

Building a Financial Social Accounting Matrix for Colombia

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ABSTRACT

This document shows a first approach to build a financial Social Accounting Matrix (SAM) for Colombian economy. In order to do it, it is proposed a methodology to build real SAM and T-accounts for financial sector. Finally, I get mix up real and financial accounts in a financial SAM. In particular, this financial SAM can be used as input for IMMPA model.

Keywords: IMMPA Model; Social Accounting Matrices.

Construyendo una matriz de contabilidad social financiera para Colombia

RESUMEN

En este documento se muestra una primer aproximación para la construcción de una Matriz de Contabilidad Social (MCS) Financiera para la economía colombiana. Para realizarlo, se propone una metodología para construir una MCS real y de cuantas T para el sector financiero. Finalmente estas cuentas, tanto del sector real como financieros, son unidas en una SAM financiera. En particular, esta financiera sirve como insumo para el modelo IMMPA.

Palabras clave: Modelo IMMPA; Social Accounting Matrices.

Clasificación JEL: C81, D57, D58.

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1. INTRODUCTION

A Social Accounting Matrix (SAM) is based on information provided by the National Account System. It details the links between supply and demand for goods in the economy and the accounts of institutional sectors within. Fundamentally, a SAM can be used in two ways: to summarize the economic data of a country or to be used as a database for a computable general equilibrium model (CGE).

In Colombia, given the quantity and quality of the information, several SAMs have been built since the late eighties. Most of the exercises were undertaken for three purposes: to produce multipliers analysis (Cordi 1988 and 1999, and Arrieta and Guzman, 2001), to serve as basis to build forecasting models, like the ones made by the National Planning Department (Gutierrez and Valderrama, 1996, and Prada, 2002), FEDESARROLLO (Bussolo and Correa, 1998) and CEGA (Prada and Ramirez, 2001), or as input for a CGE model (Hernandez, Prada and Ramirez, 2001, and Guzman and Prada, 2002). The latter is the reason for the present construction of this financial SAM; in other words, it has to be built to be incorporating it to the structure of the Integrated Macroeconomic Model for Poverty Analysis (IMMPA model)².

Jensen and Karl (2004) constructed a financial SAM using a similar approach of this paper, real accounts, produced by the Department of National Statistics (DANE), and financial accounts, elaborated by the Banco de la Republica (i.e. Central Bank), all based on the System of National Accounts (SNA). However, In order to link financial accounts to real sector using a mathematical method, called cross entropy approach, in this document is used a T-account method.

This document is organized in the following parts: in the first three sections, the real SAM is presented, including its general structure and explanations of its components, likewise the primary information sources and a brief description of its construction process. The following two sections are devoted to establishing and presenting the relations between the financial and real SAM, as well the complete description of its construction for the Colombian case. Finally, the SAM that relates the real and the financial sector is presented.

The Real SAM Structure

A general structure of a real SAM is presented in. A SAM is a square matrix in which each transaction or account of the economy is a row or a column. The payments or expenditures are listed in the columns and the income or receipts in the rows. Each one of the accounts must be balanced such that the sum of the i -th row is equal to the sum of the j -th column. There are six kinds of accounts in the SAM: goods and services, production sectors, factors, institutions, capital account and the rest of the world.

² See Agenor and Izquierdo (2003) and Agenor, Izquierdo and Jensen (2007).

Goods and services: Accounts of goods and services, by columns, show a composite good (the supply of the economy), which is produced by means of domestic goods and imports at market prices, that is, they pay some taxes for the production.

Production sectors: These accounts correspond —by columns— to the purchase of raw materials, intermediate consumption and the contracting of services for the production of goods. Their expenditures include the acquisition of intermediate goods, and the value added, which is distributed between the production factors in form of wages and rent. The receipts, which are presented in the rows, are distributed in the accounts of final consumption goods, exports and investment, in other words, in the demand of each production.

TABLE 1
Real Social Accounting Matrix Structure.

	Commodities	Activities	Primary Income Generation Account (Value Added categories)	Taxes and Subsidies	Primary and secondary distribution account of income	Institutional sectors	Rest of the world	Capital Account	TOTAL
Commodities	Commerce and Transportation Margins	Intermediate Consumption				Final Consumption expenditure	Exports of goods and services	Gross capital formation	Total demand by product, Domestic supply in basic prices by economic activity branch
Activities	Production						Payment of wage earners from the rest of the world		Factorial receipts
Primary Income Generation Account (Value Added)		Value Added				Direct taxes paid by			
Taxes and subsidies	Taxes and subsidies over the production, including VAT, tariffs	Production taxes and subsidies				Institutions			Tax receipts
Primary and secondary distribution account of income					Income of the institutions related to property rent and other operations of the income secondary distribution	Payments made by the institutions related to property rent and other operations of the income secondary distribution	Payments made by the rest of the world related to property rent and other operations of the income secondary distribution		Receipts related to property rent and other operations of the income secondary distribution
Institutional sectors			Primary Income Distribution	Received Taxes and paid subsidies by the government	Income of the rest of the world related to property rent and other operations of the income secondary distribution				Incomes by institutional sector
Rest of the world	Importation of good and services		Payment of wage earners transferred to the rest of the world			Savings from the institutions	External savings		Income of the rest of the world
Capital Account (Savings)									Savings
TOTAL	Supply by product	Domestic supply in basic prices by economic activity	Factorial payments	Received Taxes and paid subsidies by the General government	Payments related to property rent and other secondary distribution operations of the income	Institutions- expenditures	Rest of the world expenditure	Investment	

