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2011 Social Accounting Matrix for Senegal

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ABSTRACT

There is a tradition of building up and using social accounting matrices (SAM) for economywide modeling and informing policy decisions in Senegal. The last SAM was published in 2006 and the availability of both macro and micro databases for 2011 is timely for an update. This document describes the construction of a SAM for Senegal. The SAM is based upon 2011 national accounts statistics and provides a consistent framework for the assessment of growth and employment policies. It is developed in three stages. First, a standard SAM merges three national accounts tables—the supply and use tables, government finance statistics, and the balance of payments—into one consistent framework. Second, the second Senegal Poverty Monitoring Survey conducted in 2011 provides relevant information for detailed representation of the SAM factor and institutional accounts. Third, an adjustment and balancing procedure establishes consistency between the various sources of information. The 2011 SAM for Senegal is composed of 120 accounts divided into 35 industries, 35 products, 19 factors of production, including 17 categories of workers distinguished by the level of education and training, 6 tax and margins accounts, 23 institutional accounts, including 20 representative categories of households distinguished by the geographical location—urban and rural—and the consumption decile category, and 2 accumulation accounts—gross fixed capital formation and changes in inventories.

Keywords: national accounts, social accounting matrix, computable general equilibrium

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1. INTRODUCTION

The social accounting matrix (SAM) is a square matrix that describes the transaction flows taking place within an economy during a given period of time. It presents an overview of the structure and the interrelationships among sectors and institutions of an economy. A SAM is “the presentation of SNA [system of national accounts] accounts in a matrix which elaborates the linkages between a supply and use table and institutional sector accounts” (CEC et al. 1993, 575). Thus, it is a representation of national accounts information in a flexible format suited for analytical and policy needs. In general, a SAM is structured with five sets of accounts: industries, commodities, factors, institutions, and accumulation accounts. Entries along a row in the SAM indicate receipts or revenues, and entries down a column indicate payments or expenditures. Although SAMs are closely related to national accounts tables, establishing relationships between the structural features of an economy and the distribution of income and expenditure requires appropriate breakdowns of the household and factor accounts. The flexibility of a SAM provides room for its builders or users to aggregate or disaggregate its accounts in order to highlight special interests.

The supply and use table (SUT) and the integrated economic accounts (IEA) are at the center of the SNA framework and, consequently, are the main building blocks of a SAM. The SUT is a table that indicates “how supplies of different kinds of goods and services originate from domestic industries and imports and how those supplies are allocated between various intermediate or final uses, including exports” (CEC et al. 1993, 4). It describes the accounts of transactions in goods and services, and the accounts of industries of an economy. The IEA is a set of ordered economic accounts describing the process of income generation, distribution, and accumulation of the institutional sectors. It gives a synthesis of the economic transactions of the institutional sectors grouped into five categories on the basis of their principal objectives, functions, and behavior. The IEA summarizes the SUT transactions with additional information on inter-institutional transfers and on savings and investment. The SUT and the IEA are complemented by microdata that allow for more detailed representation of the SAM accounts.

There is a tradition of building up and using SAMs for economywide modeling and informing policy decisions in Senegal. Previous SAMs for Senegal were based upon national accounts (an SUT) for the years 1996, 2004, 2005, and 2006.¹ We use multiple data sources to construct the 2011 SAM for Senegal: SUT (ANSD 2014d), government financial statistics (GFS) (ANSD 2014c), balance of payments (BoP) (ANSD 2014a), and Second Senegal Poverty Monitoring Survey (ESPS 2) (ANSD 2014b). These data are for the year 2011 and are made available by Senegal’s National Agency of Statistics and Demography (Agence National de Statistique et de la Démographie [ANSD]).

The 2011 SAM for Senegal is developed in three stages. First, a standard SAM is constructed by merging Senegal’s SUT, GFS, and BoP into one consistent framework. Second, a disaggregated SAM composed of 120 accounts is developed by using household data from the ESPS 2 to add further detail to the factor and institutional accounts of the standard SAM. Third, an adjustment and balancing procedure is undertaken to establish consistency between the various sources of information.

The next sections of the document provide an overview of the data sources while laying out the procedure of building up the SAM. The concluding section gives a short description of the structure and dimensions of the final SAM.

¹ Among others, Dansokho and Diouf (1999); Diagne and others (2003); Fofana and others (2005); Fofana and Cabral (2007); National Agency of Statistics and Demography (2011); and Fall (2011).

2. THE SUPPLY AND USE TABLES

The SUTs are a synthetic presentation of the economic data contained in the national accounts in terms of the origin and destination of goods and services available in a given economy, during a given period of time. It is an accounting framework that ensures the numerical consistency of data obtained from multiple sources—industrial surveys, household surveys, investment surveys, foreign trade statistics, and so on. Commodities included in the SUT originate from local industries and imports (supply). The framework provides detailed information on production and income generation for industries. Goods and services are used for intermediate and final consumption, investment—that is, fixed capital formation and changes in inventories—and exports (use). Supplies are valued at basic and c.i.f.² prices, and uses are valued at purchasing prices. Thus, consistency between supplies and uses is ensured by taking into account transaction charges—that is, levies and taxes—and trade and transport margins.

The SUT includes an input-output matrix of intermediate consumption presenting the interconnection among industries. The industry production and value-added are also recorded in the SUT. According to the recommendations of the 1993 System of National Accounts, the SUT consists of two separate and interdependent accounting tables: the supply table and the use table.

