects that start from productive activities flowing into the added value, going from the latest to the institutions in the way of income that, finally, is spent on the purchase of goods and services produced by productive activities, thus closing the cycle.

It is through the circular-effect that the initial injection of an exogenous variable is spread throughout the economy and the result is manifested at a more advanced development stage of a regional economy. The results listed in Table 3 (Annex) of the circular-effects matrix shows the impact of intersectoral multipliers that are derived from certain economic transactions that the input-output matrix fails to get. This advantage of the circular-effects matrix results from the fact that the part of the gross production value, which exceeds the purchase of inputs for a given activity, is converted into income and is

spent, via circular effect, during acquisition of new consumer goods and new capital goods from productive activities. The same interpretation pattern can be applied to Financial Institutions.

In fact, for an increase of R\$ 1.0 billion in exogenous demand, in 1999, it was made that the Financial Institutions of the Amazon economy spent on inputs purchase (financial services in general, including deposits capture) in 1999, about R\$ 84.5 million in the agriculture sector, R\$ 126.2 million in the cattle sector, R\$ 93.7 million in the vegetal agribusiness sector, R\$ 123.7 million in the animal agribusiness sector, R\$ 236.1 million in the sector of "other industries", R \$ 146.7 in the sector of electric power, and R \$ 121.2 million within the financial sector itself, and others, as shows Table 3.

In the same year, to compensate, the Amazon Financial Institutions sold its products and financial services to all sectors that deal with them. Among these areas, it is worth highlighting: Agriculture (R \$ 92.4 million) Cattle (R \$ 103.9 million), Forestry (R \$ 88.1 million), Non-metallic minerals (R\$ 90.9 million); Metallic Minerals (R \$ 69.4 million) and Education (R \$ 134, 3 million), as confirmed in table 3.

Furthermore, FI received, in return for its financial and services products in ways of loans or financing, R\$ 104.1 million (consumer) and R \$ 53.6 million (investor), what shows the low level of funding investment in the area, as shown in Table 3. Due to all that, is observed that the intersectoral multiplier effect resulting from circular-effect are more vigorous than the multipliers of the effect-transfers due to the already mentioned reasons.

#### 4.3. SECTORAL ANALYSIS OF THE GLOBAL- EFFECTS

To start it is necessary to recall that the global-effects matrix comprises the total sum of the effects of the transfer, cross and circular matrices analyzed. The matrix of

global- effects submit all direct and indirect impacts resulting from a variation in exogenous demand. The matrix of global-effects, derived from the MCS, is completely determined by exogenous demand, as in Keynesian models, since there is no restriction of the offer, which is considered as given.

Table 4 shows the global impacts, caused by unit changes in exogenous demand by goods and services of the Amazon economy sectors, resulting from intersectorial economic interactions (shown in main diagonal) with a network of suppliers that demonstrate the backward effects ( presented in columns) and also with the network of customers that evidences the forward effects (shown in lines).

To the beginning of the analysis, it is only taken column 20 of the global multipliers of the Amazon economy matrix from 1999 which corresponds to Financial Institutions or the Financial Sector, as seen in table 4. In this column, it is noticed that an one billion reais increase in exogenous demand, for financial services and products in the financial sector, caused a further increase of R\$ 206.80 million in the financial sector itself, what added to the billion reais from the initial injection totalizes

R\$ 1,206.8 million. The analyzed results in column 20 of table 4 indicate that the financial industry located in the region has a reasonable ability to boost the amount in the case of an activity provider of financing and loans for other activities.

In table 4, besides the intra-sectoral multiplier coefficients, other intersectoral increases important for demanding inputs of the regional financial sector spread to the other economic activities, as a result of the initial injection of a billion reais, such as: R\$ 85.7 million for agriculture; R \$ 126.5 million for cattle; R\$ 156.3 million to the power sector; R \$ 417.1 million for civil construction and R\$ 1.777,1 million for the "other services "sector, as shows column 20 of table 3. These figures reflect, roughly, the

required growth of each economic sector to meet the single increases of the demand. It is therefore understood that the stimulus caused by increased exogenous demand do not induce, despite variations in the magnitude of the intersectoral connections coefficients, only the development of isolated activities, but also the Amazon economy as a whole.

It is also important to observe the impacts caused by global multipliers on institutions and on the income distribution of the Amazon economy sectors, in particular of Financial Institutions. Indeed, the exogenous demand increase in R\$ 1.0 bilhão spread direct and indirect multiplier effects on the institutions (families, enterprises and government). For the financial sector case, the increase demand for consumer goods in 1999 was of R\$ 2.010,0 million, which, added to the initial injection of R\$ 1.000,0 million, increased global demand for consumer goods of the Amazon economy in R\$ 3,010.0 million. Furthermore, the corporate and government institutions were also negatively impacted, as the same magnitude of the initial injection provided an increase in the gross formation of fixed capital of only R\$ 690.3 million, as shows column 20 of Table 4 (Annex).

The global multiplier effects spread also on the level and on the functional Amazon income distribution. These economic impacts were captured by increasing the distribution level of added value - expressed in the form of wages and profits - generated by Financial Institutions located in the Amazon. Indeed, it is noticed that in 1999, the added value of the financial sector has increased, as a result of the initial injection of a billion reais, for a total of R\$ 3.422,4 million. Of this aggregate value, about 59.53% were taken by the working class in the form of wages; and 40.70% for the entrepreneurial class in the form of profits, as seen in column 20 of table 4.

Another way of interpreting the multipliers global effects, derived from the MCS of the Amazon economy in 1999, can be made from the response issued by a given activity chosen for the stimulus caused by an unique and simultaneous injection to other productive activities. In this case, reading the global multiplier effects matrix is performed along lines of table 4. In 1999, a unique injection of one billion reais caused by the exogenous demand, resulted in a global multiplier effect on the **FI**, in sales terms of financial services and products, which ranged from a minimum of R\$ 74.7 million of the machinery, equipment and automobiles productive sectors, to a maximum of R\$ 1.206,8 million within the financial sector itself, as shows line 20 of table 4.

These results indicate that the financial industry responded in 1999, more intensely to the impacts of demand within the same activity. This only reinforces the immediate need for a national policy for regional development of the financial sector in order to add more value to products and services from the financial sector of the Amazon economy, aiming to nearer even more the relations of interdependence between the financial sector and the other productive sectors of the Amazon region.

The main diagonal of the global multipliers matrix of the Amazon shows increases in gross production values in regard to the single increase of the exogenous demand for products of each productive activity. In 1999, the global multipliers of the diagonal of global-effects matrix, which capture the intersectoral impacts of productive activities, ranged from a minimum of 1.0027 (forest sector) to a maximum of 1.5797 (the power sector) as shows the diagonal of Table 4. In that same year, the global multiplier coefficient of the financial sector in the region was 1.2068 (Table 4). This variability of global multiplier effects is a factor that may limit the improvement of the income and employment distribution structure of regional economy. To alleviate this

situation is necessary to know the conditions of the regional productive structure more deeply to prevent- from the agent side- some decisions that will penalize the poor economic sectors and / or block those channels that can facilitate a sustained economic growth of the Amazon economy. This variability, therefore, means that the global multiplier effects of the Amazon economy depends on the structure of regional demand; and that the expenditures of economic agents in the acquisition of goods and services for consumption and investment differ from company to company and consumer for consumer.

The robustness of the intra and inter sectoral relations generated within and between the financial sector and other activities in the production chain, especially those closest to the Financial Institutions upstream and downstream, shows the structure power of a key industry. Apparently in 1999, the Financial Institutions responded to stimuli of all activities of their chain with emphasis on the sectors of the mineral industry, agriculture, construction, "other services" and "other industries". The robustness' level of the financial sector global multiplier, with most sectors of the Amazon economy, shows that the regional financial sector do not have yet a strong power to drag on the growth of other regional productive activities, to trigger a process of financing development in the models of Hirschman in the Amazon.