Source: Author's Construction

Primary and secondary income generation account: This account includes the capital and labor accounts, which receive payments from the sales of their services to the activities in form of wages, rent and international capital transfers. These receipts are distributed among households, as labor income, and firms, as profits after taxes.

Institutions: These accounts include households, firms and the government. The household incomes include factorial incomes, transfers among households, firms, the government and overseas. The expenditures of the households are consumption and tax payments; the residual is the saving transferred to the capital account. The firms receive benefits and transfers, and their expenditures consist of tax payments, consumption and transfers, the residual is their savings, included in the capital account. The government account, which does not include the public administration³, uses part of its income to pay its consumption from production sectors, and the rest to make transfers to the households and firms. Its incomes come from taxes paid by households and firms, and from some transfers made abroad.

Capital account: it can be identified separately for each institution. Notwithstanding, it is consolidated as one, receiving from each institution its savings and net transfers from overseas (called external savings⁴). It provides the necessary financing for the formation of domestic fixed capital.

Rest of the world: This account registers the interaction of the domestic economy with the external sector, such that the incomes are given by the imports plus the factorial payments and the transfers made to the institutions, and the expenditures are the sum of exports, factorial payments and transfers by the domestic economy.

Sources of information

In Colombia the Department of National Statistics (DANE) elaborated the economic data since 1982. The principal source of information to build a SAM is the System of National Accounts, which is summarized in three matrices: the *supply* matrix, the *utilization* matrix and *general economic equilibrium* matrix. The first and second matrices are new in Colombia, while the latter has been constructed since the first years of the seventies. The supply and utilization matrices are built for analytic and statistical purposes since 1993.

Goods and services supply matrix

The rows of the matrix present the information relative to the components of the supply by group of products. In the columns, the products are disaggregated by the activity that produces them. The matrix has three major components:

A. Total Supply	B. Supply Matrix	C. Imports' chart
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³ It is included as a sector in the SAM.

⁴ That is equivalent to current account, in a real CGE.

The component A presents the total supply of products, valued at basic prices and consumer's prices, and the elements that permit to pass from one valuation to the other.

From these elements it can be established the following equality: total supply at consumer's price = total supply at basic price – subsidies to the products + taxes to the products except VAT + non-deductible VAT + tariffs + transportation margins + commercial margins.

Component B presents the disaggregated production by goods and economic activities. It is a *double-entry* diagram, since in its rows, it determines how each good and service is produced, and its columns show how much each economic activity produces. In the diagonal appears the main productions and outside of them, the secondary ones.

In chart C are the goods and services imports, differentiated by class of products and a column for the adjustment from CIF (Cost, Insurance and Freights) to FOB (Free on Board) prices. This is necessary since in the national accounts, imports are valued at FOB.

Good and services utilization matrix

This matrix is divided in three sub-matrices:

Total supply, taxes and subventions over the products	Intermediate consumptions	Final Demand
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The intermediate consumptions sub-matrix registers the purchases and sales of products by economic activity (inter-industrial flows). In the columns, it registers the input purchases, by each productive sector. The rows record the sales of products to an activity, which is the same as its utilization.

The final demand sub-matrix displays how each product is used in the final demand. The columns register the different final uses, which are: exports, household's final consumption, public administration's final consumption, non profit institutions' final consumption, gross fixed capital formation, changes in stocks, and acquisition less cession of valuable objects. Each column is disaggregated by products, and in the last line appears the total.

The total supply, taxes and subventions over the products quadrant are an extension of the intermediate consumption chart. For each activity, it displays the total valuation of the gross production. The difference between the production value and the intermediate consumption is the value added. It is distributed between payments to wage earners, other taxes minus subventions over the production and gross exploitation surplus and mixed income.

General Economic Equilibrium Matrix

The chart of general economic equilibrium or integrated economic accounts is a synthesis of the institutional sectors' accounts and the operations between them. It groups in a diagram all the current accounts, accumulation accounts and the balance. The columns display the sectors, and the rows the operations between them.

It is organized as follows the expenditures or uses and the assets variation are displayed in the left; the resources or receipts and the variation of the liabilities are in the right. Additionally, there are columns for the totals, the rest of the world and a last one that allows observing the equilibrium between the uses and resources of the goods and services.