The construction of the 2011 SAM for Senegal is based upon the SUT for the same year, published by ANSD. The SUT published by ANSD is presented as one integrated table combining both the supplies and the uses of goods and services (Table 2.1). Although this feature gives a consolidated overview of the transactions taking place in the Senegalese economy, it does not provide detailed information on the multiple origins of goods and services produced locally. Indeed, the presentation of the SUT as one integrated table does not highlight the supplies of commodities from more than one industry or the supplies of many commodities by one industry. In other words, industries are represented as single-commodity industries.

Table 2.1 Structure of the 2011 SUT for Senegal

		Supply					
		Industries / goods and services					
Use	Goods and services	Intermediate consumption (S1/U1)	Exports (E2)	Final consumption of households (E3)	Final consumption of government (E4)	Gross fixed capital formation (E5)	Changes in inventories (E6)
		Value-added (S2)					
		Supply (S3)					
		Imports (S4)					
		Trade margins (S5)					
		Taxes net of subsidies on products (S6)					

Source: Authors.

² Cost, insurance, and freight.

The supply side consists of local production (S3) valued at basic prices, and imports (S4) valued at c.i.f. prices. Transaction charges—that is, trade margins (S5) and taxes less subsidies on products (S6)—are added to yield total supplies at purchasing prices. The supply side describes the structure of industrial production in terms of intermediate consumption presented in an input-output matrix (S1) format, and the value-added (S2).³ The value-added is imputed as including compensation for employees, gross operating surplus and mixed income, and taxes and subsidies on production. The supply side shows 42 accounts for industries, including an account for financial intermediation services indirectly measured (FISIM) (see Table A.1 in the appendix).

The use side describes the allocation of local outputs and imports. Total supply of a commodity is used for intermediate consumption (U1), exports (U2), final consumption of households (U3) and government (U4), gross fixed capital formation (U5), and changes in inventories (U6). The use table shows 42 accounts of commodities including a residual account that records the discrepancies between supplies and uses (Table A.1 in the appendix).

³ Total production or supply (S3) is equal to intermediate consumption (S1) plus value-added (S2).

3. THE STANDARD SAM

This section describes the procedure of building up the standard SAM for Senegal based on information provided by the SUT, the GFS, and the BoP. The standard SAM is constructed in two steps. First, the SUT accounts are reorganized in a matrix format and the FISIM and the residual accounts are adjusted. Second, detail is added to institutional accounts using data from the GFS and the BoP.

Reorganizing and Adjusting the SUT

Information found in a SAM is essentially provided by the SUT. It is related to factor payments, intermediate consumption, final consumption of households and government, fixed capital formation, change in stocks, imports and exports, and indirect taxes (Table 3.1). In general, these constitute the main economic transactions recorded by a SAM. The remaining information, essentially institutional transfer incomes and payments, and savings, is often provided by an IEA.

Table 3.1 Structure of a standard SAM

	Industries	Commodities	Factors	Institutions	Savings and investment
Industries		Production at basic prices (SUT, S3)			
Commodities	Intermediate consumption at purchasing prices (SUT, S1 & U1)			Final consumption of households and government, and exports, at purchasing prices (SUT, E2, E3 & E4)	Fixed capital formation, change in stocks at purchasing prices (SUT, E5 & E6)
Factors	Compensation for employees, gross operating surplus, and mixed income (SUT, S2)				
Institutional sectors	Tax receipts on production (SUT, S2)	Imports, duty, and products taxes (SUT, S4, S5, & S6)	Compensation for employees, gross operating surplus, and mixed income (SUT, S2)	Inter-institutional transfers (IEA)	
Savings and investment				Savings (IEA)	

Source: Authors.

Notes: IEA = integrated economic accounts; SUT = supply and use table.

The first step in developing Senegal's 2011 SAM is to reorganize the SUT provided by ANSD (Table 2.1) according to the structure of a standard SAM, as presented in Table 3.1. Thus, the supply accounts are used as the first three columns of the standard SAM—that is, industries, commodities, and factors. They are completed by the use accounts in the last two columns—that is, institutions and savings/investment. At this stage, inter-institution transfer accounts remain empty and savings accounts are used to temporarily balance institutions' incomes and expenditures.

The standard SAM is composed of 99 accounts, including 42 industries/commodities, 5 factors of production, 3 tax and margins accounts, 3 institutional accounts, and 2 investment accounts. In addition, an FISIM account and a residual account appear in the SAM. The next section discusses the adjustment procedure of the FISIM and the residual accounts.

FISIMs are used by the 1993 SNA to evaluate the margins generated by financial corporations on financial intermediation. These margins are generated on the difference between the interest rate payable to depositors and the interest rate receivable from borrowers against a reference interest rate. They are considered to be indirect charges for intermediation services provided by financial corporations in channeling funds between depositors and borrowers. FISIMs are defined in the 1993 SNA as “a productive activity” and therefore should be included in the calculation of gross domestic product (GDP).

The 2011 SUT for Senegal shows a separate account for the FISIM as intermediate consumption of financial services, which is deducted from gross operating surplus (GOS) and mixed income.⁴

Our adjustment aims at redistributing the FISIM amount to industries as intermediate expenses for financial services. The FISIM adjustment is implemented in the following two steps:

1. The FISIM amount is redistributed to SAM industries in proportion to their financial services spending, and industries’ intermediate consumption of financial services is augmented by the imputed FISIM amount.
2. The imputed FISIM amount is deducted from industries’ GOS and mixed income, and the FISIM accounts are deleted from the standard SAM.

The supply side of the residual account shows an amount of 90.6 billion CFA (Communauté Financière Africaine) francs in imports and 1.2 billion in taxes and margins. On the use side, this amount is distributed to exports (34.8 billion), private final consumption (67.3 billion), changes in inventories (-11.4 billion), and intermediate consumption (1.2 billion).

