A SOCIAL ACCOUNTING MATRIX FOR BOLIVIA FEATURING FORMAL AND INFORMAL ACTIVITIES

RAINER THIELE*
DANIEL PIAZOLO**

ABSTRACT

This paper describes the construction of a Social Accounting Matrix (SAM) for Bolivia for the year 1997. Three distinctive features render the SAM a useful starting point for distributional analyses. First, production in the agricultural and services sector is split up into formal and informal activities to account for the fact that poverty is largely confined to the latter. Second, factor and household accounts exhibit a high level of disaggregation, thus permitting the monitoring of the factorial and personal income distribution. Finally, the SAM contains a detailed system of accumulation balances which reveals the distribution of assets among household groups.

RESUMEN

En el artículo se describe la construcción de una matriz de contabilidad social (SAM) Bolivia para el año 1997. Por tres razones, la SAM resulta útil como punto de partida para analizar la distribución de ingresos. Primero, se dividen los sectores agricultura y servicios en actividades formales e informales, para tomar en consideración que la probreza se concentra en actividades informales. Segundo, las cuentas de los factores de producción y de los hogares muestran un alto nivel de desagregación. Por lo tanto, se puede analizar la distribución factorial y personal de los ingresos de manera muy detallada. Finalmente, la SAM contiene un sistema detallado de saldos de activos y pasivos y sus cambios para diferentes grupos de hogares que revelan la distribución de los bienes entre ellos.

1.   THE ISSUE

After 20 years of structural adjustment programs, there is an ongoing debate about their economic and social impact (for an overview, see Thiele and Wiebelt, 2000). The distributional consequences of adjustment measures are particularly contentious. Employing, among others, econometric methods (e.g. Behrmann *et al.* 2001) and simulations in Computable General Equilibrium (CGE) models (e.g. Vos 2001; Paes de Barros and Corseuil 2001), a number of studies for Latin America obtain empirical evidence that strongly varies with the specific measures and countries considered. Somewhat surprisingly, given its reputation as an early and profound reformer, Bolivia is among the few Latin American countries for which information on the distributional impact of adjustment is very scarce. As a contribution to filling this gap, this paper presents a data set for Bolivia for the year 1997 which will later be used for CGE model simulations. The data are organized in a Social Accounting Matrix (SAM), which is the most convenient framework for keeping track of the circular flow of income and expenditures in an economy.

Three distinctive features render the present SAM a better starting point for distributional analyses than the two main recent SAM applications for Bolivia by Alarcón *et al.* (2000) and Jemio (2001b). First, in the agricultural and services sector, production is split up into formal and informal activities. This is important because Bolivia has a large informal economy where poverty is widespread and where the response to structural adjustment measures is likely to differ from the formal economy. Second, compared to the two previous studies, a stronger emphasis is put on monitoring the factorial and personal distribution of income via the distinction of 4 production factors and 6 household groups. Finally, based on Jemio (2001b), but disaggregated by households, detailed accumulation balances reveal the distribution of assets and indicate to which extent different household groups have access to the resources they need to finance investment in excess of their own savings. With these features, the SAM includes the information necessary

to analyze the main transmission mechanisms –changes in relative factor and commodity prices, changes in public redistribution, and changes in the returns on assets and the costs of liabilities– by which structural adjustment affects the well-being of households.

The paper is structured as follows. Chapter 2 shortly outlines the origins of the SAM framework and its possible uses for policy analysis. Chapter 3 provides a general overview of the components that make up the SAM for Bolivia. Chapter 4 describes the construction of the Input-Output Table around which the SAM is built, and discusses some main structural characteristics of the Bolivian economy which can be derived from the Input-Output Table. The distribution of income across factors and households is shown in Chapter 5. Chapter 6 deals with the accumulation of assets and liabilities by households. The paper closes with some concluding remarks.

2.   THE SAM AS A TOOL FOR POLICY ANALYSIS

The use of SAMs to record all the transactions that take place in an economy during a year is preceded by a long history of macroeconomic accounting (Kehoe 1998), which can be traced back at least to the year 1758 when Quesnay published his famous Tableau économique. In the twentieth century, Kuznets' work on national income accounts, Leontief's work on input-output matrices, and the statistical reconciliation of these two strands under the United Nations System of National Accounts (SNA), provided the base for the later development of SAMs. In fact, SAMs can be viewed as a straightforward extension of input-output tables in that they capture the distribution of income in addition to production and demand and thereby close the income circle.

The development of social accounting went hand in hand with the development of planning models that used these data. Such models can basically be divided into two categories. On the one hand, SAM-based multiplier models have been developed, in which certain variables, such as investment or government demand, are set exogenous and then changed in order to analyze how the changes feed through the economic system.[1] These multiplier models are demand-driven, since no constraints on supply are specified, and are thus Keynesian in spirit. On the other hand, SAMs have been used to provide data bases for constructing CGE models. A main feature of (most) CGE models is that relative price movements tend to play a central role in determining production and demand decisions, making them more neoclassical in spirit.

While SAMs constitute a powerful tool for policy analysis, their limitations have to be kept in mind. Most notably, a SAM only provides a snapshot for a particular year, which is not necessarily characteristic of the economy at hand if, for example, an exogenous shock hit the economy in that year. Furthermore, due to

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[1]   For a number of illustrative examples of this sort of modelling, see the volume edited by Pyatt and Round (1985).

lags in data collection, SAMs often are not up-to-date. This problem can partly be resolved by means of procedures for updating data bases, such as the maximum entropy approach suggested by Robinson *et al.* (2001). Finally, a SAM cannot readily be used as an input for policy analysis. To conduct a CGE analysis, most nominal flows given in the SAM have to be split up into their price and quantity component, and certain parameters such as trade elasticities have to be specified outside the SAM framework.