Each institution's sequence of accounts and balances is displayed. Each line displays the concept or transaction account, the receiving agents to the right, and the payers at the left.

Building the real SAM

The construction of the real SAM uses as basis the SAM developed by Hernandez, Prada and Ramirez (2001)⁵ —HPR, which has the following characteristics: sixty seven sectors disaggregation, six types of labor, five taxes, five rural households and ten urban household and the investment divided between private and public.

However, it is important to note that there are two other SAMs for Colombia for 1997. The one developed by Arrieta and Guzman (2001) with the purpose to be used in multipliers' exercise, and other developed by Guzman and Prada (2002) with the objective of being used in a CGE model for the fiscal incidence analysis.

There are two reasons to choose the HPR's SAM: i) its level of disaggregation in the agricultural sectors since can be classified easily according the IMMPA structure (tradable and non-tradable agriculture)⁶, and (ii) It has fifteen households, that permit a richer and detailed analysis.

The adaptation of the HPR's SAM to one for the IMMPA involves the adjustment of the sectors to the required aggregation, a new labor classification and finally, an aggregation of the household account⁷.

In first place, it was necessary to aggregate the SAM to five productive sectors, for which two criterions were considered: the aggregation of agricultural sectors in tradable and non-tradable goods, and the aggregation of the economy between formal and informal sectors.

In the case of the agricultural sectors⁸, the crop classification between tradable or not, was done according to the grade of openness of the activity, measured as

⁵ It was made according the information sources section, furthermore it use information from the national household survey and the income and expenses income to build the household disaggregation. For more details see Hernandez, Prada and Ramirez (2001) and Baron and Sorzano (2001).

⁶ In the HPR's SAM exist 13 agricultural sectors while the others SAM exist 4 agricultural sectors.

⁷ Not every step was made in this order but according to the compilation of the information.

the ratio external trade of the sector (exports plus imports) to the value of its production. According to this, the tradable sector is the one that has a 5% or more of its production dedicated to the external trade, and the non trade sector the one that has less than 5% of its value dedicated to the mentioned purpose.

The public sector was aggregated using the public administration services sectors and other services for the community in general, no marketable educational services, social services and no marketable health, services by associations and recreation and other no marketable services.

The aggregation of the formal and informal sectors of the economy was done in two steps. The first one was to aggregate the rest of sectors not aggregated in the previous steps⁹ in the national account sectors of industry, electricity, gas and water, construction, transportation and communications and financial services, which are equivalent to the same sectors in the National Household Survey. This procedure was followed in order to use the information of informality and formality from the survey.

Table 2 shows the informality rate for Colombia. To obtain the informal and formal sub-sector for each sector, its respective informality rate obtained from the national household survey was applied. Using this method it was possible to aggregate each category according with the requirements of the model.

TABLE 2
Colombia's informality rate.

	1998	1996
TOTAL	59.1%	56.0%
Not inform	41.9%	26.2%
Agriculture	55.2%	58.5%
Mining and Petroleum	17.3%	1.1%
Industry	43.7%	31.6%
Electricity, gas and water	6.6%	4.7%
Construction	69.2%	65.5%
Commerce	75.7%	73.3%
Transportation and communications	62.5%	60.1%
Financial Services	46.7%	36.2%
Other sectors	53.9%	52.8%

Source: DANE, National Household Survey Author's calculations.

The IMMPA model requires that labor must be classified in skilled and unskilled sectors. Thus, the labor from the HPR's SAM was aggregated using Arrieta

⁸ The agricultural sectors are: non-threshing coffee, palm, cocoa, yucca, bean, potato, fruits, plantain, rest of the crops, double purpose cattle, rest of livestock, forestry products and wood extraction, fish and other products of fishery.

⁹ These sectors correspond to activities 10 to 55 in Colombian national accounts.

and Guzman (2001)¹⁰ classification, which was made according to educational level attained (i.e. non, elementary, high school, university) by the 59 national accounts economic activities.

To build the labor classification by these categories, it was assumed that the unskilled workers were the people with no more than elementary education, while the skilled workers were the people with complete high school or more.

Finally, given the characteristics of the model, the household account was modified according to the following criteria¹¹: first, the capitalist households were the ninth and tenth deciles of the urban sector and the fifth quintile of the rural sector, according to HPR's SAM. Second, it was assumed that the rural sector's quintiles one to four were the non-tradable and tradable agricultural households, which have incomes from wages and capital earning depending to their labor and capital's participations, respectively. This latter criterion was used to classify urban informal unskilled and skilled labor households and urban formal skilled labor.

Table 3 shows the macroeconomic structure for the SAM of the IMMPA model. Each of the cells has a correspondence to each of the definitions in the , i. e. the supply of the economy is \$234.045 billions of pesos or the value added is \$109.771 billions of pesos. The GDP for 1997 was \$121.707 billions of pesos, adding each one of the components of the GDP.