The residual account of the SUT primarily reflects direct purchases by residents abroad and by nonresidents in Senegal. The discrepancies on taxes and margins (supply) match with the residual amount shown by total intermediate consumption (use). Thus, the residual account adjustment procedure consists of four steps:

1. Intermediate consumption residual values are adjusted through the taxes and margins accounts.
2. Net direct imports are computed by subtracting direct exports (or direct purchases of nonresidents in Senegal) from direct imports (direct purchases of residents abroad).
3. Private final consumption is proportionally increased by the residual amount considering expenses on imported commodities only; in the same vein, changes in inventories are reduced by the residual amount following the same procedure as for private final consumption.
4. Imports of goods and services are augmented according to the adjustment made for private consumption spending and changes in inventories.

The resulting SAM is composed of 95 accounts including 41 industries/commodities.⁵ The dimensions of the other accounts remain unchanged. Compensation for employees, GOS, and mixed income are paid to private institutions (households and corporations), and production taxes net of subsidies are paid to government. Institutions’ income (supply) and expenditures (use) accounts are balanced through their saving accounts. Total savings are channeled to gross fixed capital formation and changes in inventories.

⁴ The FISIM amount of 151.7 billion CFA (Communauté Financière Africaine) francs is not yet reflected in the GDP.

⁵ The 99 accounts mentioned earlier at the preliminary stage of building up the standard SAM were reduced to 95 accounts after the supply and use accounts for both FISIM and residual accounts were deleted.

The SUT-based SAM does not offer a detailed description of the institutional accounts—households, corporations, government, and the rest of the world. Therefore, a SAM is often complemented by an IEA in order to provide further information on the institutional aspect. With the unavailability of an IEA for Senegal, we use institutional information from GFS and BoP to better inform the government and rest-of-the-world sectors of the standard SAM.

The General Government

“The general government sector consists of resident institutional units that fulfill the functions of government as their primary activity. This sector includes all government units and all nonmarket nonprofit institutional units (NPIs) that are controlled by government units” (IMF 2014, 1). The government receives tax revenues from a variety of sources, as well as transfers from domestic institutions and from abroad. Government expenses are related to the provision of services, transfers and subsidies to households and corporations, and transfers to the rest of the world. Government revenue and expense accounts balance through its primary savings.

The SUT-based SAM described above contains a government account that includes revenue from indirect taxes and duties, and fees paid by households for public services. Data from the GFS are used to better inform the SAM’s government accounts by adding in direct tax revenues, nontax revenues, and other public spending.

The GFS is a statistical framework that compiles government revenues and expenses for a given year. It shows how government revenues finance expenditures, on the one hand, and provide an analytical framework to measure the interaction between the public finance sector and other institutional units, on the other. The GFS is structured in transactions related to the basic activities of government (revenues, grants, expenditures, and net lending). Receipts include tax and nontax revenues. Spending consists of all nonrefundable cash payments and is split into current expenditures (salaries and wages, purchases of goods and services, domestic and external interest, and transfers and subsidies) and capital expenditures.

The SUT covers indirect tax receipts—domestic taxes on goods and services and taxes on foreign trade—but does not include direct taxes. It also highlights revenue collection related to access to public services. Tax revenues shown by the GFS include both direct and indirect revenues, in addition to nontax and transfer revenues. Wages and salaries and government intermediate consumption are the only government spending activities recorded by the SUT. Here they are supplemented by payments of debt service (internal and external) and transfer and subsidy spending provided by the GFS.

Table 3.2 provides an overview of the information recorded by the SUT and the GFS and how it is incorporated in the SAM. The SUT receipts from indirect taxes are complemented by direct taxes and by nontax revenues and transfers provided by the GFS. This reconciliation results in extra revenue of 159.5 billion CFA francs, because indirect tax receipts are higher in the SUT compared with the GFS values. On the expenditure side, government spending as reported in the SUT is complemented by payments of public debt service and primary savings from the GFS. Thus, government accounts are rebalanced through an increase in government transfers and subsidies from 335 billion in the GFS to 604 billion in the SAM (or from 27.2 percent to 43.3 percent of government spending). Thus, to compensate for the income gap between the SUT and the GFS, government aggregate spending in the SAM is increased by 12.4 percent compared with the GFS amount.

Table 3.2 General government sector

GFS	Amount (in billions of CFA francs)			SUT and SAM
	GFS	SUT	SAM	
Total revenues and grants	1 525.6	1 100.7	1 685.0	Total revenues and grants
Tax revenue	1286.9	1100.7	1446.3	Tax revenue
- Direct tax	345.6		345.6	- Direct tax
		218.0		
- Indirect tax	941.3	882.7	218.0	- Production tax
Nontax revenue	49.5		882.7	- Other indirect taxes
Contribution to FSE*	39.2		49.5	Capital revenue
Grants	150.0		39.2	Internal transfers revenue
			150.0	External transfers revenue
Total current expenditures	1 233.4	616.5	1 386.8	Total current expenditures
Interest payments on internal debt	42.0		42.0	Internal transfers
Interest payments on external debt	62.0		62.0	External transfers
Wages and salaries	427.5	250.8	250.8	Wages and salaries
Expenses on goods and services	355.9	410.4	410.4	Expenses on goods and services
Transfers and subsidies	335.0		603.8	Internal transfers and subsidies
		12.8	12.8	Subsidies on production
MDRI and HIPC financed	11.0		11.0	Internal transfers
		-6.0	-6.0	Fees and payments for public services
Fiscal balance	292.2	272.8	292.2	Fiscal balance

Source: Compiled by authors from the 2011 supply and use table (ANSD 2014d) and 2011 government financial statistics (ANSD 2014c).