3.   A SCHEMATIC SAM FOR BOLIVIA

A schematic representation of the SAM structure chosen for Bolivia is given in Table 1.[2] The Bolivian SAM consists of four different types of accounts. First, product supply and demand is described by a set of *commodity accounts*, where the row shows the cost components that add up to overall supply from domestic sources, plus imports, while the column lists the domestic demand components and exports. Second, *factor accounts* depict how value added is distributed to the domestic factors of production, and how this factor income is transformed into income accruing to the various institutional agents (government, households, companies, rest of the world) identified in the SAM. Third, *current accounts* show the sources from which institutions receive income, and the uses to which they put that income. Part of it is consumed, part is redistributed among the institutional agents themselves, and the remaining is saved. Among the institutional accounts are two important macroeconomic balances, namely the government budget and the current account of the balance of payments.

All in all, with slight variations in exposition, these first three kinds of accounts can be found in almost every SAM. The main peculiarity here lies in the level of disaggregation among commodities, factors, and institutions, which will be discussed in detail below. In conceptional terms, the *capital accounts*, which are required to establish the link between savings and investment, constitute the distinctive feature of the Bolivian SAM. In most existing SAMs, it is simply assumed that the savings of the different institutions are collected in a "savings pool" and then made available for investment, without any reference to the process of financial intermediation. Here, by contrast, all major flows of funds occurring to match the positions of surplus units (institutions for which savings exceed investment) and deficit units are recorded. The explicit consideration of financial market transactions carries a number of advantages.[3] Viewed from the perspective of structural adjustment programs, the main advantage appears to be that in certain areas such as monetary policy the transmission that runs via the financial system can be analyzed.

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2   For an algebraic representation of the SAM, see Appendix 1.
3   Vos (1991) provides a detailed account of these advantages.

TABLE 1. STRUCTURE OF THE SOCIAL ACCOUNTING MATRIX

	COMMODITIES	FACTORS	INSTITUTIONS (CURRENT)				INSTITUTIONS (CAPITAL)					TOTALS
			Govern-ment	House-holds	Com-panies	Rest of the World	Govern-ment	House-holds	Com-panies	Rest of the World	Financial Institutions	
Commodities	INTERMEDIATE DEMAND			CONSUMPTION		EXPORTS	INVESTMENT					TOTAL DEMAND
Factors	DISTRIBUTION OF VALUE ADDED TO FACTORS					EXPORTS OF FACTOR SERVICES						TOTAL FACTOR INCOME
Government	INDIRECT TAXES				DIRECT TAXES							
Households		DISTRIBUTION OF INCOME TO HOUSEHOLDS AND COMPANIES			TRANSFERS, INTEREST AND DIVIDENDS	TRANSFERS						TOTAL INCOME OF INSTITUTIONS
Companies												
Rest of the World	IMPORTS	IMPORTS OF FACTOR SERVICES		INTEREST ON DEBT								CURR. ACC. (DEBIT)
Government				SAVINGS BY INSTITUTIONS			FLOWS OF FUNDS					TOTAL INVESTMENT FINANCE
Households												
Companies												
Rest of the World						EXT. SAV.						
Financial Institutions												
TOTALS	TOTAL SUPPLY	DISTRIBUTED FACTOR INCOME		USE OF DISPOSABLE INCOME OF INSTITUTIONS		CURR. ACC. (CREDIT)	TOTAL INVESTMENT (FINANCIAL AND PHYSICAL)					

4.   THE INPUT-OUTPUT TABLE

1.   Construction of the Input-Output Table

The Input-Output Table forms the core of the SAM as it describes the structure of the economy.[4] Based on the data for 35 sectors from the Instituto Nacional de Estadistica (INE) (2001a) of Bolivia an aggregated Input-Output table with 13 sectors was constructed.[5] The chosen aggregation reflects the favored focus of the analysis and groups together activities with similar demand and supply characteristics. As discussed later, the remaining 13 sectors differ quite significantly, e.g. in their trade shares and their dependency on intermediate products. The assignment of the 35 sectors of the Input-Output Table to the 13 sectors of the SAM is represented in Overview 1.

Most aggregated sectors are derived through the simple addition of the individual sectors. However, the composition of the service sectors and the agricultural sectors is more complex. For these two sectors, a disaggregation into informal and formal activities was considered necessary because most of the poorer people in Bolivia pursue informal activities, and because production characteristics (e.g. trade shares) differ between formal and informal activities. Informal activities are identified according to the value added share of unincorporated capital. A high share of unincorporated capital is assumed to reflect a high percentage of informal activity. The derived shares of informal activities for eight service sectors are given in Table 2 and range from 0 percent in *communications* to 65 percent in *trade*. For *transport and storage, financial services* and *company services* we assume that the share of formal activity is 100 percent. In *domestic services* wages account for all value added. Here, a modification is introduced: The complete sector is attributed to informal services.

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4   The Input-Output Table is derived through a calculation process using the technology matrix and the make matrix of an economy. For a detailed description of the matrices used in the SAM construction see Bulmer-Thomas (1982). For Bolivia, these matrices are provided by the Instituto Nacional de Estadistica (INE) (2001a).

5   The Bolivian statistics include an additional dummy sector 36, called *imputed bank service charge*, which was eliminated in order to construct a square (35x35) Input-Output table following a similar procedure to the one suggested in Lysy (1977, p. 9). Whereas Lysy allocates the values of the imputed bank service charge to the other sectors in proportion to each sector's value added, we allot this in proportion to the value added share of incorporated capital (see also Chapter IV), assuming that only sectors with a high share of incorporated capital demand a high share of the imputed bank services.