Incorporating the financial accounts to the SAM

The introduction of the financial assets and loans in the SAM requires two additional types of accounts: the capital accounts that belong to the economic agents and the financial assets (or liabilities) of the agents. It is also possible to consider one that is the difference between the two previous accounts.

¹⁰ Arrieta and Guzman (2001) took as information sources: the 1993 population census, the National Household Survey of Sept. 1997 and the 1990 economic census. Additionally they used the following sources: the 1997 manufacturing industrial survey, the 1997 General Comptroller's office research of public sector employment, DANE and ICFES' educational statistics about docents, the 1997 micro industrial survey by areas and some statistics of the Ministry of Mining and other entities about the occupied personal in different activities.

¹¹ The IMMPA Model has the following households: trade crops, non trade crops, formal unskilled labor, informal unskilled labor, formal skilled labor and capitalists.

TABLE 3
1997 SAM Macroeconomic Structure for Colombia (thousands of pesos).

	Goods and Services	Production Sectors	Primary Income Generation Account (Value Added categories)	Taxes and Subsidies
Good and Services	0	87.076.823		
Production sectors	198.936.426			
Primary Income Generation Account (Value Added)		109.771.821		
Taxes and subsidies	9.847.898	2.087.782		
Primary and secondary distribution account of income			109.771.821	18.695.773
Institutional sectors				
Rest of the world	25.261.030			
Capital Account (Savings)				
TOTAL	234.045.354	198.936.426	109.771.821	18.695.773

TABLE 3 (Continuación)
 1997 SAM Macroeconomic Structure for Colombia (thousands of pesos).

	Primary and secondary distribution account of income	Institutional sectors	Rest of the world	Capital Account	TOTAL
Good and Services		103.439.484	18.063.272	25.465.774	234.045.353
Production sectors					198.936.426
Primary Income Generation Account (Value Added)					109.771.821
Taxes and subsidies		6.760.093			18.695.773
Primary and secondary distribution account of income		68.053.966	5.584.717		73.638.683
Institutional sectors	69.493.335				197.960.929
Rest of the world	4.145.348				29.406.378
Capital Account (Savings)		19.707.385	5.758.389		25.465.774
TOTAL	73.638.683	197.960.928	29.406.378	25.465.774	

Source: Author's calculations.

The capital accounts: in a financial SAM, each of the agents has two types of accounts, a current account like in a real SAM and a capital account. In fact, the real SAM has an accumulation account which acts as a capital account, but it is usually one for all institutions in the economy. Though in the rows there are savings for each institution, in the columns there are not enough information about the total investment, without taking in account how much each agent participates in the gross formation of fixed capital or even, in the net investment. In addition, this capital account just registers the physical capital flows and the institutions own resources. The creation of a different capital account for each institution details better the information about their resources, physical and financial assets that they keep as compensation for their loans. Additionally, it makes possible to distinguish non-financial firms from the financial ones (e.g. central bank and commercial banks), which does not occur in a real SAM.

Assets and liabilities accounts register in detail the structure of the financial resources and their uses by the institutions. The financial assets categories depend on what questions are to be answered in the model and what detail exists about the financial institutions. These assets can be registered in the SAM in terms of stocks or (just) flows¹².

TABLE presents a financial SAM, in which the relation between the financial and real SAMs is given by the capital or accumulation account. This SAM shows how the financing of savings and investment is given through the different financial assets owned by the different institutions.

In this SAM, the rows are the institutional assets while the columns are their liabilities. In this way, it can be represented the matrix in form of T-accounts, like it is show in Table 5.

For the households, there is a liability represented by their savings, while their assets take three forms: demand for money, deposits in the domestic and foreign banks.

The firms can finance their investment (their asset in the SAM) through loans they can subscribe in the domestic market and external debt market and their savings, which is represented by the retained profits.

The government finances its fiscal deficit with credits acquired in the domestic debt market and loans obtained abroad, as well as it can get financing from the Central bank in form of loans or an advance of its profits and privatizations.

For the domestic banks, the deposits made by the households and the loans obtained in foreign banks are supported by the reserve requirements, which remain in the Central bank, and the loans made to the firms and public sector.

In the case of the central bank, its liabilities are currency and the reserve requirements, while its assets are the loans to the government and the international reserves.

¹² If *stocks* are going to be introduced in the SAM, two additional accounts must be opened: one for an inventory entry book and other for an inventory exit book.

Finally, the rest of the world has assets in form of loans made to the private and public sectors. Its liabilities are the deposits made by the household abroad, the Central bank's international reserves and the current account's deficit or surplus.

TABLE 4
Financial SAM Scheme.