#### 4.4. ANALYSIS OF THE KEYNESIANS MULTIPLIER EFFECTS

To analyze the ability of the real sectors of the Amazon economy of generating sectoral product, employment and income, it will be used the concepts of the product, employment and income (wages and profits) multipliers. These multipliers capture the generation capacity of the product, employment and income, in direct and indirect ways, through increased exogenous demand. These Keynesian multipliers were calculated from

the global multiplier effects matrix and its vector-column and vector-line of the considered variables: product, employment and income.

**a) Product multiplier**

The product multiplier (MP<sub>j</sub>) is derived from the formula  $MP_j = \sum_{i=1}^n A_{ij}$ , where A<sub>ij</sub> are the coefficients of direct and indirect effects of the Mg column-vectors, which measures the variation of the total output of all productive sectors of the Amazon economy in response to variations of a monetary unit of final demand for products of a specific sector considered for analysis. In the case of Financial Institutions, the output multiplier of 5.7202 suggests that, in 1999 for one R\$ billion increase of final demand, the IF responded with an increase of approximately R\$ 5.720,2 million inputs (financial services and products) to meet this increase in final demand, as can be seen in table 5. The financial sector product multiplier is one of the most robust among the sectors of the Amazon economy, which is also above the average of the product multiplier (4.5556) of the regional economy, as confirms table 5.

**b) Employment multiplier**

The sectoral employment multiplier (ME<sub>j</sub>) is derived from the formula  $ME_j = \frac{E_j}{e_j}$ , where  $E_{j(1 \times 23)} = e_{j(1 \times 23)} \cdot M_{g(23 \times 23)}$ . It means that E<sub>j</sub> represents the direct and indirect employment coefficients calculated by the previous multiplication of the vector-line of direct employment (e<sub>j</sub>) by the direct and indirect coefficients of the global effects matrix (M<sub>g</sub>). Therefore, the employment multiplier measures the capacity of employment generation in each sector in response to exogenous variation of a monetary unit of the final demand. For Financial Institutions, the employment multiplier is of 19.8506, so one

of the most robust of the Amazon economy. This means that for an exogenous increase of one billion reais of final demand, the financial sector of the Amazon economy responded with a generation of direct and indirect jobs, in 1999, of 19,851, thus high above the regional average, as Table 5 confirms. These indicators come to confirm the strategic importance of the regional financial sector to leverage the development of the Amazon.

***c) Income multiplier***

The sectoral aggregate income multiplier (  $MR_j$  ) is derived from the formula

$$MR_j = \frac{R_j}{r_j}, \text{ in which}$$

$R_{j(1 \times 23)} = r_{j(1 \times 23)} \cdot M_{g(23 \times 23)}$ . This means that the calculation of the income multiplier ( $MR_j$ ) is obtained by dividing the values of the vector-line of income (salaries plus profits) direct and indirect effects of the global-effects matrix ( $R_j$ ) by the values of the vector-line income direct coefficients ( $r_j$ ). Therefore, the sectoral income multiplier captures the ability of a given sector of the Amazon economy to expand its aggregate income in response to exogenous growth of a monetary unit of final demand. For the financial sector of the Amazon economy, it is noticed that the multiplier of aggregate income is relatively low, even getting under the regional average, when compared to other sectors with greater power to generate income. In fact, for an increase of one billion reais of final demand, the financial sector of the Amazon responded with an increase of only R \$ 172.4 million in income, as shows Table 5.

**4.6. ANALYSIS OF LINKAGE BACKWARD AND FORWARD EFFECTS**

In this section, we discuss the economic impacts resulting from the interconnections between various activities of the 1999' MCS of the Amazon economy.



In the face of inter-regional inequalities in income, one of the goals of the regional periphery Brazilian economies is to obtain a rapid income growth. To this, the industrialization and regional agroindustrialization may help reducing the economic gap between the rich and poor. It is therefore very important to choose the strategy of regional economic development due to lack of resources to operate a wide and diverse investment volume.

In this sense, it is important to know the intensity of the effects of back and forth chaining of productive activities of the Amazon, such as these criteria for choosing the key industries of greater power to leverage. The theoretical basis that guides the decision of economic agents regarding the option for the most appropriate strategy for pro-economic development, balanced growth versus unbalanced growth is very well known. Indeed, the concepts of *linkage effects* back (retrospective) and forward (prospective) were developed by Hirschman (1981).

Nevertheless, the technique required to measure the direct and indirect effects on the regional economy was developed by Rasmussem (1963), improved by Jones (1976). The reverse matrix of social accounting, M, is the matrix for the measurement of the intersectoral chaining. The choice for this alternative is due to the fact that SAM includes, besides the intermediate demands (inputs), the final demands for consumption and investment expenditures, as well as the income of production factors of and its distribution among institutions. Therefore, the linkage coefficients derived from SAM are more robust than those of IOM, as they get all direct and indirect effects of exogenous variations in final demand for all sectors of the regional economy.

***a) Determining Method of the Chaining Effects Coefficients***

The identification of key-industries in a regional economy is made through the analysis of the backward ( $U_j$ ) and forward  $U_i$  linkage effects coefficients from the MCS of 1999 of the Amazon economy. These are defined as follows:

$$U_j = [(Ma_j / n) / \overline{Ma}] = \text{where } U_j \text{ measures the backward linkage effect,}$$

$Ma_j$  is the coefficients sum of a determined column  $j$  of the  $M$  reverse MCS;

and  $\overline{Ma}$  is the average of all  $Ma$  matrix elements;

$$U_i = [(Pa_i / n) / \overline{Pa}] = \text{where } U_i \text{ measures the forward linkage effect}$$

$Pa_i$  = is the sum of the coefficient of a determined line  $i$  of reverse SAM; and

$\overline{Pa}$  is the average of all elements of the  $Pa$ ;

$n$  = is the number of productive activities of the reverse SAM.

Once the averages ( $Ma_j / n$ ) show the need for intermediate inputs, in case the final demand of the productive activity increase in one unit  $j$ , then  $U_j > 1$  indicates that productive activity  $j$  strongly depends on inputs produced in other productive activities, and vice versa where  $U_j < 1$ . This coefficient that captures the *effect of backward chaining* was developed by Rasmussem (1957) and accepted by Hirschman (1961) who considered that as a good indicator to identify key-industries for developing economies.

Regarding the coefficient that captures the *effect of forward chaining*, this was developed by Jones (1976) who uses a products coefficients matrix,  $P$ , instead of the technical coefficients matrix used in the model Rasmussem (1957). To facilitate the *ranking* interpretation of the Amazon economy key-sectors, both forward and backward coefficients were normalized by the global media sector.<sup>15</sup> Activities or industries that

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<sup>15</sup> Santana.(2004).

have high effects of backwards ( $U_j > 1$ ) and forward ( $U_i > 1$ ) chaining are those that provide greater induction power on the product of a given regional economy through the external savings generated by demand and / or offer of the economy.

***b) Analysis of the back and forward chaining effects***

Taking the table 6 as a reference, is it found that in 1999 there were three production activities with the *linkage* forward and backward effects greater than the unit. In the same year, the Financial Institutions placed in the Amazon showed an index of the backward linkage ( $U_j = 0,1500 < 1$ ) lower than the unit. Consequently, the Financial Institutions in the Amazon economy have low backward linkage power to productive activities located upstream of its position, as shows table 6. By the same table, note that the Financial Institutions of the region have an index of the forward linkage effect ( $U_i = 1.6117 > 1$ ) greater than unity. This means that the region's financial sector is connecting more and more with the activities of the downstream position in the economic structure of the region, it means, it is strengthening final demand for their products and financial services by the productive activities and social institutions part.

The fragility of the backward linkages effects in the financial sector may have some validity under certain historical conditions exclusionary regional development that is just waiting for the exclusive logic of the market performance. However, in a regional economy where the state is present with investments in basic social capital, allocation of tax credit and incentives, besides the purchasing power of state enterprises, the combined effects of these pro-development tools can overcome this inertia and enable strategic private investment generator of scale economies, scope economies and external economies - by increasing the industrial plant, the product differentiation and the

deepening of vertical integration - through the market' support, especially in the current globalization context.