Note: GFS = government financial statistics; HIPC = heavily indebted poor countries; MDRI = Multilateral Debt Relief Initiative; SAM = social accounting matrix; SUT = supply and use table. * Contributions of nonstate actors in support to the electricity sector through the Fonds de Soutien à l'Electricité (FSE).

The Rest of the World

In the standard SAM, transactions between residents and nonresidents are recorded by an account for the rest of the world. This account receives revenues from the sale of goods and services to the national economy (imports) and transfers of residents in the form of debt payments, factor incomes, and remittances to the rest of the world. In turn, the rest of the world buys goods and services from the national economy (exports) and transfers income to resident institutions in the form of grants, factor income, and remittances. A positive balance of the account represents a nonresident saving in the national economy, while a negative balance shows an investment of residents abroad. In the SUT-based SAM, the rest-of-the-world sector essentially reflects transactions of goods and services, that is, imports and exports. In developing Senegal's 2011 SAM, the rest-of-the-world account is completed by information available in the BoP.

The BoP is a statistical framework that reports the economic and financial transactions between residents of an economy and nonresidents in a given period, in general a year. The transaction flows are divided into current account (trade of goods and services, income revenues, and current transfers); capital account (capital transfers); and financial account (direct or portfolio investments). The BoP established by the Central Bank of West African States⁶ is the main source for information guiding the construction of the rest-of-the-world account.

The SUT records a slightly higher trade deficit than does the BoP (Table 3.3). The SAM reflects the import and export values and thus the trade deficit of the SUT. This information is supplemented by the BoP information on net income (interest payments on external debt and other factor income) and other current transfers and transactions (private and public).

⁶ Banque Centrale des Etats de l'Afrique de l'Ouest, or BCEAO.

Table 3.3 Rest-of-the-world sector

Item	BoP			SAM		
	Supply	Use	Balance	Supply	Use	Balance
<i>Goods and services (SUT)</i>	3,006.5	1,752.5	1,253.9	3,006.5	1,752.5	1,253.9
Goods and services BoP	3,029.6	1,787.3	1,242.2			
Primary income	259.0	126.2	132.8			
Secondary income	143.0	976.9	-834.0			
Social transfers	4.4	66.7	-62.3	4.4	66.7	-62.3
Capital transfers	138.6	910.3	-771.7	161.7	945.1	-771.7
Households	90.0	713.6	-623.5	113.1	748.4	-635.2
Corporations	48.6	196.7	-148.2	48.6	196.7	-148.2
Current account balance	3,431.6	2,890.5	541.1	3,431.6	2,890.5	541.1

Source: Computed by authors using the balance of payments (ANSD 2014a) and supply and use table (ANSD 2014d).

Notes: BoP = balance of payments; SAM = social accounting matrix; SUT = supply and use table.

Interest payments on government foreign debt are higher in the BoP compared with the GFS. However, the BoP records a lower amount of grant revenue received by the government of Senegal compared with the GFS. Thus, the SAM reflects the interest on external debt (62.0 billion) and the government current transfers from abroad (150 billion) of the GFS. The current account deficit as recorded by the BoP (541.1 billion) is also retained in the SAM. As a consequence, the upward adjustment of the current transfers of the rest of the world offsets the imbalances created by the trade deficit, the external public debt, and external public grants. The current transfer account balance increases slightly from 623.5 to 635.2 billion (1.9 percent).

Table 3.4 presents an aggregate version of the standard SAM built from the national accounts tables. Factor accounts are still aggregated into compensation of employees, GOS, and mixed income, and households and corporations are merged into one account. Due to the aggregated structure of the factor and institutional accounts, the standard SAM is not suited for income distribution analyses. Thus, the next sections discuss the procedure followed to further disaggregate the SAM accounts.

Table 3.4 The standard SAM for Senegal, aggregated version (in billions of 2011 CFA francs)

	Ind.	Com.	S&W	TOP1	SOP	FCC	NOS	DT	TOP2	TOI	TM	PI	Gov.	ROW	GFCF	CIS	Total
Industry (Ind.)		11,770															11,770
Commodity (Com.)	5,871										1,539	5,629	655	1,753	1,658	94	17,199
Salaries and wages(S&W)	1,467																1,467
Taxes on production (TOP1)	218																218
Subsidies on production (SOP)	(13)																(13)
Fixed capital consumption (FCC)	810																810
Net operating surplus (NOS)	3,417																3,417
Direct taxes (DT)												346					346
Taxes on products (TOP2)		490															490
Taxes on imports (TOI)		393															393
Trade margins (TM)		1,539															1,539
Private institutions (PI)			1,507			810	3,195						663	919			7,094
Government (Gov.)				218	(13)		50	346	490	393		39		150			1,672
Rest of the world (ROW)		3,006	(39)				172					162	62				3,363
Gross fixed capital formation (GFCF)												919	292	541		(94)	1,658
Changes in stocks (CIS)																	0
Total	11,770	17,199	1,467	218	(13)	810	3,417	346	490	393	1,539	7,094	1,672	3,363	1,658	0	51,423

Sources: Compiled by authors from supply and use table (ANSD 2014d), government financial statistics (ANSD 2014c), and balance of payments (ANSD 2014a).

Note: SAM = social accounting matrix.