Households				Variations in domestic deposits	Deposits' variation abroad	Changes in the demand for money		Households' portfolio
Firms							Private Investment	Private Investment expenditures
Government							Government's surplus or deficit	Government's requirements for loans
Domestic Banks		Variations in loans to the private sector	Variations in loans to the public sector			Change in Domestic Reserves		Domestic banks assets
Rest of the world		Variations in loans given by the rest of the world to the private sector	Variations in loans given by the rest of the world to the public sector	Variations in loans given by the rest of the world to domestic banks			Net Loans	Foreign Banks assets
Central bank			Variations in loans given by the Central bank to the public sector	Rediscount operations made with commercial banks	Variations of International Reserves		Net Loans	Central bank assets
Net worth				Net loans				Total
Accumulation	Households' savings	Retained profits by the firms						net worth
Total	Households' savings	Private investment funding	Loans to the Government	Domestic Banking sector liabilities	Current account's surplus or deficit			Savings supply of the economy
					Foreign Banking sector liabilities	Central bank Liabilities	Total net worth	Total investment of the economy

Source: Author's Construction.

TABLE 5
T-accounts for the Financial SAM.

Households	
Assets	Liabilities
Currency Assets kept abroad Domestic banking deposits	Savings
Total Assets = Total Liabilities	

Non Financial Firms	
Assets	Liabilities
Private investment	Savings Loans from Domestic Banks Loans from Foreign Banks
Total Assets = Total Liabilities	

Government	
Assets	Liabilities
Fiscal Deficit or Surplus	Loans from Foreign Banks Loans from Domestic Banks Treasury advances Privatizations
Total Assets = Total Liabilities	

Domestic Banks	
Assets	Liabilities
Total of Loans of the Banks Reserve requirements Net Loan	Deposits in domestic banks Loans in foreign banks Rediscount Operations
Total Assets = Total Liabilities	

Central bank	
Assets	Liabilities
Treasury Advances Reserves Rediscount Operations	Currency Reserve requirements Net loans
Total Assets = Total Liabilities	

Rest of the world	
Assets	Liabilities
Loans to the domestic banks Loans to the firms Loans to the Government Privatizations	Savings: Current Account Balance Foreign deposits Reserves Net loans
Total Assets = Total Liabilities	

Adapted from Arnault (2002).

Building the Financial SAM

As it was mentioned earlier, a SAM contains flows of the economy such that the financial SAM's accounts are the stock variations occurred between 1996 and 1997. It is important to note that the external sector's accounts were changed to Colombian pesos, according to the 1997 end of year exchange rate.

The sources used in the construction of the financial SAM were various, mainly from: the real SAM -in the case of the accumulation account; fiscal balances for the most of the government's accounts; Central bank's sectorized summaries and sectorized summaries of the financial sector, for the banking system; and the balance of payments for the external sector.

The financial SAM was built in several steps, given the information and the importance of each account. In this order of ideas, the construction began with the households' balance accounts, continuing with the rest of the world and Central bank, public and private sectors, and ending with the adjustment of the banking sector accounts.

The households' account took as given the households' savings from the real SAM, in the side of the liabilities. In the assets' side, the deposits made abroad by the capitalist households are taken from the information about liabilities provided by the Banking Annual Survey (BAS) for Colombia, for the years 1996 and 1997. Given these two accounts, it was adjusted the banking deposits and the currency in the economy, keeping their proportions within the monetary base (high liquidity money).

Given the scarce information possessed at the moment, the distribution of the demand for money and the households' deposits were made *ad-hoc*. Thus, it was assumed that the rural households and urban informal unskilled households do not have deposits so their transactions are made with cash. Meanwhile, formal and capitalist households distribute their deposits according to their savings¹³.

The balance sheet of the central bank took as given the reserve requirements, the loans made to the government and the rediscount operations made with the commercial bank, all obtained from the central bank's sectorized balance, and the international reserves were taken from the balance of payments. Thus, given the demand for money, the adjustment account was the central bank net loans.

For the rest of the world, the available information contained the deposits made abroad, the international reserves (from the financial accounts of the households, and central bank) and current account's deficit (from the real SAM), in the side of the liabilities. The assets were taken from the external debt balance of the balance of payments, for private sector; sectorized balance sheet of financial sector, for loans to the domestic sector; and the fiscal balance sheet for the loans made to the government.

In the case of the public sector, the main restriction was the fiscal deficit. In consequence, it was taken as given the loans made by the central bank and the ex-

¹³ Currency was taken as the adjustment account.

ternal sector to the government; then the financing was adjusted by means of loans of the banking sector and the privatizations.

The private sector has in the side of the assets, the private investment, taken from the real SAM, and the foreign loans and the retained profits (which are the firms' savings in the real SAM) in the side of the liabilities. Thus, to complete the balance sheet the banking sector loans were adjusted.

TABLE 6
1997 Financial SAM for Colombia (thousands of pesos).