The level of structural interdependence among the productive activities of the region's economy, can be derived both from the inputs offer from other activities to the considered productive activity -causing the backward effects - as from demand for products of this considered activity, by other activities, allowing the emergence of forwards effects. Moreover, regional economic development can be stimulated by the forces of final demand connections, according to the Keynesian tradition, associated with the income structure (added value) which, in turn, binds to the regional productive structure, through social institutions, closing the circular flow specified by the 1999 SAM. This shows that the financial sector is able to establish strong backward and forward *linkages* with other regional productive activities and should therefore be one of the key-activities of the Amazon economy that should be considered important for the sustainable development in the region. Through the indexes behavior capture the connection backward and forward effects of productive activities in the Amazon, despite the federal government policy of stabilization and the policy of economic growth in discretionary in forced march that penalizes some productive activities over others, the majority of the sectors of the regional economy had expanded its structural economic links, as shows Pictures 1 and 2.

## **5. CONCLUSION**

The analysis of the Amazon Financial Institutions' function, from the viewpoint of the 1999 SAM, was primarily to draw attention on the strategic importance that they can exercise to reduce regional inequalities. This performance, in any way, must be seen - by the authorities and monetary policies in order not to allow the process of bank

concentration only in urban centers, making the Amazon limited as for productive financings, since these credits, related to industrialization, tend to stay in the richest and therefore more developed regions, which - to some extent – blocks the expansion of the Amazon economy. As it was the main goal in this research to measure and interpret the effects of financial institutions on the other sectors of the Amazon economy, it can be measured the commercial flows of productive activity and view the conditioning factors that influence the sectoral fluctuations in the Amazon economy sector. Accordingly, it was found that the scarceness of available work-force offer and of additions and renovations to the formation of gross stock capital, via investment, limit the amount of production that can be used to the final market. Finally, it is concluded that the expansion of private banking network into the Amazon serve as a factor of financial leverage for the business of the development plan of organs in this area, as the SUDAM,

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**ANNEX**



**Table 1: Amazon Transfer-Effects Matrix of Stone (MET):1999**

Sector N	1	2	3	4	5	6	7	8	9	10	11	12	13
Product description / Sector	Agriculture	Cattle	Forestry	Mineral extraction	Non-metallic mineral	Metallic mineral	Machines, Equipments and automobiles	Wood and furniture	Cellulose, paper and graphic	Textile, clothing and leather	Vegetal Agribusiness	Animal agribusiness	Other industries
Agriculture	0,0474	0,0657	0,0099	0,0013	0,0009	0,0009	0,0005	0,0017	0,0019	0,0254	0,2776	0,0308	0,0267
Cattle	0,0089	0,0625	0,0004	0,0002	0,0002	0,0001	0,0001	0,0002	0,0002	0,0041	0,0260	0,3526	0,0015
Forestry	0,0001	0,0001	0,0006	0,0001	0,0028	0,0109	0,0006	0,0765	0,0258	0,0003	0,0003	0,0001	0,0013
Mineral extraction	0,0033	0,0026	0,0002	0,0454	0,0226	0,0106	0,0006	0,0002	0,0015	0,0004	0,0021	0,0017	0,0035
Non-metallic mineral	0,0002	0,0001	0,0001	0,0016	0,0795	0,0032	0,0016	0,0009	0,0011	0,0005	0,0012	0,0003	0,0042
Metallic mineral	0,0006	0,0005	0,0003	0,0042	0,0154	0,3189	0,0310	0,0067	0,0044	0,0046	0,0034	0,0017	0,0059
Machines, Equipments and automobiles	0,0009	0,0009	0,0005	0,0058	0,0105	0,0107	0,0583	0,0320	0,0072	0,0094	0,0025	0,0016	0,0033
Wood and furniture	0,0006	0,0002	0,0002	0,0001	0,0006	0,0012	0,0038	0,0785	0,0032	0,0011	0,0005	0,0005	0,0015
Cellulose, paper and graphic	0,0009	0,0007	0,0003	0,0020	0,0073	0,0049	0,0016	0,0017	0,1478	0,0064	0,0078	0,0035	0,0056
Textile, clothing and leather	0,0005	0,0002	0,0000	0,0003	0,0003	0,0002	0,0003	0,0014	0,0008	0,2913	0,0015	0,0002	0,0014
Vegetal Agribusiness	0,0008	0,0087	0,0002	0,0005	0,0006	0,0004	0,0002	0,0005	0,0014	0,0010	0,1813	0,0072	0,0098
Animal agribusiness	0,0008	0,0195	0,0002	0,0002	0,0002	0,0001	0,0001	0,0002	0,0002	0,0100	0,0056	0,0787	0,0006
Other industries	0,0331	0,0212	0,0063	0,0133	0,0210	0,0243	0,0143	0,0304	0,0493	0,0433	0,0194	0,0141	0,0923
Power	0,0051	0,0067	0,0020	0,0453	0,0307	0,0405	0,0108	0,0283	0,0388	0,0269	0,0194	0,0162	0,0159
Health and sanitation	0,0009	0,0013	0,0004	0,0102	0,0130	0,0063	0,0018	0,0037	0,0061	0,0048	0,0036	0,0031	0,0029
Construction	0,0007	0,0006	0,0003	0,0046	0,0043	0,0025	0,0018	0,0026	0,0037	0,0023	0,0025	0,0024	0,0020
Trade	0,0518	0,0288	0,0115	0,0346	0,0289	0,0327	0,0337	0,0632	0,0570	0,0603	0,0757	0,0619	0,0406
Transport	0,0255	0,0230	0,0176	0,0423	0,0296	0,0268	0,0102	0,0265	0,0198	0,0211	0,0383	0,0353	0,0202
Telecommunication	0,0031	0,0025	0,0014	0,0126	0,0112	0,0106	0,0099	0,0141	0,0209	0,0109	0,0104	0,0104	0,0098
<b>Financial Institution</b>	<b>0,0087</b>	<b>0,0082</b>	<b>0,0062</b>	<b>0,0354</b>	<b>0,0193</b>	<b>0,0175</b>	<b>0,0101</b>	<b>0,0080</b>	<b>0,0151</b>	<b>0,0130</b>	<b>0,0166</b>	<b>0,0138</b>	<b>0,0112</b>
Education	0,0000	0,0000	0,0000	0,0001	0,0001	0,0000	0,0000	0,0000	0,0001	0,0000	0,0001	0,0001	0,0001
Storage	0,0007	0,0006	0,0003	0,0022	0,0018	0,0014	0,0013	0,0017	0,0021	0,0016	0,0016	0,0015	0,0015
Other services	0,0222	0,0212	0,0139	0,0691	0,0418	0,0233	0,0199	0,0291	0,0433	0,0276	0,0346	0,0333	0,0315
Family	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
FBCF	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Salary	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Profit	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Source: SAM, 1999.