OVERVIEW 1. AGGREGATION OF SECTORS OF THE INPUT-OUTPUT TABLE FOR THE SOCIAL ACCOUNTING MATRIX

Sectors in the Social Accounting Matrix	Sectors in the Disaggregated Input-Output Table
1. Traditional Agriculture/ 2. Modern Agriculture	1. Non-industrialized crop production 2. Industrialized crop production 4. Livestock production 5. Timber production, hunting and fisheries
3. Coca Sector	3. Coca
4. Crude Oil and Natural Gas	6. Crude oil and natural gas
5. Mining	7. Mining
6. Consumer Goods	8. Meat and processed meat 9. Dairy products 10. Baking and grain mill products 11. Sugar and confectionary products 12. Other food products 13. Beverages 14. Processed tobacco 15. Textile, clothing and leather products 16. Wood and wood products 17. Paper and paper products
7. Intermediate Goods	18. Chemical products 19. Processed oil products 20. Non-metallic mineral products 21. Base metals 23. Other manufacturing
8. Capital Goods	22. Metallic products, machinery and equipment
9. Electricity, Gas and Water	24. Electricity, gas and water
10. Construction	25. Construction and public building activities
11. Informal Service Sector/ 12. Formal Service Sector	26. Trade 27. Transport and storage 28. Communication 29. Financial services 30. Company services 31. Property 32. Local, social and personal services 33. Restaurants and hotels 34. Domestic services
13. Public Sector	35. Public sector

TABLE 2
SHARE OF INFORMAL AND FORMAL ACTIVITIES IN
THE SERVICES SECTORS

Sector number and sector	Percentage share of informal activity	Percentage share of formal activity	Sector share of all service sectors	Weighted share of the informal activities	Weighted share of the formal activities
	I	II	III	I * III	II * III
26. Trade	0.65	0.35	0.19	0.12	0.06
27. Transport and storage	0.00	1.00	0.25	0.00	0.25
28. Communication	0.00	1.00	0.06	0.00	0.06
29. Financial services	0.00	1.00	0.11	0.00	0.11
30. Company services	0.00	1.00	0.10	0.00	0.10
31. Property	0.00	1.00	0.09	0.00	0.09
32. Local, social and personal services	0.34	0.66	0.11	0.04	0.07
33. Restaurants and hotels	0.29	0.71	0.08	0.02	0.06
34. Domestic services	1.00	0.00	0.02	0.02	0.00
Total			1.00	0.20	0.80

Source: Calculated on the basis of Instituto Nacional de Estadística (INE) (2001a, 2001b).

Table 2 also presents each sector's percentage share of the total value added of the nine service sectors and the derived weighted share of the informal and formal activities. For all nine service sectors, informal services account on average for 20 percent of the activities.

A similar aggregation procedure using the value added share of unincorporated capital was performed for the division between traditional (informal) and modern (formal) agriculture. Table 3 gives the percentage share of traditional and modern activities in each agricultural sector, the weight of each agricultural sector (according to the value added) and the derived overall share of traditional and modern agricultural activities. 67 percent of the Bolivian agriculture is traditional, 33 percent is modern.

2.   Structural Characteristics of Supply and Demand

From the 13-sector Input-Output Table, various indicators describing demand and supply in the Bolivian economy can readily be calculated. The structure of the sectoral use of goods is given in Table 4. This table shows for each sector the absolute values of the components that make up domestic absorption: intermediate demand, private consumption, government consumption and investment (which is the sum of fixed capital formation and inventories). Subtracting imports and tariffs from domestic absorption yields the domestic use of domestically

produced goods. Adding to this exports results in the overall use of domestically produced goods.[6]

TABLE 3
SHARE OF TRADITIONAL AND MODERN ACTIVITIES IN THE
AGRICULTURAL SECTORS

Sector Number and Sector	Percentage share of traditional activity	Percentage share of modern activity	Sector share of all agricultural sectors	Weighted share of the traditional activities	Weighted share of the modern activities
	I	II	III	I * III	II * III
1. Non-industrialized crop production	0.92	0.08	0.46	0.42	0.03
2. Industrialized crop production	0.32	0.68	0.21	0.07	0.14
4. Livestock production	0.65	0.35	0.27	0.17	0.10
5. Timber production, hunting and fisheries	0.16	0.84	0.06	0.01	0.05
Total			1.00	0.67	0.33

Source: Calculated on the basis of Instituto Nacional de Estadística (INE) (2001a, 2001b).

An examination of the relative shares of the different components reveals an enormous variety among sectors. Intermediate demand accounts for 83 percent of domestic absorption for *crude oil and natural gas* whereas the share is only about 1 percent in the *public sector* and in the *coca sector*. Coca is the sector where final private consumption is with almost 99 percent the largest component of absorption. *Consumer goods* (63 percent) and *electricity, gas and water* (56 percent) are the sectors with the next highest share of private consumption. Government consumption is only a component of domestic absorption in the public sector. Investment is a decisive component of absorption for *construction* (almost 96 percent) and *capital goods* (59 percent). These structural characteristics are important determinants of the likely impact of structural adjustment. If, for example, investment is cut back as a result of fiscal consolidation, this will lead to a contraction of the construction and capital goods sector.

In foreign trade, overall imports correspond to 16 percent of domestic absorption, a moderate share for a small economy such as Bolivia. There are no imports of coca, crude oil and natural gas, and construction. However, for capital goods imports correspond to 86 percent, for intermediate goods to 38 percent and for consumer goods to almost 15 percent of domestic absorption. Table 4 also includes the import structure of the Bolivian economy. Almost 90 percent of all imports are directed to the three sectors capital goods (44 percent), intermediate goods (27 percent) and consumer goods (17 percent).

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[6]   It should be noted that all macroeconomic totals in the Input-Output Table are equal to the national account figures calculated by INE (2001a).