	Households	Firms	Government	Domestic Banks	Foreign Banks	Central Bank	Net worth	Accumulation	Total
Households				3.814.816	891.187	690.221		0	5.396.224
Firms			0	0	0	0	0	18.333.019	18.333.019
Government			0	0	0	0	0	3.381.968	3.381.968
Domestic Banks		5.565.256	1.481.786	0	0	499.910	0	0	7.546.952
Rest of the world		2.207.389	2.050.836	2.280.000	0	0	473.250	0	7.011.475
Central bank			-150.654	650.466	361.899	0	328.420	0	1.190.131
Net worth				801.670	0	0	0	0	801.670
Accumulation	5.396.224	10.560.374	0	0	5.758.389	0	0	0	21.714.987
Total	5.396.224	18.333.019	3.381.968	7.546.952	7.011.475	1.190.131	801.670	21.714.987	

Source: Author's calculations.

The consolidated domestic banking system had its balance completed, where its assets were the loans to the private sector, the loans to the government and the banking reserve requirements. Its liabilities were the domestic deposits, external credits and the rediscount operations with the central bank. To adjust the latter account, it was assumed that the difference between assets and liabilities was equal to the net capital of the banking sector.

¡Error! No se encuentra el origen de la referencia. shows the financial SAM for Colombia. Government deficit, \$3.381 billions of pesos, was financed through \$1,841 billions from the domestic banks, \$2.050 billions of pesos from abroad and pays \$150 millions of pesos to the central bank. On another hand, households' savings, \$5.936 billions of pesos comes from \$3.814 billions of pesos of domestic deposits, \$891 millions of pesos of domestic abroad and \$690 millions of pesos of currency.

The SAM for the IMMPA model

The purpose of this section is to explain how to merge the real and financial SAM, taking into account the structure of the IMMPA model. Thus, we make some changes

such that the construction of the real and financial SAMs is equivalent with the IMMPA's SAM.

First, this model do not has a structure of activities and commodities like in the real SAM so it is necessary to merge them in one matrix called goods¹⁴. Second, it is assume that profits of the economy are equivalent to the capital. Third, the financing of the firms is put in the investment account. Finally, the transfers of the government and of the rest of the world to the households were the adjustment account.

The structure for the IMMPA's SAM is depicted in the TABLE . As before, expenditures made by the agents are in the columns and the incomes or receipts are displayed through the rows. For example, government spends in public consumption, makes some transfers to the households, and pays interests to domestic and foreign banks; it finances its operations through the collection of tariffs, indirect and direct taxes, profits from its firms, money from the domestic and foreign banks (loans), utilities or loans from the central bank, and gains (or losses) from foreign reserves. In the case of the firms, its investments are financed with retained earnings, loans from domestic and foreign banks.

Building IMMPA's SAM

As it was mentioned, the link between the real and financial SAM was the savings. Therefore, we built a matrix with the structure exhibit in TABLE , but only using the financial accounts from the financial SAM. In consequence, it was obtained an imbalance equivalent to the savings and investment of the economy, but with the opposite sign¹⁵.

After that, we built a matrix, only using the real accounts, creating a link with the financial SAM through of the interest paid by each real institution (households, government and firms) to the financial institutions (domestic banks, foreign banks and central bank). Thus, there is an imbalance between accounts equivalent to the savings and investment of the economy¹⁶.

The IMMPA SAM was obtained from the merge of these two matrices. This SAM links the real accounts with the financial accounts and displays the financing of the real institutions.

¹⁴ It was the method RAS depicted by Reinert and Ronal-Holst (1997).

¹⁵ It is because investment is an asset and saving is a liability in the financial institutions.

¹⁶ Note that the financial accounts show the financing of the real institutions.

TABLE 7
Structure of the SAM for the IMMPA model.

	Goods	Labor	Indirect taxes	Profits	Households	Government	Money	Domestic Banks	Foreign banks	Central bank	Investment	Rest of the world	Total
Goods	Intermediate Consumption				Private consumption	Public consumption					Investment	Exports	Demand of the economy
Labor	Labor value added												Factorial receipts for labor
Indirect taxes	Paid indirect taxes												Indirect taxes
	Capital value added								Interest paid for deposits				Profits
Households		Salaries		Private Profits		Transfers		Interest paid for deposits	Loans to the government	Loans to the government		Transfers	Incomes of the households
Government	Tariffs		Collect indirect taxes	Public profits	Direct Taxes			Loans to the government				Gains or losses in foreign reserves	Financing of the government
Money					Currency				Loans to the domestic banks	Money market operations			Money demand
Domestic banks					Domestic deposits		Interest paid to domestic banks					Net cash flow	Financing of the abroad
Foreign banks					Abroad Deposits		Interest paid to foreign banks	Interest paid to foreign banks	Loans to the firms				Financing of the central bank
Central bank							Currency	Reserve requirements					Financing of the Investment
Investment				Retained Earnings				Loans to the firms				Reserves	Foreign incomes
Rest of the world	Imports												
Total	Supply of the economy	Value added for labor	Indirect taxes	Paid profits	Households expenses	Government expenses	Money Supply	Domestic banks expenses	Foreign banks expenses	Central bank incomes	Investment	Foreign expenses	

Adapted from Agenor and Izquierdo (2003).