**Table 1: Amazon Transfer-Effects Matrix of Stone (MET):1999 (Continuation)**

Sector N.	14	15	16	17	18	19	20	21	22	23	Institutions		Added value	
Product description / Sector	Power	Health and sanitation	Construction	Trade	Transports	Tele-communication	<b>Financial Institutions</b>	Education	Storage	Other services	Consume	FBCF	Salary	Profit
Agriculture	0,0006	0,0093	0,0007	0,0017	0,0014	0,0009	<b>0,0012</b>	0,0012	0,0371	0,0042	0,0000	0,0000	0,0000	0,0000
Cattle	0,0006	0,0060	0,0001	0,0004	0,0002	0,0003	<b>0,0003</b>	0,0010	0,0243	0,0007	0,0000	0,0000	0,0000	0,0000
Forestry	0,0001	0,0002	0,0013	0,0002	0,0001	0,0002	<b>0,0002</b>	0,0001	0,0004	0,0002	0,0000	0,0000	0,0000	0,0000
Mineral extraction	0,0001	0,0002	0,0048	0,0002	0,0001	0,0001	<b>0,0001</b>	0,0000	0,0006	0,0002	0,0000	0,0000	0,0000	0,0000
Non-metallic mineral	0,0005	0,0012	0,0509	0,0006	0,0005	0,0015	<b>0,0003</b>	0,0004	0,0032	0,0015	0,0000	0,0000	0,0000	0,0000
Metallic mineral	0,0010	0,0010	0,0267	0,0009	0,0017	0,0046	<b>0,0004</b>	0,0003	0,0021	0,0012	0,0000	0,0000	0,0000	0,0000
Machines, Equipments and automobiles	0,0126	0,0050	0,0097	0,0026	0,0147	0,0181	<b>0,0018</b>	0,0005	0,0017	0,0071	0,0000	0,0000	0,0000	0,0000
Wood and furniture	0,0002	0,0004	0,0127	0,0004	0,0003	0,0003	<b>0,0001</b>	0,0002	0,0016	0,0004	0,0000	0,0000	0,0000	0,0000
Cellulose, paper and graphic	0,0033	0,0042	0,0013	0,0074	0,0023	0,0061	<b>0,0074</b>	0,0032	0,0054	0,0079	0,0000	0,0000	0,0000	0,0000
Textile, clothing and leather	0,0001	0,0008	0,0002	0,0004	0,0012	0,0004	<b>0,0002</b>	0,0001	0,0030	0,0011	0,0000	0,0000	0,0000	0,0000
Vegetal Agribusiness	0,0003	0,0050	0,0003	0,0008	0,0020	0,0006	<b>0,0005</b>	0,0011	0,0431	0,0008	0,0000	0,0000	0,0000	0,0000
Animal agribusiness	0,0002	0,0088	0,0001	0,0006	0,0002	0,0006	<b>0,0005</b>	0,0020	0,0479	0,0012	0,0000	0,0000	0,0000	0,0000
Other industries	0,0110	0,0257	0,0215	0,0393	0,0306	0,0108	<b>0,0133</b>	0,0038	0,0942	0,0172	0,0000	0,0000	0,0000	0,0000
Power	0,4679	0,1317	0,0057	0,0259	0,0066	0,0105	<b>0,0097</b>	0,0065	0,0263	0,0138	0,0000	0,0000	0,0000	0,0000
Health and sanitation	0,0004	0,0163	0,0015	0,0042	0,0012	0,0018	<b>0,0023</b>	0,0017	0,0043	0,0047	0,0000	0,0000	0,0000	0,0000
Construction	0,0083	0,0116	0,0400	0,0051	0,0055	0,0104	<b>0,0023</b>	0,0044	0,0057	0,0116	0,0000	0,0000	0,0000	0,0000
Trade	0,0097	0,0217	0,0318	0,0176	0,0260	0,0129	<b>0,0063</b>	0,0057	0,0628	0,0160	0,0000	0,0000	0,0000	0,0000
Transport	0,0047	0,0082	0,0161	0,0404	0,0986	0,0072	<b>0,0159</b>	0,0030	0,0088	0,0105	0,0000	0,0000	0,0000	0,0000
Telecommunication	0,0059	0,0064	0,0056	0,0334	0,0186	0,0135	<b>0,0204</b>	0,0027	0,0109	0,0104	0,0000	0,0000	0,0000	0,0000
<b>Financial Institution</b>	<b>0,0294</b>	<b>0,0098</b>	<b>0,0066</b>	<b>0,0266</b>	<b>0,0212</b>	<b>0,0200</b>	<b>0,0856</b>	<b>0,0010</b>	<b>0,0050</b>	<b>0,0083</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>
Education	0,0001	0,0003	0,0000	0,0002	0,0001	0,0001	<b>0,0014</b>	0,0116	0,0000	0,0013	0,0000	0,0000	0,0000	0,0000
Storage	0,0030	0,0301	0,0009	0,0091	0,0022	0,0115	<b>0,0073</b>	0,0015	0,0012	0,0062	0,0000	0,0000	0,0000	0,0000
Other services	0,0611	0,1192	0,0260	0,1284	0,0450	0,0640	<b>0,1761</b>	0,0279	0,0247	0,0589	0,0000	0,0000	0,0000	0,0000
Family	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	<b>0,0000</b>	0,0000	0,0000
FBCF	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	<b>0,0000</b>	0,0000	0,0000
Salary	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	<b>0,0000</b>
Profit	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	<b>0,0000</b>

Source :SAM, 1999.

**Table 2: Amazon Net Cross-effects matrix of Stone (MECZs):1999**

Sector N	1	2	3	4	5	6	7	8	9	10	11	12	13
Product description / Sector	Agriculture	Cattle	Forestry	Mineral extraction	Non-metallic mineral	Agriculture	Machines, Equipments and automobiles	Wood and furniture	Cellulose, paper and graphic	Textile, clothing and leather	Vegetal Agribusiness	Animal agribusiness	Other industries
Agriculture	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Cattle	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Forestry	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Mineral extraction	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Non-metallic mineral	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Metallic mineral	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Machines, Equipments and automobiles	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Wood and furniture	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Cellulose, paper and graphic	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Textile, clothing and leather	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Vegetal Agribusiness	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Animal agribusiness	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Other industries	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Power	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Health and sanitation	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Construction	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Trade	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Transport	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Telecommunication	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
<b>Financial Institutions</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>
Education	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Storage	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Other services	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
Family	0,4045	0,3890	0,4603	0,4774	0,5291	0,4201	0,3950	0,5302	0,5053	0,4306	0,4487	0,4232	0,4036
FBCF	0,2775	0,2401	0,3794	0,2344	0,2579	0,1585	0,1363	0,2074	0,1469	0,1251	0,2076	0,1975	0,1705
Salary	0,1064	0,1285	0,0688	0,1533	0,1681	0,1510	0,1563	0,2277	0,2422	0,1886	0,1340	0,1376	0,1413
Profit	0,5568	0,4818	0,7613	0,4704	0,5175	0,3180	0,2734	0,4161	0,2947	0,2511	0,4164	0,3963	0,3421

Source: SAM, 1999.

**Tabela 2: Amazon Net Cross-effects matrix of Stone (MECZs):1999 (Continuation)**

N. do Setor	14	15	16	17	18	19	20	21	22	23	Instituições		Valor adicionado	
Product description / Sector	Power	Health and sanitation	Construction	Trade	Transports	Tele-communication	<b>Financial Institutions</b>	Education	Storage	Other services	Consume	FBCF	Salary	Profit
Agriculture	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0242	0,0170	0,0242	0,0206
Cattle	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0419	0,0002	0,0419	0,0211
Forestry	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0006	0,0009	0,0006	0,0008
Mineral extraction	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0006	0,0027	0,0006	0,0016
Non-metallic mineral	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0024	0,0277	0,0024	0,0150
Metallic mineral	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0033	0,0166	0,0033	0,0099
Machines, Equipments and automobiles	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0136	0,0500	0,0136	0,0317
Wood and furniture	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0037	0,0088	0,0037	0,0062
Cellulose, paper and graphic	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0098	0,0012	0,0098	0,0055
Textile, clothing and leather	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0035	0,0001	0,0035	0,0018
Vegetal Agribusiness	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0311	0,0002	0,0311	0,0157
Animal agribusiness	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0411	0,0001	0,0411	0,0206
Other industries	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0746	0,0165	0,0746	0,0457
Power	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0477	0,0044	0,0477	0,0261
Health and sanitation	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0788	0,0011	0,0788	0,0401
Construction	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0082	0,5652	0,0082	0,2858
Trade	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0760	0,0388	0,0760	0,0575
Transport	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0552	0,0134	0,0552	0,0344
Telecommunication	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0379	0,0043	0,0379	0,0212
<b>Financial Institutions</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0000</b>	<b>0,0391</b>	<b>0,0048</b>	<b>0,0391</b>	<b>0,0220</b>
Education	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,1037	0,0000	0,1037	0,0520
Storage	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,0440	0,0008	0,0440	0,0225
Other services	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	<b>0,0000</b>	0,0000	0,0000	0,0000	0,5248	0,0309	0,5248	0,2786
Family	0,5975	0,6864	0,4817	0,5410	0,4936	0,6238	<b>0,7846</b>	0,9188	0,5497	0,7354	0,0000	0,0000	1,0000	0,5016
FBCF	0,1167	0,0946	0,2732	0,1431	0,1545	0,2519	<b>0,1502</b>	0,0449	0,1626	0,1427	0,0000	0,0000	0,0000	0,4984
Salary	0,3197	0,5154	0,1224	0,3181	0,2689	0,2952	<b>0,5587</b>	0,8600	0,2792	0,5526	0,4709	0,0889	0,0000	0,0000
Profit	0,2342	0,1899	0,5481	0,2872	0,3100	0,5053	<b>0,3013</b>	0,0901	0,3263	0,2863	0,2845	0,3293	0,0000	0,0000

Source: SAM, 1999.