4. HOUSEHOLD DATA AND DISAGGREGATED SAM

The structure and dimension of a SAM are determined by the interests and concerns of its builders and users, and the data availability. The standard SAM built from the national accounts tables presents relatively detailed industries and commodities, but aggregated accounts for factors and institutional sectors. Due to the desirability of a more detailed SAM allowing for income distribution analysis, we use survey data to develop a disaggregated SAM with more detailed representation of factor and household accounts.

Disaggregating the standard SAM requires vectors of household income and expenditure built from a representative household survey. Sometimes household surveys miss information on the labor market and should be complemented by other surveys providing such information—for example, a labor force survey or a time use survey.

The SAM for Senegal intends to provide a consistent framework for the analysis of strategic options for economic growth and employment. This concern is reflected in the presentation of the worker categories and the labor market, on the one hand, and the choice of the representative household groups, on the other.

The household-level data of Senegal's SAM are provided by the second Senegal Poverty Monitoring Survey—Enquête de Suivi de la Pauvreté au Sengal, or ESPS 2—conducted in 2011 (ANSD 2014b). The survey questionnaire was administered in full to one-third of the sample, 5,953 households. The remaining two-thirds, 11,938 households, were given the light questionnaire, which excluded sections such as food consumption expenditures. The survey incorporates weights that allow for extrapolating national results from the two subsamples.

This section describes the procedure of disaggregating the 2011 SAM for Senegal starting from the standard SAM described above. First, GOS/mixed income is imputed to productive factors, that is, labor and capital. Workers and the labor market are broken down into different categories according to education level and training criteria. Second, private institutions are allowed to include several representative categories of households and a representative category of firms.

Disaggregating the Factor Accounts

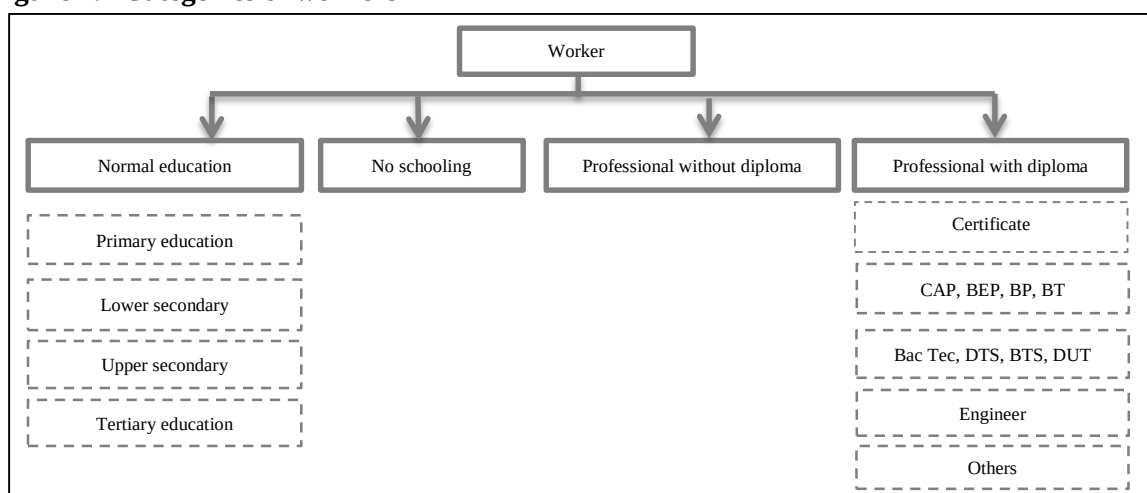
The standard SAM records two factor accounts: compensation of employees, and GOS and mixed income. The latter includes both own capital and self-employed incomes. Individuals will engage in self-employment either because they cannot find paid work or are not working desirable hours in their profession (unemployment or underemployment) or because their expected implicit wage from the self-employed activity exceeds that offered by the market.

First, we generate self-employed labor cost by multiplying the estimated implicit wage rate of individuals by the time spent in self-employment or family business work using information from the survey (ANSD 2014b). Second, we approximate capital cost by the residual profit after deducting self-employed labor cost.

Computing self-employed labor cost requires data on self-employment time and the estimation of implicit wages. Senegal's 2011 survey provides data on time spent by individuals in market activities. Thus, we compute individuals' hourly wage and time (in hours) allocated to self-employed work using information from the survey and predict their implicit wages using a selected regression method first introduced by Heckman (1979).

Salaried and self-employed workers are grouped by various types of work and by industries. A mapping between the SAM and the survey leads to 33 industries commonly identified in both data sources. Using the survey data, workers are classified into 17 labor categories according to individuals' education level and training criteria (Figure 4.1).

Figure 4.1 Categories of workers



Source: Authors.

Notes: Bac Tec = baccalauréat technique; BEP = brevet d'études professionnelles; BP = brevet professionnel; BT = brevet de technicien; BTS = brevet de technicien supérieur; CAP = certificat d'aptitude professionnelle; DTS = diplôme de technicien supérieur; DUT = diplôme universitaire technique. Lower secondary: 1 to 4 years in secondary school; upper secondary: 5 to 7 years in secondary school.

Furthermore, three accounts for agriculture—staple crops, cash crops, and livestock—highlighted by the standard SAM are merged into one aggregated account—crops and livestock. In the same vein, the food and beverage industries (seven accounts) are merged into one aggregated account—food and beverage. This adjustment permitted matching of industry categories in the ESPS 2 and the SUT, and importing of the payments to workers from the survey into the SAM framework.

Private Institutions: Households and Corporations

Private institutions, including households and financial and nonfinancial corporations, are broken down using information from the 2011 ESPS 2 household survey. Household income and expenditure data are gathered from ESPS 2, and data for corporations are generated residually. Twenty representative categories of households are defined according to place of residence and consumption decile category.