Note that, in this SAM appears new accounts, like the interest paid for each institution (real or financial) to the financial institutions (domestic and foreign banks and central bank), which had not been included in the real or financial SAM. In order to build these cells it was used the stocks implicit in the flows of the financial SAM, and keeping the consistency by means of the calibration of the interest rates.

As in the case of the financial SAM, stocks were built according to the available the information and the importance of each account. The sources of information were the same ones that for the construction of the financial MCS.

The external and internal debt stocks of the public sector were estimated keeping constant the rates as GDP proportion, which were for 1997 20.3% and 14.1%, respectively. In addition, it was taken as given the interest paid of public debt, from these years was estimated the external and internal stock for the public debt¹⁷, later were estimated an implicit interest rates for each component of the debt.

The stocks for foreign deposits were built from the information contained in the Banking Annual Survey for 1996 and 1997, on another hand the interest rate, to estimate the interest paid for foreign deposits, was the Libor for 1997 (5.6%). For

¹⁷ The stocks for 1996 were estimated like the difference between the 1997 stock and their respective flow.

the interest paid for foreign loans, to the domestic banks, it was used the prime rate (8.4%) for 1997.

Finally, in the portfolio of the households, the money demand was calibrated such that money supply was equal demand¹⁸. The stocks of domestic deposits were built so its proportion of the monetary base was constant.

Final Remarks

A methodology to build a financial SAM was showed in this document used as base year national a financial accounts for 1997, since in 1999 was the worst recession for Colombia a later years had been of recovering. Thus, a caveat is important, the structure of the economy could be changed a lot in the last years.

In first place was build a real SAM taking as start point the national account system from Colombia, and later it was used a T-accounts being the primary source sheet balance of central bank, balance of payments and government accounts. Finally, these two matrices, real SAM and t-accounts, was getting mix up in one SAM that can be used as input for IMPPA model.

The financial SAM has a structure activities-commodities, and same structure of IMPPA model. That is, includes five sectors: tradable and non-tradable agriculture, private formal and informal urban sector, and public sector, and three factor payment accounts, six types of taxes, ten institutional accounts, which include financial sector.

¹⁸ It means that the credit of the central bank to the government plus international reserves, in local currency, minus the required reserves is equal to the money supply.

ANNEX 1 DETAILED REAL SAM

		1	2	3	4	5
1	Trade Agriculture	192,733	55,246	1,704,199	1,442,521	200,038
2	Non Trade Agriculture	145,067	499,144	3,260,004	2,672,247	61,616
3	Private Urban (formal) Sector	1,795,259	1,946,709	22,075,904	12,540,807	4,483,893
4	Informal Sector	730,642	812,517	13,894,305	14,436,938	4,127,033
5	Public Sector	0	0	0	0	0
6	Unskilled Labor	5,328,335	4,857,813	4,370,705	6,755,192	1,076,258
7	Skilled Labor	1,514,421	1,380,689	17,543,688	19,162,890	12,267,777
8	Indirect taxes	422,141	798	5,049,263	4,820,959	250,594
9	Working Capital	0	0	0	0	0
10	Sectoral Profits	282,007	318,380	17,426,293	14,556,609	2,930,765
11	Trade Agriculture Households	0	0	0	0	0
12	Non Trade Agriculture households	0	0	0	0	0
13	Unskilled Informal Households	0	0	0	0	0
14	Unskilled Formal Households	0	0	0	0	0
15	Skilled Households	0	0	0	0	0
16	Capitalist Households	0	0	0	0	0
17	Government	121,436	808	715,062	554,619	0
18	Money	0	0	0	0	0
19	Domestic Banks	0	0	0	0	0
20	Foreign Banks	0	0	0	0	0
21	Central Bank	0	0	0	0	0
22	Investment	0	0	0	0	0
23	Net Worth	0	0	0	0	0
24	Rest of the World	1,120,081	33,716	13,431,075	10,676,158	0

		6	7	8	9	10
1	Trade Agriculture	0	0	0	0	0
2	Non Trade Agriculture	0	0	0	0	0
3	Private Urban (formal) Sector	0	0	0	0	0
4	Informal Sector	0	0	0	0	0
5	Public Sector	0	0	0	0	0
6	Unskilled Labor	0	0	0	0	0
7	Skilled Labor	0	0	0	0	0
8	Indirect taxes	0	0	0	0	0
9	Working Capital	0	0	0	0	0
10	Sectoral Profits	0	0	0	0	0
11	Trade Agriculture Households	2,242,330	0	0	0	0
12	Non Trade Agriculture households	1,817,149	0	0	0	186,620
13	Unskilled Informal Households	10,823,251	0	0	0	2,310,999
14	Unskilled Formal Households	7,505,572	0	0	0	0
15	Skilled Households	0	51,869,466	0	0	0
16	Capitalist Households	0	0	0	0	7,341,661
17	Government	0	0	10,543,755	0	13,926,154
18	Money	0	0	0	0	0
19	Domestic Banks	0	0	0	0	2,480,035
20	Foreign Banks	0	0	0	0	983,675
21	Central Bank	0	0	0	0	0
22	Investment	0	0	0	0	10,560,374
23	Net Worth	0	0	0	0	0
24	Rest of the World	0	0	0	0	0