**Table 3:** Amazon Cross-effects matrix of Stone (MECs):1999

Sector N.	1	2	3	4	5	6	7	8	9	10	11	12	13
Product description / Sector	Agriculture	Cattle	Forestry	Mineral extraction	Non-metallic mineral	Agriculture	Machines, Equipments and automobiles	Wood and furniture	Cellulose, paper and graphic	Textile, clothing and leather	Vegetal Agribusiness	Animal agribusiness	Other industries
Agriculture	0,0548	0,0512	0,0659	0,0594	0,0658	0,0496	0,0459	0,0630	0,0572	0,0488	0,0551	0,0521	0,0487
Cattle	0,0762	0,0718	0,0902	0,0847	0,0938	0,0719	0,0669	0,0912	0,0841	0,0716	0,0789	0,0745	0,0701
Forestry	0,0018	0,0016	0,0021	0,0019	0,0021	0,0015	0,0014	0,0020	0,0018	0,0015	0,0017	0,0016	0,0015
Mineral extraction	0,0028	0,0025	0,0034	0,0028	0,0031	0,0023	0,0021	0,0029	0,0025	0,0022	0,0026	0,0025	0,0023
Non-metallic mineral	0,0221	0,0201	0,0279	0,0221	0,0245	0,0175	0,0159	0,0223	0,0191	0,0163	0,0203	0,0192	0,0175
Metallic mineral	0,0165	0,0152	0,0206	0,0169	0,0187	0,0136	0,0124	0,0173	0,0151	0,0129	0,0156	0,0147	0,0135
Machines, Equipments and automobiles	0,0567	0,0521	0,0702	0,0586	0,0648	0,0473	0,0434	0,0604	0,0530	0,0452	0,0540	0,0510	0,0471
Wood and furniture	0,0123	0,0114	0,0151	0,0129	0,0143	0,0105	0,0097	0,0134	0,0119	0,0101	0,0119	0,0112	0,0104
Cellulose, paper and graphic	0,0186	0,0174	0,0220	0,0205	0,0227	0,0174	0,0162	0,0220	0,0203	0,0173	0,0191	0,0181	0,0170
Textile, clothing and leather	0,0065	0,0061	0,0076	0,0072	0,0079	0,0061	0,0057	0,0077	0,0071	0,0060	0,0067	0,0063	0,0059
Vegetal Agribusiness	0,0566	0,0533	0,0670	0,0629	0,0696	0,0534	0,0497	0,0677	0,0624	0,0532	0,0586	0,0553	0,0520
Animal agribusiness	0,0746	0,0703	0,0883	0,0830	0,0919	0,0704	0,0655	0,0893	0,0824	0,0702	0,0773	0,0730	0,0687
Other industries	0,1461	0,1372	0,1739	0,1611	0,1783	0,1359	0,1262	0,1724	0,1581	0,1348	0,1498	0,1415	0,1328
Power	0,0894	0,0842	0,1062	0,0991	0,1097	0,0839	0,0780	0,1064	0,0979	0,0834	0,0923	0,0872	0,0819
Health and sanitation	0,1438	0,1354	0,1703	0,1599	0,1770	0,1356	0,1262	0,1720	0,1585	0,1351	0,1489	0,1406	0,1322
Construction	0,3766	0,3404	0,4802	0,3687	0,4071	0,2856	0,2582	0,3664	0,3079	0,2624	0,3362	0,3185	0,2892
Trade	0,1629	0,1524	0,1952	0,1778	0,1967	0,1490	0,1381	0,1892	0,1724	0,1469	0,1651	0,1560	0,1460
Transport	0,1088	0,1022	0,1297	0,1199	0,1327	0,1011	0,0939	0,1283	0,1176	0,1002	0,1115	0,1053	0,0988
Telecommunication	0,0716	0,0673	0,0850	0,0793	0,0878	0,0671	0,0624	0,0851	0,0782	0,0667	0,0738	0,0697	0,0655
<b>Financial Institutions</b>	<b>0,0742</b>	<b>0,0697</b>	<b>0,0881</b>	<b>0,0821</b>	<b>0,0909</b>	<b>0,0694</b>	<b>0,0646</b>	<b>0,0881</b>	<b>0,0810</b>	<b>0,0690</b>	<b>0,0764</b>	<b>0,0722</b>	<b>0,0678</b>
Education	0,1882	0,1773	0,2228	0,2094	0,2318	0,1777	0,1654	0,2253	0,2078	0,1771	0,1951	0,1842	0,1732
Storage	0,0804	0,0757	0,0952	0,0894	0,0990	0,0758	0,0706	0,0961	0,0886	0,0755	0,0833	0,0786	0,0739
Other services	0,9725	0,9154	1,1532	1,0793	1,1948	0,9145	0,8506	1,1596	1,0679	0,9101	1,0049	0,9491	0,8920
Family	1,4108	1,3213	1,6889	1,5425	1,7070	1,2942	1,2002	1,6432	1,4992	1,2776	1,4328	1,3537	1,2675
FBCF	0,3625	0,3373	0,4391	0,3887	0,4300	0,3220	0,2974	0,4095	0,3689	0,3144	0,3600	0,3402	0,3170
Salary	0,9117	0,8567	1,0848	1,0065	1,1141	0,8499	0,7897	1,0783	0,9898	0,8435	0,9364	0,8845	0,8302

Profit | 0,7272 | 0,6767 | 0,8810 | 0,7799 | 0,8627 | 0,6459 | 0,5967 | 0,8215 | 0,7402 | 0,6308 | 0,7222 | 0,6826 | 0,6360

Source: SAM, 1999.