TABLE 4

STRUCTURE OF THE SECTORAL USE OF GOODS

(Percent of absorption)

Sector No.	Sector	Intermediate Demand	Private Consumption	Government Consumption	Investment	Structure of Imports	Imports	Structure of Exports	Exports[a]	Structure of Demand
(1)	Traditional Agriculture	59.76	41.77	0.00	-1.53	3.23	8.04	5.16	8.77	7.01
(2)	Modern Agriculture	77.68	14.58	0.00	7.75	0.84	4.85	8.12	25.34	3.81
(3)	Coca Sector	1.10	98.90	0.00	0.00	0.00	0.00	3.71	80.72	0.55
(4)	Crude Oil and Natural Gas	83.36	0.00	0.00	16.64	0.00	0.00	5.97	24.59	2.89
(5)	Mining	101.44	0.00	0.00	-1.44	0.70	9.73	18.05	65.48	3.28
(6)	Consumer Goods	36.82	62.76	0.00	0.42	16.70	14.85	25.27	15.33	19.62
(7)	Intermediate Goods	71.14	26.42	0.00	2.44	26.50	38.46	11.48	15.66	8.72
(8)	Capital Goods	20.12	20.67	0.00	59.21	43.64	86.21	0.64	5.94	1.29
(9)	Electricity, Gas and Water	44.40	55.60	0.00	0.00	0.03	0.18	0.02	0.10	2.42
(10)	Construction	4.45	0.00	0.00	95.55	0.00	0.00	0.00	0.00	4.72
(11)	Informal Service Sectors	48.81	51.19	0.00	0.00	1.72	3.19	0.00	0.00	9.04
(12)	Formal Service Sectors	43.16	54.89	0.00	1.95	6.59	4.29	21.52	9.14	29.03
(13)	Public Sector	0.73	8.37	90.89	0.00	0.07	0.14	0.06	0.08	8.62
	Average/Sum	42.12	39.95	7.43	10.50	100.00	16.45	100.00	11.90	100.00

[a] Percent of domestic production

Source: Own calculation based on INE (2001a).

Exports account for about 12 percent of the overall use of domestic goods. As in the case of imports, this points to a rather low integration of the Bolivian economy into world markets. Very large shares are reported for coca (more than 80 percent) and mining (65 percent). The export ratio differs substantially between the informal and the formal agricultural sectors and underlines the necessity to distinguish between them: Whereas only less than 9 percent of traditional agriculture is exported, more than 25 percent of modern agriculture goes abroad.[7] The export structure shows that 76 percent of all exports stem from four sectors: Consumer goods (25 percent), formal services (22 percent), mining (18 percent) and intermediate goods (11 percent).

The trade pattern that emerges for Bolivia has important implications for the distributional analysis of adjustment programs. All policies that lead to a (real) devaluation of the Boliviano, for example, will benefit outward-oriented sectors with reasonable flexibility to shift between domestic and world markets, such as mining and modern agriculture. Outward-oriented sectors with low flexibility, such as capital goods where domestic production cannot easily substitute for imports, will hardly benefit. And sectors mainly producing nontradables, such as informal services where most of the urban poor earn their living, will be hurt by a depreciation.

The overall demand structure of the Bolivian economy is also represented in Table 4. It shows that the demand for formal services (28 percent) and for consumer goods (20 percent) are quite important as a share of overall demand. The next three sectors (informal services, intermediate goods and public sector) have a share of around 9 percent each of overall demand. Coca accounts for only half of one percent of total demand, and for less than four percent of all exports. However, since it employs many smallholders (Section IV.1) and is regionally concentrated, a separate consideration of coca is justified, e.g. for the analysis of coca eradication programs.

Table 5 presents the structure of the sectoral production costs in Bolivia in 1997. For each of the 13 sectors the costs for intermediates and the factors of production are given as absolute values and as percentage shares.

This representation shows that coca (93 percent), traditional agriculture (75 percent), mining (74 percent) and the public sector (73 percent) are the sectors with the highest share of costs for the factors of production in the sectoral net production. The sectors capital goods (76 percent), consumer goods (71 percent) and intermediate goods (67 percent) are the sectors with the highest share of intermediate costs.

The sectoral cost structure is of major importance for the examination of adjustment programs. The capital goods sector, for instance, with its high share of intermediate costs and a large share of imported intermediates will not be very responsive to cost pressures, given that it can barely substitute imports by domestic

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[7]   Since the export share of informal services is negligibly small, the exports of informal services are assigned as exports of formal services. The export share of formal services then amounts to 9 percent of the overall use of domestic goods.

TABLE 5
STRUCTURE OF SECTORAL PRODUCTION COSTS
(Percent)

	Traditional agriculture	Modern agriculture	Coca	Oil and gas	Mining	Consumer goods	Inter-mediate goods	Capital Goods	Electricity, gas and water	Cons-truction	Informal services	Formal services	Public sector	Total
Intermediate goods	25.18	33.78	6.73	44.56	26.03	71.03	67.12	76.32	38.06	63.51	55.40	40.32	26.61	47.74
Factors of production	74.82	66.22	93.27	55.44	73.97	28.97	32.88	23.68	61.94	36.49	44.60	59.68	73.39	52.26
Net production	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Own calculations based on INE (2001a; 2001b).

production. By contrast, sectors facing a high cost share for primary factors and reasonably flexible factor markets (like coca and traditional agriculture) will be much more able to pass cost pressure on to factors. These effects are, in turn, very important for the distributional aspects of adjustment programs.

5.   DISTRIBUTIONAL ASPECTS

The reforms typically required in adjustment programs affect the real income position of households via four basic channels. First, most structural measures alter the use and remuneration of production factors and thus have an impact on factor incomes that varies with factor endowments. Second, fiscal consolidation usually entails a reduction and/or restructuring of transfer payments to households. Third, a liberalization of the financial sector changes the returns on assets as well as the costs of liabilities. Fourth, microeconomic reforms such as cuts in food and energy subsidies lead to changes in relative consumer prices, thereby affecting the real income distribution as long as consumption patterns are not identical across households. The informational base the SAM provides for modeling these four channels will be discussed in the following.

1.   Distribution of Factor Income

The net value added created in the economy flows as a reward to the factors used in the production process. In order to obtain a rich enough picture of the resulting factorial income distribution, we extend the conventional breakdown of value added into labor and capital income by distinguishing four different production factors: *Skilled labor, unskilled labor, corporate capital*, and *unincorporated capital*. While the two labor categories correspond to the distinction between employees and workers made in Bolivian statistics, the two types of capital are characterized by different ownership structures. Corporate capital is owned by private and public enterprises and all corporate capital income is retained in these enterprises. Unincorporated capital, by contrast, belongs to households who also receive the respective factor income. This factor income, in turn, comprises both profits distributed to owners of enterprises and mixed income earned by self-employed workers, the latter being a conglomerate of a return on investment and other components such as land rents.