The ESPS 2 survey records several expenditure categories for household consumption. We mapped the SUT categories to the survey categories of goods and services. Surveyed households' consumption of goods and services is distributed according to the 33 categories included in the standard SAM. The analysis of the budget share of household consumption highlights differences between the survey and the SUT. The mapping does not show spending by surveyed households in five SUT consumption categories: wood manufacturing, machinery and equipment, financial services, business services, and fees and payments to access public services. We reflect the survey consumption expenses into the SAM and consider adjusting discrepancies observed for some accounts as listed above.

Consumption expenses are generated for 20 representative household categories defined according to the place of residence (urban or rural) and the consumption decile group. Real and implicit wages and salaries are compiled for 17 types of work using the ESPS 2 data and grouped according to the categories of representative households. The survey provides detailed information on nonlabor income sources, that is, net income generated from household production activities and individual entrepreneurship, rents and interest, and other incomes (such as dividends). Net farm and off-farm income are computed separately before being combined into household aggregated net income or mixed income. Capital income is generated by deducting the implicit cost of self-employed labor from mixed income. Survey capital income is grouped according to the 20 representative household categories. This information is used to distribute the SAM's estimated capital income to various categories of households.

At this stage, the SAM does not contain detailed information on institutional transfer revenues and payments. The ESPS 2 survey provides transfer revenues and payments among households and between them and other institutions. First, the shares of transfer revenues and payments between the various categories of households and other institutional units (corporations, government, and the rest of the world) are calculated from the survey and used to break down the SAM values. Second, we generate the SAM intrahousehold transfer data by constructing a transfer matrix among the representative household groups using the survey data. The sources of the aggregate remittances received by a household are traced using aggregated proportional shares of payments by all households.

In sum, the SAM household sector is generated using the ESPS 2 data. The household sector is split into 20 subsectors corresponding to representative household categories. Income and expenditure accounts for corporations are filled out residually using information from the private institutional account of the standard SAM and information from the households' accounts generated from the survey.

Assembling data from various sources—SUT, GFS, BoP, and ESPS 2—has resulted in a detailed presentation of the SAM accounts. However, several accounts of the resulting SAM remain out of balance. The next section discusses the adjustment and balancing procedure.

5. ADJUSTMENT AND BALANCING PROCEDURE

When disaggregating the SAM factors in Section 4, we merged the five agricultural industries into three accounts to permit the transfer of payments to workers from the survey to the SAM framework. Thus, staple crops, cash crops, livestock, and hunting industries were first grouped into a single industry to match with the survey categories of industry. At the end, the agricultural sector was readjusted to return to its original structure, that is, including staple crops, cash crops, livestock and hunting, forestry, and fishing subsectors. Thus, the initial data for “staple crops,” “cash crops,” and “livestock and hunting” are integrated, and distributive shares are used for the labor income. The purpose of the readjustment is to further detail the representation of the agricultural sector in the SAM framework.

Discrepancies in consumption spending between the SUT and ESPS 2 lead to the following adjustments. The SUT expenses on financial services are distributed proportionally among household categories using the survey savings information. Fees and payments for public services appearing in the SUT and not in the survey are adjusted through government’s direct expenditure and households’ direct payments to government, such as their contributions to social security, pensions, and so on. Government subsidies to trade services shown by the SUT are paid to corporations and reflected in their savings account. The concluding section summarizes the structure and dimensions of the final SAM for Senegal.

6. CONCLUSION

The 2011 SAM for Senegal (Table A.2 in the appendix) is composed of 120 accounts including 35 industries: 5 agriculture, 1 mining and quarrying, 2 food and beverage manufacturing, 15 nonfood manufacturing, 11 private services, and 1 public service. The structure and dimensions of the commodity accounts are identical to those of the industry accounts. Productive factors are structured in 2 accounts for capital and 17 for labor. Workers are disaggregated by their level of education and training. The capital account features the consumption of fixed capital and the net operating surplus. Taxes and subsidies, although related to the government sector, are presented in separate accounts. The final SAM contains 5 accounts for taxes and subsidies and 1 account for margins. The institutional sector is disaggregated into the corporate sector, the government sector, the rest of the world, and 20 representative household groups. The latter are identified by the area of residence—rural or urban—and the consumption decile category. Finally, the SAM presents 2 accumulation accounts, gross fixed capital formation and changes in inventories.

Total supply of goods and services at market prices is estimated at 17,218 billion CFA francs in 2011. The domestic economy contributes 80 percent of the total supply. The GDP at factor cost is estimated at 5,899 billion CFA francs, that is, US\$12.5 billion. The Senegalese economy is more labor-than capital-intensive; the ratios of labor and capital to GDP are 57.4 percent and 39.1 percent, respectively. The input intensity of the economy—ratio of intermediate consumption value to GDP at factor cost—is close to 1.

Transaction costs—taxes, levies, subsidies, and margins—represent 16.9 percent of total supply at basis prices, with taxes, levies, and subsidies accounting for 6.4 percent. Supplies of goods and services at market prices are primarily used for intermediate consumption (42.8 percent) and final consumption (private 32.4 percent and public 3.8 percent). Investment consumption and exports account for 10.8 and 10.2 percent of total supply, respectively. Nominal GDP is estimated at 6,845 billion CFA francs in 2011, that is, US\$14.5 billion. It is distributed by expenditure components as follows: 91.1 percent final consumption, 27.2 percent investment, and -18.3 percent net exports.