**Table 3: Amazon Cross-effects matrix of Stone (MECs):1999 (Continuation)**

Sector N.	14	15	16	17	18	19	20	21	22	23	Institution		Added Value	
Product description / Sector	Power	Health and sanitation	Construction	Trade	Transports	Tele-communication	<b>Financial Institutions</b>	Education	Storage	Other services	Consume	FBCF	Salary	Profit
Agriculture	0,0645	0,0719	0,0620	0,0605	0,0565	0,0746	<b>0,0845</b>	0,0916	0,0624	0,0793	0,0728	0,0390	0,0728	0,0559
Cattle	0,0963	0,1084	0,0875	0,0892	0,0827	0,1077	<b>0,1262</b>	0,1406	0,0916	0,1184	0,1084	0,0552	0,1084	0,0819
Forestry	0,0020	0,0022	0,0020	0,0019	0,0017	0,0023	<b>0,0026</b>	0,0027	0,0019	0,0024	0,0022	0,0012	0,0022	0,0017
Mineral extraction	0,0027	0,0030	0,0030	0,0026	0,0025	0,0034	<b>0,0036</b>	0,0036	0,0028	0,0034	0,0031	0,0019	0,0031	0,0025
Non-metallic mineral	0,0202	0,0215	0,0239	0,0199	0,0192	0,0266	<b>0,0264</b>	0,0253	0,0209	0,0248	0,0231	0,0148	0,0231	0,0190
Metallic mineral	0,0163	0,0176	0,0181	0,0158	0,0151	0,0206	<b>0,0213</b>	0,0213	0,0165	0,0200	0,0185	0,0113	0,0185	0,0149
Machines, Equipments and automobiles	0,0577	0,0627	0,0624	0,0555	0,0528	0,0717	<b>0,0754</b>	0,0767	0,0579	0,0709	0,0655	0,0389	0,0655	0,0522
Wood and furniture	0,0131	0,0143	0,0136	0,0125	0,0118	0,0159	<b>0,0171</b>	0,0178	0,0130	0,0161	0,0148	0,0085	0,0148	0,0117
Cellulose, paper and graphic	0,0231	0,0260	0,0213	0,0215	0,0200	0,0260	<b>0,0303</b>	0,0336	0,0221	0,0284	0,0261	0,0134	0,0261	0,0197
Textile, clothing and leather	0,0081	0,0091	0,0074	0,0075	0,0070	0,0091	<b>0,0106</b>	0,0118	0,0077	0,0100	0,0091	0,0047	0,0091	0,0069
Vegetal Agribusiness	0,0715	0,0804	0,0650	0,0662	0,0614	0,0800	<b>0,0937</b>	0,1043	0,0680	0,0879	0,0804	0,0410	0,0804	0,0608
Animal agribusiness	0,0943	0,1062	0,0857	0,0874	0,0811	0,1055	<b>0,1237</b>	0,1377	0,0897	0,1160	0,1062	0,0541	0,1062	0,0802
Other industries	0,1801	0,2020	0,1670	0,1676	0,1558	0,2038	<b>0,2361</b>	0,2605	0,1724	0,2215	0,2029	0,1052	0,2029	0,1542
Power	0,1119	0,1258	0,1025	0,1039	0,0964	0,1257	<b>0,1467</b>	0,1627	0,1067	0,1376	0,1260	0,0647	0,1260	0,0954
Health and sanitation	0,1815	0,2043	0,1651	0,1683	0,1560	0,2031	<b>0,2380</b>	0,2649	0,1728	0,2232	0,2043	0,1042	0,2043	0,1544
Construction	0,3178	0,3330	0,4018	0,3182	0,3098	0,4375	<b>0,4148</b>	0,3793	0,3373	0,3903	0,3649	0,2480	0,3649	0,3066
Trade	0,1951	0,2179	0,1850	0,1824	0,1702	0,2238	<b>0,2557</b>	0,2791	0,1880	0,2399	0,2201	0,1164	0,2201	0,1684
Transport	0,1339	0,1502	0,1243	0,1246	0,1159	0,1517	<b>0,1755</b>	0,1935	0,1282	0,1647	0,1509	0,0783	0,1509	0,1147
Telecommunication	0,0893	0,1004	0,0820	0,0830	0,0770	0,1005	<b>0,1171</b>	0,1298	0,0853	0,1099	0,1006	0,0517	0,1006	0,0762
<b>Financial Institutions</b>	<b>0,0924</b>	<b>0,1039</b>	<b>0,0850</b>	<b>0,0859</b>	<b>0,0797</b>	<b>0,1041</b>	<b>0,1212</b>	<b>0,1343</b>	<b>0,0882</b>	<b>0,1137</b>	<b>0,1041</b>	<b>0,0536</b>	<b>0,1041</b>	<b>0,0789</b>
Education	0,2380	0,2680	0,2163	0,2206	0,2045	0,2662	<b>0,3121</b>	0,3476	0,2265	0,2927	0,2679	0,1365	0,2679	0,2024
Storage	0,1014	0,1142	0,0924	0,0941	0,0872	0,1136	<b>0,1330</b>	0,1480	0,0966	0,1248	0,1142	0,0583	0,1142	0,0863
Other services	1,2210	1,3735	1,1158	1,1330	1,0513	1,3701	<b>1,6009</b>	1,7786	1,1637	1,5019	1,3750	0,7038	1,3750	1,0404
Family	1,6979	1,8984	1,6045	1,5866	1,4790	1,9436	<b>2,2254</b>	2,4337	1,6346	2,0882	2,5843	1,3163	2,5843	1,9523
FBCF	0,4124	0,4571	0,4076	0,3891	0,3650	0,4850	<b>0,5402</b>	0,5776	0,4025	0,5071	0,6081	0,4197	0,6081	0,5142

Salary	1,1279	1,2662	1,0429	1,0492	0,9751	1,2744	<b>1,4787</b>	1,6340	1,0788	1,3873	1,2710	0,6571	1,7419	1,2455
Profit	0,8273	0,9171	0,8177	0,7806	0,7323	0,9731	<b>1,0837</b>	1,1588	0,8075	1,0173	0,9355	0,5127	1,2200	1,0316

Source: SAM, 1999..

**Table 4: Amazon Global-effects matrix (MEG): 1999**

Sector N	1	2	3	4	5	6	7	8	9	10	11	12	13
Product description / Sector	Agriculture	Cattle	Forestry	Mineral extraction	Non-metallic mineral	Agriculture	Machines, Equipments and automobiles	Wood and furniture	Cellulose, paper and graphic	Textile, clothing and leather	Vegetal Agribusiness	Animal agribusiness	Other industries
Agriculture	1,1021	0,1169	0,0758	0,0608	0,0667	0,0505	0,0464	0,0648	0,0592	0,0742	0,3327	0,0829	0,0753
Cattle	0,0851	1,1342	0,0906	0,0849	0,0940	0,0720	0,0670	0,0913	0,0843	0,0757	0,1049	0,4272	0,0716
Forestry	0,0019	0,0017	1,0027	0,0020	0,0049	0,0124	0,0020	0,0785	0,0276	0,0018	0,0020	0,0018	0,0029
Mineral extraction	0,0061	0,0051	0,0036	1,0482	0,0257	0,0129	0,0026	0,0031	0,0040	0,0025	0,0047	0,0041	0,0058
Non-metallic mineral	0,0223	0,0203	0,0279	0,0237	1,1040	0,0206	0,0175	0,0233	0,0202	0,0168	0,0215	0,0195	0,0217
Metallic mineral	0,0171	0,0157	0,0209	0,0211	0,0341	1,3325	0,0434	0,0240	0,0195	0,0174	0,0190	0,0164	0,0195
Machines, Equipments and automobiles	0,0576	0,0530	0,0706	0,0644	0,0753	0,0581	1,1017	0,0924	0,0603	0,0546	0,0564	0,0526	0,0504
Wood and furniture	0,0129	0,0116	0,0153	0,0130	0,0149	0,0117	0,0135	1,0919	0,0151	0,0112	0,0124	0,0118	0,0119
Cellulose, paper and graphic	0,0194	0,0182	0,0223	0,0225	0,0300	0,0222	0,0177	0,0237	1,1681	0,0236	0,0269	0,0216	0,0225
Textile, clothing and leather	0,0070	0,0063	0,0077	0,0075	0,0082	0,0062	0,0060	0,0091	0,0079	1,2973	0,0082	0,0065	0,0074
Vegetal Agribusiness	0,0573	0,0620	0,0672	0,0634	0,0702	0,0538	0,0499	0,0682	0,0638	0,0542	1,2399	0,0626	0,0618
Animal agribusiness	0,0754	0,0898	0,0885	0,0832	0,0921	0,0706	0,0656	0,0895	0,0826	0,0802	0,0830	1,1517	0,0693
Other industries	0,1792	0,1584	0,1802	0,1744	0,1993	0,1602	0,1405	0,2028	0,2074	0,1781	0,1692	0,1556	1,2251
Power	0,0945	0,0909	0,1081	0,1444	0,1405	0,1244	0,0888	0,1348	0,1367	0,1104	0,1117	0,1034	0,0978
Health and sanitation	0,1447	0,1367	0,1706	0,1701	0,1899	0,1419	0,1280	0,1756	0,1646	0,1400	0,1525	0,1437	0,1351
Construction	0,3772	0,3409	0,4806	0,3734	0,4115	0,2880	0,2599	0,3690	0,3116	0,2647	0,3386	0,3209	0,2912
Trade	0,2146	0,1813	0,2067	0,2124	0,2256	0,1817	0,1718	0,2524	0,2294	0,2072	0,2408	0,2179	0,1866
Transport	0,1343	0,1252	0,1473	0,1622	0,1623	0,1279	0,1041	0,1548	0,1374	0,1213	0,1498	0,1407	0,1190
Telecommunication	0,0747	0,0698	0,0864	0,0919	0,0990	0,0776	0,0723	0,0992	0,0991	0,0776	0,0842	0,0801	0,0752
<b>Financial Institutions</b>	<b>0,0828</b>	<b>0,0779</b>	<b>0,0943</b>	<b>0,1175</b>	<b>0,1101</b>	<b>0,0870</b>	<b>0,0747</b>	<b>0,0961</b>	<b>0,0961</b>	<b>0,0820</b>	<b>0,0930</b>	<b>0,0860</b>	<b>0,0790</b>
Education	0,1882	0,1773	0,2228	0,2095	0,2319	0,1778	0,1654	0,2254	0,2079	0,1772	0,1951	0,1843	0,1733
Storage	0,0811	0,0763	0,0955	0,0916	0,1008	0,0772	0,0719	0,0979	0,0908	0,0771	0,0849	0,0801	0,0754
Other services	0,9947	0,9366	1,1671	1,1483	1,2366	0,9378	0,8705	1,1888	1,1112	0,9376	1,0396	0,9824	0,9235
Family	1,8154	1,7103	2,1492	2,0199	2,2362	1,7143	1,5953	2,1734	2,0045	1,7083	1,8815	1,7769	1,6711
FBCF	0,6400	0,5774	0,8186	0,6232	0,6880	0,4804	0,4337	0,6169	0,5158	0,4395	0,5675	0,5377	0,4875
Salary	1,0181	0,9852	1,1535	1,1598	1,2822	1,0009	0,9460	1,3060	1,2319	1,0321	1,0704	1,0221	0,9715
Profit	1,2840	1,1585	1,6423	1,2503	1,3802	0,9639	0,8701	1,2376	1,0349	0,8818	1,1386	1,0789	0,9780