Arriving at the distribution of income to these four factors involved several steps. Basic data for breaking down value added into its components were provided by INE (2001b) which calculated for 1998 the shares of wages, operating surpluses and mixed income in total value added. These data were adapted as follows. First, to obtain 1997 figures, it was assumed that the structure of value added did not change between 1997 and 1998. Then, wages were distributed between skilled and unskilled labor according to the information given in the 1997 employment survey

(INE, 1997). Finally, operating surpluses were split up into distributed profits and corporate capital income by taking the aggregate value of retained earnings given in the national accounts as total corporate capital income, and by assuming that both types of income have the same sectoral composition.

The factorial income distribution for the 13 production sectors that results from these calculations is shown in Table 6. A very diversified picture emerges. Traditional agriculture and informal services where, by assumption, only unincorporated capital is used as a production factor, account for the bulk of mixed income. Corporate capital income and distributed profits are highest in formal services, a result that is partly owed to the large size of the sector. As a share of sectoral net value added, corporate capital income, for example, is much higher in both the oil and gas and the utilities sector. Skilled laborers earn most of their income either from providing formal services or from serving in the public administration, while unskilled workers receive a high share of their income from modern agriculture, manufacturing, construction and public services. Overall, with such a sectoral diversity of factor incomes, adjustment policies that induce structural change are likely to have a substantial impact on Bolivia's factorial income distribution.

Knowledge of the functional income distribution constitutes only a first step towards assessing a country's distributional situation. More direct insights can be gained by tracing the flow of income from factors to households. In doing so for Bolivia, we identify six different types of households: *smallholders*, *agricultural workers*, *employees*, *non-agricultural workers*, *urban informals*, and *employers*. The disaggregation is basically made along functional lines, i.e. households with similar factor endowments are lumped together. This is justified because factor income is the single-most important income source in Bolivia given the low degree of redistribution (see Section V.2). Furthermore, workers and those involved in informal activities are disaggregated regionally as their consumption patterns tend to vary between regions (see Section V.3).

Appendix Table 1 (columns 14-18; rows 19-27) shows how income is distributed from the 4 production factors to the 6 household groups and to enterprises. 5 household groups obtain factor income from one single source: smallholders and urban informals only earn mixed income, agricultural and non-agricultural workers only unskilled labor income, and employees only skilled labor income. Employers are the sole exception as this group does not only include capital owners but also self-employed people with mixed income, such as providers of financial services, who cannot meaningfully be counted as informals.

What these income flows mean for the well-being of households is revealed by the average income figures presented in Table 7. Not surprisingly, it turns out that smallholders are worst off, followed by urban informals and the two categories of worker households. The rather large gap between smallholders and urban informals on the one hand and agricultural and non-agricultural workers on the other hand is largely due to the fact that unpaid family workers are included among the former. But even if unpaid family workers are excluded from the calculation, the ranking remains unchanged. Smallholders then earn about 30 percent less

TABLE 6
DISTRIBUTION OF INCOME TO FACTORS

	Traditional agriculture	Modern agriculture	Coca	Oil and gas	Mining	Consumer goods	Inter-mediate goods	Capital goods	Electricity, gas and water	Construc-tion	Informal services	Formal services	Public sector	Total
						Shares (in percent of value added)								
Skilled labor		0.07	0.06	0.34	0.05	0.11	0.13	0.14	0.22	0.19		0.29	0.91	0.26
Unskilled labor		0.26	0.25	0.17	0.16	0.16	0.17	0.23	0.03	0.27		0.02	0.09	0.08
Corporate capital		0.26	0.01	0.49	0.19	0.20	0.24	0.07	0.75	0.22		0.22		0.16
Unincorporated capital														
Distributed profits					0.29	0.31	0.37	0.10		0.13		0.33		0.20
Mixed income	1.00	0.41	0.66		0.31	0.21	0.09	0.45		0.19	1.00	0.15		0.30
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
						Shares (in percent of factor income)								
Skilled labor		0.01	0.00	0.03	0.01	0.05	0.02	0.00	0.03	0.02		0.37	0.46	1.00
Unskilled labor		0.17	0.03	0.05	0.09	0.22	0.10	0.01	0.01	0.11		0.07	0.15	1.00
Corporate capital		0.08	0.00	0.07	0.05	0.14	0.07	0.00	0.13	0.02		0.44		1.00
Unincorporated capital														
Distributed profits					0.07	0.17	0.09	0.00		0.02		0.55		1.00
Mixed income	0.36	0.11	0.02		0.05	0.08	0.01	0.00		0.04	0.28	0.16		1.00
Total	0.11	0.05	0.01	0.02	0.05	0.11	0.05	0.00	0.03	0.03	0.08	0.33	0.13	1.00

Source: Own calculations based on INE (1997, 2001b).

than agricultural workers, and urban informals almost 10 percent less than non-agricultural workers. Incomes of employees and employers are substantially above the national average. As the by far richest household group, employers earn more than ten times the amount that goes to smallholders. Such a considerable range of income levels suggests that the classification chosen here has succeeded in isolating household groups with different living standards and thus provides a useful starting point for distributional analyses. Nevertheless, substantial within-group disparities still exist at the chosen level of disaggregation. As a consequence, the Gini coefficient for the income distribution resulting from the SAM only amounts to slightly above 0.4, whereas most previous studies based on disaggregated household surveys obtain Gini coefficients of more than 0.5 (Thiele 2003).

TABLE 7
EMPLOYMENT AND AVERAGE MONTHLY INCOME
BY HOUSEHOLD GROUPS

	Smallholder	Agricultural Workers	Employees	Non-Agricultural Workers	Urban Informals	Employers	Total
Employment	1409313[a]	66672	626368	296451	878203[a]	292734	3569741
Income (Millions of Bolivianos)	4125	580	9321	2315	4372	9425	30138
Average Income per Month (Bolivianos)	244	725	1240	651	415	2683	704

[a] Including unpaid family workers.
Source: Own calculations based on INE (1997) and Appendix Table 1.