		11	12	13	14	15	16
1	Trade Agriculture	74,390	66,475	468,578	267,769	1,850,499	41,252
2	Non Trade Agriculture	82,239	73,490	518,024	296,025	2,045,768	45,605
3	Private Urban (formal) Sector	1,016,988	908,791	6,405,979	3,660,699	25,298,341	563,965
4	Informal Sector	923,009	824,811	5,814,007	3,322,416	22,960,539	511,849
5	Public Sector	26,748	23,903	168,488	96,282	665,388	3,393,727
6	Unskilled Labor	0	0	0	0	0	0
7	Skilled Labor	0	0	0	0	0	0
8	Indirect taxes	0	0	0	0	0	0
9	Working Capital	0	0	0	0	0	0
10	Sectoral Profits	0	0	0	0	0	0
11	Trade Agriculture Households	0	0	0	0	0	0
12	Non Trade Agriculture households	0	0	0	0	0	0
13	Unskilled Informal Households	0	0	0	0	0	0
14	Unskilled Formal Households	0	0	0	0	0	0
15	Skilled Households	0	0	0	0	0	0
16	Capitalist Households	0	0	0	0	0	0
17	Government	45,686	40,825	267,601	152,921	1,473,078	235,197
18	Money	190,531	170,261	178,426	18,724	129,394	2,885
19	Domestic Banks	0	0	0	83,238	575,242	3,156,336
20	Foreing Banks	0	0	0	0	0	891,187
21	Central Bank	0	0	0	0	0	0
22	Investment	0	0	0	0	0	0
23	Net Worth	0	0	0	0	0	0
24	Rest of the World	0	0	0	0	0	0

		17	18	19	20	21
1	Trade Agriculture	0	0	0	0	0
2	Non Trade Agriculture	0	0	0	0	0
3	Private Urban (formal) Sector	2,745,129	0	0	0	0
4	Informal Sector	4,387,626	0	0	0	0
5	Public Sector	21,023,437	0	0	0	0
6	Unskilled Labor	0	0	0	0	0
7	Skilled Labor	0	0	0	0	0
8	Indirect taxes	0	0	0	0	0
9	Working Capital	0	0	0	0	0
10	Sectoral Profits	0	0	2,275,465	0	0
11	Trade Agriculture Households	117,262	0	0	0	0
12	Non Trade Agriculture households	104,787	0	0	0	0
13	Unskilled Informal Households	686,854	0	0	0	0
14	Unskilled Formal Households	341,839	0	50,664	0	0
15	Skilled Households	926,217	0	350,130	0	0
16	Capitalist Households	-2,936,440	0	1,921,155	245,842	0
17	Government	0	0	1,481,786	2,050,836	-150,654
18	Money	0	0	0	0	0
19	Domestic Banks	3,042,688	0	0	2,280,000	650,466
20	Foreing Banks	1,630,876	0	925,308	0	0
21	Central Bank	0	690,221	499,910	0	0
22	Investment	0	0	5,565,256	2,207,389	0
23	Net Worth	0	0	0	473,250	328,420
24	Rest of the World	0	0	0	0	361,899

		22	23	24
1	Trade Agriculture	135,755	0	5,152,667
2	Non Trade Agriculture	172,692	0	33,898
3	Private Urban (formal) Sector	7,894,705	0	8,133,326
4	Informal Sector	10,129,867	0	4,743,381
5	Public Sector	0	0	0
6	Unskilled Labor	0	0	0
7	Skilled Labor	0	0	0
8	Indirect taxes	0	0	0
9	Working Capital	0	0	0
10	Sectoral Profits	0	0	0
11	Trade Agriculture Households	0	0	0
12	Non Trade Agriculture households	0	0	0
13	Unskilled Informal Households	0	0	0
14	Unskilled Formal Households	0	0	0
15	Skilled Households	0	0	1,852,435
16	Capitalist Households	0	0	2,269,787
17	Government	0	0	611,164
18	Money	0	0	0
19	Domestic Banks	0	801,670	0
20	Foreign Banks	0	0	2,826,271
21	Central Bank	0	0	0
22	Investment	0	0	0
23	Net Worth	0	0	0
24	Rest of the World	0	0	0

Source: Author's calculations.

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