Senegal's openness to external trade—that is, the ratio of imports and exports to GDP—is estimated at 69.5 percent in 2011; the ratios of imports and exports to GDP are 43.9 percent and 25.6 percent, respectively. The structural trade deficit is financed by factor and other transfer income (10.4 percent of GDP) and foreign investments (7.9 percent of GDP).

Services account for 61.8 percent of GDP, industry for 23.6 percent, and agriculture for 14.6 percent (Table A.3 in the appendix). Among single industries, trade makes the largest contribution to GDP, 17.3 percent. It is followed by public administration (7.5 percent), telecommunications (7.3 percent), real estate (6.3 percent), services to enterprises (5.5 percent), and subsistence agriculture (5.3 percent).

Senegal primarily imports energy and food products for intermediate and final uses. Refined oil and crude oil, coal (as mining and quarrying products), and food products account for 13.7 percent, 10.2 percent, and 18.0 percent of total import values, respectively (Table A.3). Import penetration rates are relatively high for manufactured goods such as equipment, apparatus, and machinery, as well as mining, energy, and chemical products. For these products, constrained local supply is complemented by imports to meet domestic demand. Import penetration ratios are relatively low for services, for which demand is primarily satisfied by local supply. On the other hand, light manufactured nonfood products, as well as food and agriculture products, face more competition from imported goods, with import penetration ratios ranging between 0.3 and 0.7.

Senegal primarily exports manufactured food, chemical products, and energy products, with shares in total export value of 14.7 percent, 13.5 percent, and 11.0 percent, respectively. High export ratios of equipment, apparatus and machinery, and to a lesser extent, metal and transport products highlight a re-exportation phenomenon. Export ratios are relatively high for petroleum and chemical products, tobacco, mining, and fish products, as well as for restaurant and lodging services.

APPENDIX: SUPPLEMENTARY TABLES

Table A.1 List of industries and commodities, 2011 supply and use table for Senegal

Industry	Commodity
010 Staple crops	010 Staple crops
020 Cash crops	020 Cash crops
030 Livestock	030 Livestock
040 Forestry	040 Forestry
050 Fishing	050 Fishing
060 Mining	060 Mining
070 Processing and preserving of meat, fish	070 Processing and preserving of meat, fish
080 Manufacture of vegetable and animal oils and fats	080 Manufacture of vegetable and animal oils and fats
090 Manufacture of grain mill products	090 Manufacture of grain mill products
100 Manufacture of starches and starch products	100 Manufacture of starches and starch products
110 Manufacture of sugar	110 Manufacture of sugar
120 Manufacture of other food products n.e.c.	120 Manufacture of other food products n.e.c.
130 Manufacture of beverages	130 Manufacture of beverages
140 Manufacture of tobacco products	140 Manufacture of tobacco products
150 Spinning, weaving, and finishing of textiles	150 Spinning, weaving, and finishing of textiles
160 Manufacture of leather and related products	160 Manufacture of leather and related products
170 Manufacture of wood and of products of wood	170 Manufacture of wood and of products of wood
180 Manufacture of paper and paper products	180 Manufacture of paper and paper products
190 Manufacture of coke and refined petroleum products	190 Manufacture of coke and refined petroleum products
200 Manufacture of chemicals and chemical products	200 Manufacture of chemicals and chemical products
210 Manufacture of rubber and plastics products	210 Manufacture of rubber and plastics products
220 Manufacture of glass and ceramic products	220 Manufacture of glass and ceramic products
230 Manufacture of basic metals	230 Manufacture of basic metals
240 Manufacture of machinery	240 Manufacture of machinery
250 Manufacture of computer, electronic, and optical products	250 Manufacture of computer, electronic, and optical products
260 Manufacture of transport equipment	260 Manufacture of transport equipment
270 Other manufacturing	270 Other manufacturing
280 Electricity, gas, and water	280 Electricity, gas, and water
290 Construction	290 Construction
300 Trade	300 Trade
310 Repair of computers and personal and household goods	310 Repair of computers and personal and household goods
320 Food and beverage service activities	320 Food and beverage service activities
330 Transportation	330 Transportation
340 Telecommunications	340 Telecommunications
350 Financial services	350 Financial services

Table A.1 Continued

Industry	Commodity
360 Real estate activities	360 Real estate activities
370 Activities of business services	370 Activities of business services
380 Administrative and support service activities	380 Administrative and support service activities
390 Education	390 Education
400 Human health and social work activities	400 Human health and social work activities
410 Activities of membership organizations	410 Activities of membership organizations
420 Financial intermediation service indirectly measured	430 Residual account

Source: ANSD (2014d).

Note: n.e.c. = not elsewhere classified.

Table A.2 The 2011 SAM for Senegal, aggregated version (in billions of CFA francs)

	Ind.	Com.	S&W	TOP1	SOP	FCC	NOS	DT	TOP2	TOI	TM	PI	Gov.	ROW	GFCF	CIS	Total
		11,726															11,726
Industry (Ind.)	5,827								1,539		5,577		661	1,753	1,658	203	17,218
Commodity (Com.)	3,386																3,386
Salaries and wages(S&W)	2,308																2,308
Taxes on production (TOP1)	218																218
Subsidies on production (SOP)	-13																-13
Fixed capital consumption (FCC)		552															552
Net operating surplus (NOS)		394															394
Direct taxes (DT)		1,539															1,539
Taxes on products (TOP2)											48	303					352
Taxes on imports (TOI)			3,386	1,240							356	776	1	361			6,120
Trade margins (TM)				846									726	607			2,178
Private institutions (PI)				50	218	-13	552	394		352		39		150			1,742
Government (Gov.)		3,006		172							9	162	62				3,412
Rest of the world (ROW)											130	898	292	541		-203	1,861
Gross fixed capital formation (GFCF)																	0
Changes in stocks (CIS)	11,726	17,218	3,386	2,308	218	-13	552	394	1,539	352	6,120	2,178	1,742	3,412	1,861	0	

Source: Authors.