Source: SAM, 1999.

**Table 4: Amazon Global-effects matrix (MEG): 1999 (Continuation)**

Sector N	14	15	16	17	18	19	20	21	22	23	Instituições		Valor adicionado	
Product description / Sector	Power	Health and sanitation	Construction	Trade	Transports	Tele-communication	Financial Institutions	Education	Storage	Other services	Consume	FBCF	Salary	Profit
Agriculture	0,0651	0,0812	0,0627	0,0622	0,0579	0,0755	<b>0,0857</b>	0,0929	0,0996	0,0835	0,0970	0,0560	0,0970	0,0765
Cattle	0,0968	0,1144	0,0876	0,0896	0,0829	0,1080	<b>0,1265</b>	0,1415	0,1159	0,1191	0,1503	0,0554	0,1503	0,1030
Forestry	0,0021	0,0023	0,0033	0,0021	0,0019	0,0025	<b>0,0028</b>	0,0028	0,0023	0,0027	0,0029	0,0022	0,0029	0,0025
Mineral extraction	0,0028	0,0032	0,0079	0,0028	0,0027	0,0036	<b>0,0036</b>	0,0036	0,0034	0,0035	0,0037	0,0046	0,0037	0,0041
Non-metallic mineral	0,0207	0,0228	0,0748	0,0204	0,0196	0,0281	<b>0,0267</b>	0,0258	0,0242	0,0263	0,0255	0,0426	0,0255	0,0340
Metallic mineral	0,0172	0,0185	0,0448	0,0166	0,0168	0,0252	<b>0,0217</b>	0,0216	0,0186	0,0211	0,0218	0,0279	0,0218	0,0248
Machines, Equipments and automobiles	0,0702	0,0677	0,0721	0,0581	0,0674	0,0899	<b>0,0772</b>	0,0772	0,0596	0,0780	0,0791	0,0889	0,0791	0,0840
Wood and furniture	0,0133	0,0147	0,0264	0,0129	0,0121	0,0162	<b>0,0172</b>	0,0179	0,0146	0,0165	0,0185	0,0174	0,0185	0,0179
Cellulose, paper and graphic	0,0264	0,0302	0,0226	0,0289	0,0222	0,0321	<b>0,0377</b>	0,0368	0,0275	0,0363	0,0359	0,0146	0,0359	0,0252
Textile, clothing and leather	0,0082	0,0100	0,0076	0,0080	0,0082	0,0095	<b>0,0109</b>	0,0119	0,0107	0,0110	0,0126	0,0048	0,0126	0,0087
Vegetal Agribusiness	0,0717	0,0854	0,0653	0,0671	0,0634	0,0806	<b>0,0942</b>	0,1054	0,1111	0,0887	0,1115	0,0412	0,1115	0,0765
Animal agribusiness	0,0945	0,1150	0,0858	0,0880	0,0812	0,1061	<b>0,1242</b>	0,1397	0,1377	0,1172	0,1472	0,0542	0,1472	0,1009
Other industries	0,1911	0,2277	0,1885	0,2069	0,1865	0,2146	<b>0,2494</b>	0,2644	0,2666	0,2386	0,2776	0,1217	0,2776	0,1999
Power	1,5797	0,2575	0,1083	0,1298	0,1031	0,1362	<b>0,1563</b>	0,1693	0,1330	0,1514	0,1737	0,0691	0,1737	0,1216
Health and sanitation	0,1819	1,2206	0,1666	0,1725	0,1572	0,2050	<b>0,2403</b>	0,2666	0,1771	0,2279	0,2832	0,1053	0,2832	0,1945
Construction	0,3262	0,3446	1,4418	0,3233	0,3153	0,4479	<b>0,4171</b>	0,3837	0,3430	0,4020	0,3731	0,8131	0,3731	0,5924
Trade	0,2047	0,2397	0,2168	1,2000	0,1962	0,2367	<b>0,2620</b>	0,2848	0,2508	0,2559	0,2961	0,1552	0,2961	0,2259
Transport	0,1386	0,1583	0,1405	0,1651	1,2145	0,1588	<b>0,1915</b>	0,1965	0,1371	0,1751	0,2061	0,0917	0,2061	0,1491
Telecommunication	0,0952	0,1068	0,0876	0,1164	0,0956	1,1140	<b>0,1375</b>	0,1325	0,0962	0,1202	0,1385	0,0561	0,1385	0,0974
<b>Financial Institutions</b>	<b>0,1218</b>	<b>0,1137</b>	<b>0,0916</b>	<b>0,1125</b>	<b>0,1009</b>	<b>0,1241</b>	<b>1,2068</b>	<b>0,1352</b>	<b>0,0932</b>	<b>0,1220</b>	<b>0,1433</b>	<b>0,0584</b>	<b>0,1433</b>	<b>0,1010</b>
Education	0,2381	0,2683	0,2163	0,2208	0,2046	0,2663	<b>0,3135</b>	1,3591	0,2265	0,2940	0,3716	0,1365	0,3716	0,2544
Storage	0,1045	0,1443	0,0932	0,1031	0,0894	0,1250	<b>0,1403</b>	0,1495	1,0978	0,1309	0,1582	0,0590	0,1582	0,1088
Other services	1,2821	1,4927	1,1418	1,2614	1,0963	1,4341	<b>1,7771</b>	1,8065	1,1885	2,5607	1,8998	0,7347	1,8998	1,3191
Family	2,2955	2,5847	2,0862	2,1276	1,9726	2,5674	<b>3,0100</b>	3,3525	2,1843	2,8236	3,5843	1,3163	3,5843	2,4539
FBCF	0,5291	0,5517	0,6808	0,5322	0,5195	0,7369	<b>0,6903</b>	0,6225	0,5651	0,6497	0,6081	1,4197	0,6081	1,0126
Salary	1,4477	1,7816	1,1653	1,3672	1,2440	1,5696	<b>2,0374</b>	2,4940	1,3580	1,9399	1,7419	0,7460	2,7419	1,2455
Profit	1,0616	1,1069	1,3658	1,0677	1,0423	1,4784	<b>1,3850</b>	1,2489	1,1338	1,3036	1,2200	0,8420	1,2200	2,0316

Source: SAM, 1999.