2.   Redistribution of Income

Various transactions taking place between institutions, such as government transfers to households and remittances from Bolivians living abroad, modify the factorial income distribution described above. In the SAM, the six household groups, the government, private and public enterprises, and the rest of the world are identified as participants in this process of redistribution. Financial institutions are assumed to act as mere intermediaries (see Section VI.2). Their current transactions are allocated to the two kinds of enterprises. As a result, the institution "private enterprises" does not only include private firms, but also commercial banks, insurance companies and pension funds, while the institution "public enterprises" consists of state-owned and capitalized firms, the Central Bank, and other financial institutions such as development banks.

Table 8 shows the part of the inter-institutional transactions that involves the six household groups; a full description of the income flows between institutions is given in Appendix Table 1. It turns out that households as an aggregate have

net receipts of about 2.5 billion Bolivianos. The most significant transactions recorded are public transfers (2.5 billion Bolivianos), government revenues (2 billion Bolivianos), interest receipts on deposits and dividends on equities (3.0 billion Bolivianos), and interest payments on loans (1.1 billion Bolivianos). Pensions and the corresponding contributions account for the bulk of the flows from and to the government. Direct taxes and transfers, the classical means of public redistribution, only play a minor role, with 200 and 400 million Bolivianos, respectively, as do remittances, with less than 200 million Bolivianos.

Since there is no survey information available on the payments and receipts of different household groups, the disaggregation of the overall amounts had to be based on a number of assumptions, of which the most important are:

(i)   public pensions are confined to employees;
(ii)   only employers and employees hold equities and deposits in the private and public banking system;
(iii)   only employers and employees have access to private loans, while public loans are distributed to smallholders and informals;
(iv)   smallholders and urban informals do not pay taxes;
(v)   all household groups receive remittances;
(vi)   all household groups except employers receive transfers from the government.

TABLE 8
REDISTRIBUTION BETWEEN INSTITUTIONS
(Millions of Bolivianos)

	Small- holders	Agricultural Workers	Employees	Non Agricultural Workers	Urban Informals	Employers	Total
Receipts from							
Private Enterprises			1400			1423	2823
Public Enterprises			76			77	153
Government	74	11	2249	42	79		2455
Rest of the World	24	4	54	13	25	54	174
Payments to							
Private Enterprises			448			456	904
Public Enterprises	179				59		239
Government		4	1834	14		127	1979
Rest of the World							
Net Receipts	−81	11	1496	41	45	972	2484

Source: Own calculations based on National Account Data (INE, 2001a).

Based on these assumptions, overall flows were allocated among households in fixed proportions to their income levels. What comes out is that the bulk of redistribution involves employers and employees, while the poorer household groups are barely affected. Although this inevitably is a very stylized

pattern, one can at least conclude that the redistribution process in Bolivia does not do much to correct for the disparities occurring in the primary income distribution. Poor households may not be totally excluded from formal social security and financial markets as assumed here, but their access definitely is very limited. Adding to this the low level of transfers, redistribution cannot be markedly progressive and thus is unlikely to constitute a major link between structural adjustment and the well-being of poor households.

3.   Structure of Household Demand

At given nominal factor and transfer incomes, the sectoral composition of private demand determines how the real income position of households might be affected by structural adjustment policies via changes in relative consumer prices. Since sectoral expenditures cannot be observed directly, the calculation of the demand vector for each household group had to proceed in two steps. First, consumption data from the national accounts were grouped into six commodity aggregates (see Table 9), and then disaggregated by household group combining information from the 1999 MECOVI survey (INE, 2001c) and from Jemio (1993). Although the latter only identifies three types of households (rural, lower-income urban, upper-income urban), it had to be used here because the survey does not provide the necessary data for all relevant commodities. Due to lacking evidence, the shares spent on clothing and footwear and on consumer durables were set equal for the two rural households, for non-agricultural workers and informals, and for employees and employers, while expenditures on all services apart from transport were calculated residually. Second, the resulting commodity demand schedule was translated into a sectoral demand schedule employing a transformation matrix based on Jemio (1993).

TABLE 9
STRUCTURE OF COMMODITY DEMAND
(Percent)

Commodity / Household Group	Smallholder	Agricultural Workers	Employees	Non-Agricultural Workers	Urban Informals	Employers	Total
Food, Beverages and Tobacco	0.512	0.504	0.295	0.419	0.396	0.272	0.348
Clothing and Footwear	0.055	0.055	0.048	0.049	0.049	0.048	0.049
Housing, Water and Energy	0.065	0.074	0.115	0.074	0.090	0.115	0.100
Consumer Durables	0.071	0.071	0.085	0.063	0.063	0.085	0.077
Transport	0.174	0.174	0.167	0.160	0.177	0.172	0.171
Other Services	0.123	0.123	0.291	0.235	0.224	0.310	0.255
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: Own calculations based on INE (2001c) and Jemio (1993).

In the commodity demand schedule shown in Table 9 two structural characteristics stand out. Food, beverages and tobacco are on much higher demand

in poorer than in richer households and, among poorer households, rural spending exceeds urban spending. The mirror image can be observed with respect to services: wealthier people spend more than poorer people, and the urban poor more than the rural poor, on services such as health and education; only the budget shares allocated to transport are more or less equal across household groups, although the aggregate figures are likely to mask differences such as a move from public to private means of transportation with rising living standards.

This structure of demand carries over to the sectoral consumption pattern reported in Table 10. The share of the consumption basket devoted to the output of traditional agriculture, for instance, ranges from about 5 percent for employees and employers to more than 10 percent for smallholders, and services contribute between 30 percent (for smallholders) and 50 percent (for employers) to overall expenditures. In the case of services, the composition of demand also differs among households: the relative importance of informal services is highest in poor urban households, while rural households have to rely for the most part on formal services as they lack access to many of the services only provided by the urban informal economy. Overall, the structural variation in consumption seems to be large enough to constitute a potential mechanism through which adjustment measures can affect the distribution of income.