Note: SAM = social accounting matrix.

Table A.3 Selected distributive variables

Variable	Production		GDP (factor cost)		Imports			Exports		
	Billion FCFA	Share	Billion FCFA	Share	Billion FCFA	Share	Ratio	Billion FCFA	Share	Ratio
010 Staple crops	358,661	3.1%	312,276	5.3%	147,168	4.9%	0.4	17,452	1.0%	0.05
020 Cash crops	114,765	1.0%	88,305	1.5%	30,919	1.0%	0.3	34,990	2.0%	0.30
030 Livestock	310,532	2.6%	288,135	4.9%	7,079	0.2%	0.0	594	0.0%	0.00
040 Forestry	94,527	0.8%	61,141	1.0%	2,576	0.1%	0.0	1,647	0.1%	0.02
050 Fishing	210,493	1.8%	113,639	1.9%	17,802	0.6%	0.1	111,001	6.3%	0.53
060 Mining	271,894	2.3%	139,392	2.4%	307,483	10.2%	1.1	146,119	8.3%	0.54
070-130 Manufacture of food and beverage	1,307,411	11.1%	306,849	5.2%	541,947	18.0%	0.4	257,787	14.7%	0.20
140 Manufacture of tobacco products	69,788	0.6%	9,276	0.2%	1,695	0.1%	0.0	51,952	3.0%	0.74
150 Spinning, weaving, and finishing of textiles	169,223	1.4%	66,674	1.1%	70,838	2.4%	0.4	22,631	1.3%	0.13
160 Manufacture of leather and related products	19,180	0.2%	10,008	0.2%	10,801	0.4%	0.6	2,649	0.2%	0.14
170 Manufacture of wood and of products of wood	80,360	0.7%	36,372	0.6%	36,564	1.2%	0.5	4,765	0.3%	0.06
180 Manufacture of paper and paper products	132,529	1.1%	38,986	0.7%	44,671	1.5%	0.3	10,399	0.6%	0.08
190 Manufacture of coke and refined petroleum products	438,360	3.7%	19,630	0.3%	412,891	13.7%	0.9	192,954	11.0%	0.44
200 Manufacture of chemicals and chemical products	267,956	2.3%	95,349	1.6%	249,636	8.3%	0.9	236,907	13.5%	0.88
210 Manufacture of rubber and plastics products	74,641	0.6%	24,851	0.4%	55,831	1.9%	0.7	15,470	0.9%	0.21
220 Manufacture of glass and ceramic products	268,168	2.3%	83,440	1.4%	38,100	1.3%	0.1	114,966	6.6%	0.43
230 Manufacture of basic metals	96,092	0.8%	39,265	0.7%	211,013	7.0%	2.2	72,903	4.2%	0.76
240 Manufacture of machinery	20,958	0.2%	3,962	0.1%	269,283	9.0%	12.8	20,266	1.2%	0.97
250 Manufacture of computer, electronic, and optical products	151	0.0%	15	0.0%	71,636	2.4%	474.4	4,601	0.3%	30.47
260 Manufacture of transport equipment	15,058	0.1%	4,535	0.1%	210,238	7.0%	14.0	8,193	0.5%	0.54
270 Other manufacturing	140,629	1.2%	78,238	1.3%	14,784	0.5%	0.1	3,607	0.2%	0.03
280 Electricity, gas, and water	380,598	3.2%	169,981	2.9%	0	0.0%	0.0		0.0%	0.00
290 Construction	1,113,858	9.5%	265,856	4.5%	0	0.0%	0.0		0.0%	0.00
300 Trade	1,539,177	13.1%	1,022,732	17.3%	0	0.0%	0.0		0.0%	0.00
310 Repair of computers and personal and household goods	232,732	2.0%	58,421	1.0%	0	0.0%	0.0		0.0%	0.00
320 Food and beverage service activities	235,438	2.0%	43,379	0.7%	0	0.0%	0.0	120,151	6.9%	0.51
330 Transportation	542,895	4.6%	262,554	4.5%	59,108	2.0%	0.1	47,035	2.7%	0.09
340 Telecommunications	701,374	6.0%	428,074	7.3%	44,562	1.5%	0.1	85,122	4.9%	0.12
350 Financial services	330,224	2.8%	227,791	3.9%	18,825	0.6%	0.1	2,200	0.1%	0.01
360 Real estate activities	401,384	3.4%	369,767	6.3%	0	0.0%	0.0		0.0%	0.00
370 Activities of business services	465,119	4.0%	323,012	5.5%	95,357	3.2%	0.2	104,651	6.0%	0.22
380 Administrative and support service activities	661,263	5.6%	439,584	7.5%	0	0.0%	0.0		0.0%	0.00
390 Education	352,914	3.0%	265,286	4.5%	30,915	1.0%	0.1	13,600	0.8%	0.04
400 Human health and social work activities	132,294	1.1%	87,509	1.5%	2,847	0.1%	0.0	1,100	0.1%	0.01
410 Activities of membership organizations	175,752	1.5%	114,692	1.9%	1,882	0.1%	0.0	46,807	2.7%	0.27
All industries/products	1,1726,396	100.0%	5,898,976	100.0%	3,006,452	100.0%	0.3	1,752,519	100.0%	0.15

Source: Computation of authors from the social accounting matrix.

Notes: FCFA = CFA francs; GDP = gross domestic product.

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