**Table 5:** Amazon Keynesian product, employment and income multipliers: 1999

Sector	Multipliers		
	Product	Employment	Income
Agriculture	4,0305	2,3178	0,9933
Cattle	3,9060	3,7468	0,5721
Forestry	4,4527	1,9725	1,4174
Mineral extraction	4,3905	13,7280	0,1756
Non-metallic mineral	4,7275	6,8895	0,3865
Metallic mineral	4,1051	11,5438	0,1702
Machines, Equipments and automobiles	3,5814	18,4242	0,0986
Wood and furniture	4,6566	3,7873	0,6716
Cellulose, paper and graphic	4,4048	8,6879	0,2609
Textile, clothing and leather	4,0827	2,6446	0,7237
Vegetal Agribusiness	4,5709	10,4126	0,2122
Animal agribusiness	4,3539	22,3871	0,0938
Other industries	3,8013	11,3680	0,1715
Power	4,9530	37,9791	0,0661
Health and sanitation	5,1396	5,5305	0,5223
Construction	4,4538	6,4125	0,3947
Trade	4,4684	3,6033	0,6758
Transport	4,1958	3,5998	0,6351
Telecommunication	5,0399	38,8094	0,0785
<b>Financial Institutions</b>	<b>5,7202</b>	<b>19,8506</b>	<b>0,1724</b>
Education	5,8254	2,8410	1,3175
Storage	4,6347	1,9960	1,2484
Other services	5,2828	5,6529	0,5738
<b>Region's average</b>	<b>4,5556</b>	<b>10,6168</b>	<b>0,5057</b>

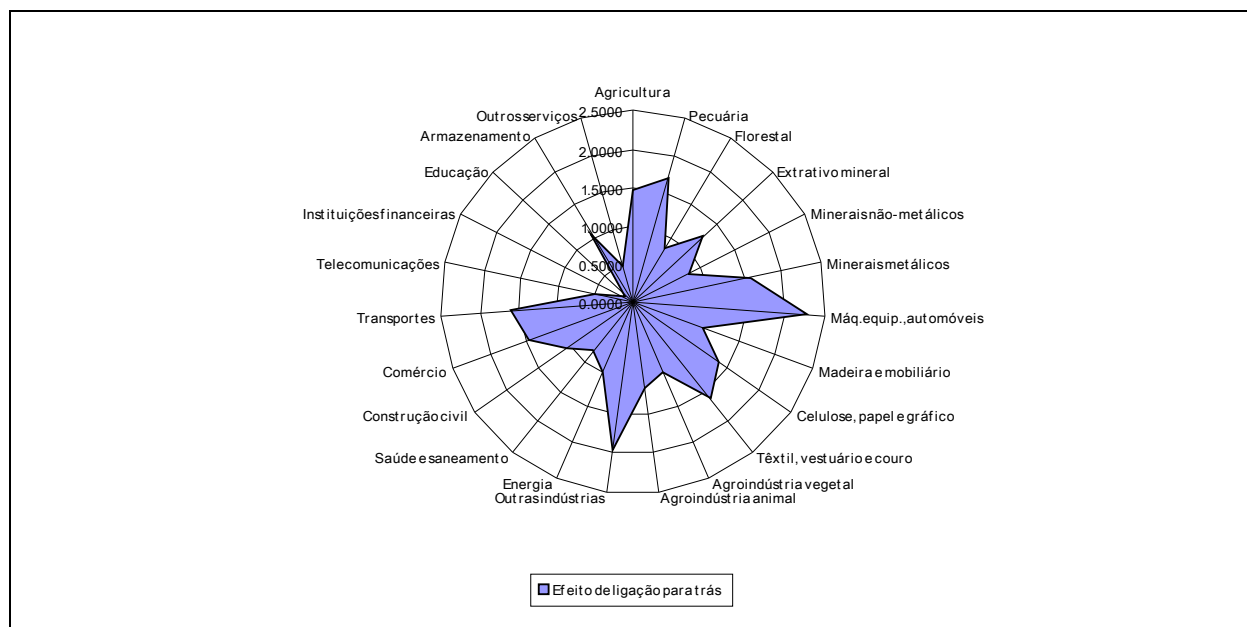
Source: Table 3.

**Table 6:** Linkage backward and forward effects of the economic sectors highlighting the Financial Institutions in the Amazon: 1999

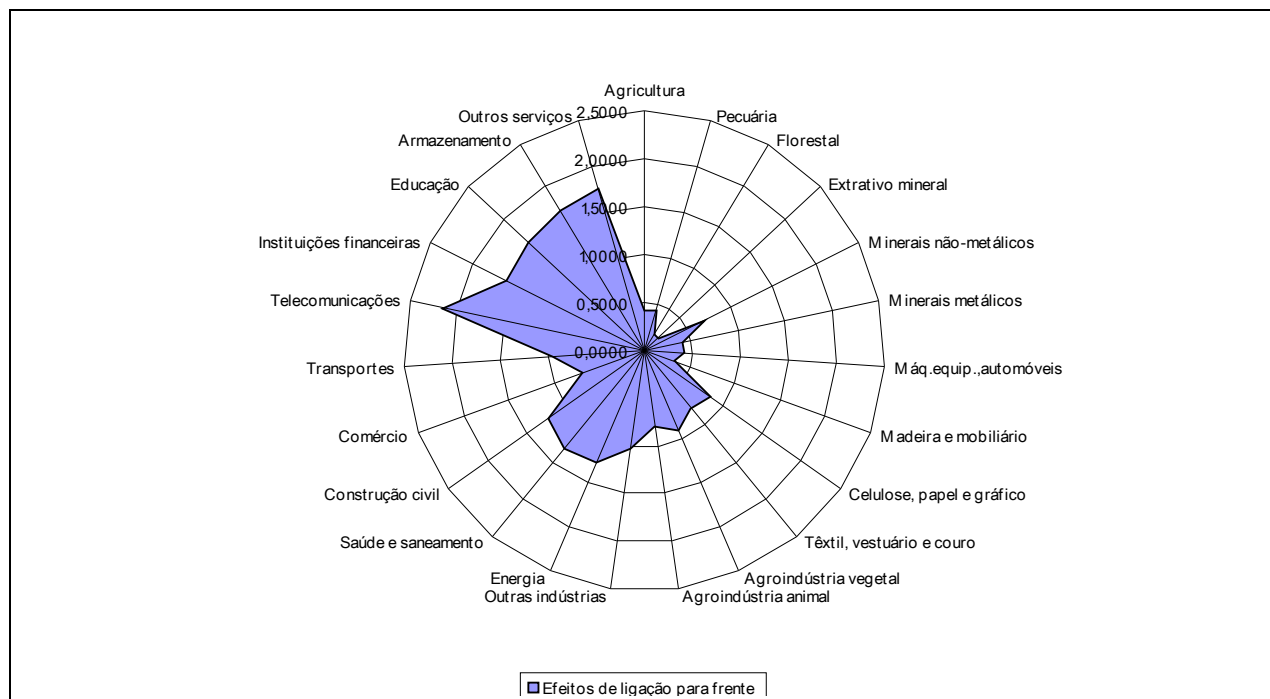
Sector	Backward linkage effects	Forward linkage effects
Agriculture	1,4590	0,4119
Cattle	1,6678	0,4283
Forestry	0,7983	0,1848
Mineral extraction	1,2576	0,1888
Non-metallic mineral	0,8131	0,7068
Metallic mineral	1,5633	0,3886
Machines, Equipments and automobiles	2,2720	0,4133
Wood and furniture	0,9692	0,3245
Cellulose, paper and graphic	1,3692	0,8384
Textile, clothing and leather	1,6238	0,7733
Vegetal Agribusiness	0,9789	0,9007
Animal agribusiness	1,1313	0,8017
Other industries	1,9482	1,0159
Power	0,9857	1,2722
Health and sanitation	0,8054	1,3188
Construction	1,0455	1,2188
Trade	1,4263	0,6912
Transport	1,5918	0,9604

Telecommunication	0,4979	2,1422
<b>Financial Institutions</b>	<b>0,1500</b>	<b>1,6117</b>
Education	0,1355	1,6554
Storage	1,0301	1,7110
Other services	0,4870	1,7526
<b>Average</b>	<b>1,1307</b>	<b>0,9440</b>

Source: Table 3.



Picture 1: Backwards linkage effects of MCS in the Amazon: 1999



Picture 2: Forward linkage effects of MCS in the Amazon: 1999.