TABLE 10
SECTORAL CONSUMPTION DEMAND BY HOUSEHOLD GROUPS
(Millions of Bolivianos)

Household Group / Sector	Smallholder	Agricultural Workers	Employees	Non-Agricultural Workers	Urban Informals	Employers	Total
Traditional Agriculture	519	62	542	197	343	484	2147
Modern Agriculture	49	7	95	32	55	84	322
Coca	33	5	7	8	15	9	77
Oil and Gas	0	0	0	0	0	0	0
Mining	0	0	0	0	0	0	0
Consumer Goods	1562	235	2668	818	1426	2336	9044
Intermediate Goods	290	44	839	141	289	729	2332
Capital Goods	167	25	482	81	166	422	1344
Electricity, Gas and Water	84	14	380	56	126	332	991
Construction	0	0	0	0	0	0	0
Informal Services	121	18	1175	371	694	1153	3531
Formal Services	1144	166	3989	642	1201	3659	10800
Public Sector	39	6	209	31	58	182	526
Total	4008	581	10386	2379	4371	9389	31113

Source: Own calculations based on Jemio (1993) and Table 9.

6. ACCUMULATION BALANCES

This chapter deals with the part of income institutions retain for investment in physical and financial capital. It first discusses the savings and investment recorded for the year 1997 (Section VI.1), and then links these flows to the

corresponding stocks which indicate the wealth of the different institutions (Section VI.2).

1.   Saving and Investment

At given factor incomes, inter-institutional transfers, and consumption expenditures, the amount saved by each domestic institution can be calculated residually from the accounting identity.

(1)   factor income + net transfers = consumption + savings.

External savings are determined by the current account balance. As shown in Appendix Table 1 (columns 30-43; rows 19-28), employers and employees dominate household savings. All other household groups exhibit saving rates of around zero. Households and enterprises together account for about half of overall savings. The other half is contributed by the government and the rest of the world, reflecting that Bolivia in 1997 ran a budget surplus and a current account deficit.

Total savings (8.176 billion Bolivianos) determine the resources available for investment in physical capital. The institutional composition of this investment is documented in the national accounts, except for the different household groups. The breakdown of household investment had to rely on two assumptions: first, gross fixed capital formation, which includes the establishment of residential buildings, was assumed to have the same distribution as the respective capital stocks (see below); second, aggregate inventories were distributed among smallholders, urban informals, and employers – i.e. among those household groups that are also producing units – taking shares in total mixed income as weights.

Compared to the government and enterprises, whose investment amounts to 2.086 and 5.666 billion Bolivianos, respectively, households do not invest much (Table 11). For informals and smallholders, investment is even slightly negative as the reduction in inventories overcompensates positive fixed capital formation. Furthermore, the investment projects households undertake are largely confined to construction; only employers utilize a non-negligible amount of capital goods.

The low investment levels realized by smallholders and informals point towards a possible persistence of poverty because for these household groups, who derive their income from self-employment, capital formation arguably is the most important means to raise living standards in the medium to long run. As a complement to private investment, capital expenditures by the government on public goods such as infrastructure may also have a considerable impact on the well-being of smallholders and informals. Hence, if public investment is cut back during adjustment, this constitutes another mechanism through which macroeconomic reforms may be transmitted to the household level.

TABLE 11
COMPOSITION OF INVESTMENT BY HOUSEHOLD GROUPS
(Millions of Bolivianos)

Household Group / Sector	Smallholder	Agricultural Workers	Employees	Non-Agricultural Workers	Urban Informals	Employers	Total
Modern Agriculture	16						16
Capital Goods	21				23	72	116
Construction	104	6	268	29	139	205	751
Formal Services	8				8	15	31
Gross Fixed Investment	149	6	268	29	170	292	914
Changes in Stocks	−188				−199	−103	−490
Total	−39	6	268	29	−29	189	424

Source: Own calculations based on INE (2001a, 2001c).

While overall savings in the economy have to be equal to overall investment, this is not true for individual institutions. Here, saving-investment surpluses by households and the rest of the world correspond with deficits by enterprises and the government. These surpluses and deficits are balanced via the financial system. For each institution, the identity.

(2)   saving − investment = Δ assets − Δ liabilities = Δ net assets.

must hold, i.e. institutions with a saving-investment surplus accumulate (net) financial assets and thereby finance the deficits of the other institutions. Some of the financial transactions, for example the purchase of shares in enterprises, take place directly between institutions, while others involve one of the following financial intermediaries: the Central Bank, commercial banks, other financial institutions, and pension funds.

The matrix describing the flow of funds between all these economic agents replicates the structure of the matrix for 1998 given in Jemio (2001b). Since neither the existing case studies nor the Bolivian household surveys contain appropriate information about the financial transactions conducted by individual household groups, the disaggregation again produces a stylized picture. For shares, deposits and loans, the same assumptions as in Section V.2 were applied. In addition, it was assumed that only employees accumulate private pension rights, and that only employers hold foreign assets. Currency holdings were calculated residually so as to balance the flow-of-funds system.

The financial flows between all institutions identified in the SAM can be found in Appendix Table 2 (columns 31–44; rows 1–14). For the six household groups, savings allocated to pension funds, deposits in and loans from the commercial banking system, and foreign assets turn out to be the most significant items, which are all confined to the two richer household groups (see columns 1–

6 and rows 37–44 for assets; columns 7–14 and rows 31–36 for liabilities). The participation of poorer households in the financial system is low, both as creditors and debtors. From a distributional viewpoint, the most relevant feature emerging from the flow of funds is that smallholders and informals have very limited access to credit. This result may be somewhat overstated because in reality the two groups are likely to obtain at least some loans from commercial banks. Nevertheless, it seems reasonable to conclude that credit constraints – probably combined with a low saving capacity and other institutional factors not captured in the SAM – act as a break on investment by smallholders and informals.

2.   Net Wealth

        The flows just described link the stocks at the beginning to those at the end of 1997. Stocks can also be subject to revaluations over the year. In the highly dollarized Bolivian economy, such revaluations are assumed to be driven by exchange rate changes, with a depreciation of the Boliviano implying an appreciation of existing assets and liabilities and vice versa. For financial stocks, the accumulation process is described by

(3) $\text{assets}_t = \text{assets}_{t-1} + \Delta \text{assets} + \text{revaluation of assets,}$

and

(4) $\text{liabilities}_t = \text{liabilities}_{t-1} + \Delta \text{liabilities} + \text{revaluation of liabilities.}$

A similar relationship holds for physical capital:

(5) $\text{capital stock}_t = \text{capital stock}_{t-1} + \text{investment} - \text{depreciation} + \text{capital gains.}$

From equations (3) to (5), net wealth can be derived as

(6) $\text{net wealth}_t = \text{assets}_t - \text{liabilities}_t + \text{capital stock}_t.$

        A full account of these stock-flow relationships for all institutions is given in Appendix Table 2. Here we focus on the net wealth position of the different household groups, which is of particular interest from a distributional point of view. To arrive at the net wealth figures, end-of-period stocks at the aggregate household level were first set equal to the beginning-of-period stocks for 1998 given in Jemio (2001b), and the beginning-of-period stocks were then derived by calculating backwards. The disaggregation of financial stocks was achieved by making the same assumptions as in Section VI.1, except for currency holdings which were fixed at the same proportion of income for each household group. Physical capital was distributed among households using the information the MECOVI survey provides about fixed assets such as buildings and vehicles.
        Table 12 shows the end-of-period stocks and the resulting net wealth. It turns out that physical capital is by far the dominating asset in the portfolio of Bolivians. This is even true for those two household groups (employers and

employees) with the strongest links to the financial system. Just as the income distribution, the distribution of net wealth exhibits a clear distinction between the 4 poorer and the 2 richer household groups. The overall dispersion of net wealth is even higher than the dispersion of income, with an average employer's net assets exceeding those of an average smallholder by a factor of 15.[8] Among the poorer households, smallholders and urban informals appear to be in a somewhat better position in terms of net wealth than in terms of income as they own relatively large physical capital stocks.

TABLE 12
ASSETS AND LIABILITIES BY HOUSEHOLD GROUPS
(Millions of Bolivianos)[a]

Household Group / Sector	Smallholder	Agricultural Workers	Employees	Non-Agricultural Workers	Urban Informals	Employers	Total
Assets							
Private Enterprises			746			754	1500
Central Bank	186	26	419	104	197	424	1356
Commercial Banks			4598			4650	9248
Other Financial Inst.			957			968	1925
Pension Funds			605				605
Rest of the World						1070	1070
Physical Capital	6909	297	12419	1356	7884	13521	42386
Liabilities							
Commercial Banks			4318			4366	8684
Other Financial Inst.	1915				638		2553
Net Assets	5180	323	15427	1460	7442	17021	46853
Average Net Assets (Bolivianos per occupied person)	3675	4842	24629	4927	8475	58144	

Source: Own calculation based on Jemio (2001b) and INE (2001c).
[a] End-of-period stocks.

7.   CONCLUDING REMARKS

This paper has described the construction of a Social Accounting Matrix (SAM) for Bolivia for the year 1997. The SAM displays a number of distributional features of the Bolivian economy, of which the most important are:

(i)   Smallholders and urban informals together account for about two thirds of the total labor force, but for less than a quarter of total income;

(ii)   the richest household group (employers) receives slightly more than ten times the income of the poorest household group (smallholders);

[8] This result does not necessarily imply lower returns on the wealth of richer households because some returns (most notably the imputed rents for owner-occupied housing) do not show up as income in the SAM.

(iii)   disparities in the distribution of wealth are even somewhat wider, with
           employer's net assets exceeding those of smallholders by a factor of 15;

(iv)   the poor household groups are characterized by low savings, low
           investment, and a low participation in the financial system.

       To arrive at a SAM that captures these distributional features in a consistent
way, data from different sources – primarily the 1997 Input-Output table, the 1997
national accounts, and two household surveys for 1997 and 1999 – had to be
reconciled. Moreover, various assumptions had to be made because at the given
level of disaggregation not all the required information was available. The resulting
data base is therefore in parts somewhat stylized, but it is still likely to provide a
reasonable approximation of the structural characteristics prevailing in Bolivia,
rendering it a useful starting point for further analyses.
       While international comparisons are inherently limited by country-specific
features, at least two generalizations from the Bolivian SAM seem to be justified.
First, since dual production patterns can be found almost everywhere in the
developing world, the distinction between formal and informal activities made in
this paper might serve as a blueprint for future SAM applications. Second, the
household disaggregation according to factor endowments for Bolivia might also
be the best choice for most other low and lower-middle income countries, given
that redistribution tends to play a major role only at higher per capita income.
Finally, it would in general be desirable to integrate financial accounts into SAMs
but data requirements may often be too demanding.

REFERENCES

Alarcón, J., J. van Heemst, and N. de Jong (2000), Extending the SAM with Social and
           Environmental Indicators: An Application to Bolivia. *Economic Systems
           Research* 12 (4): 473–496.
Behrman, J., N. Birdsall, and M. Székely (2001), Pobreza, Desigualidad y Liberalización
           Comercial y Financiera. *Working Paper 449* (Washington, D.C.,
           Interamerican Development Bank).
Bulmer-Thomas, V. (1982), *Input–Output Analysis in Developing Countries: Sources,
           Methods and Applications* (Chichester, John Wiley & Sons).
INE (Instituto Nacional de Estadística) (1997), Encuesta Nacional de Empleo III: Noviem-
           bre 1997, La Paz.
INE (Instituto Nacional de Estadística) (2001a), Cuentas Nacionales 1988–1997, La Paz.
INE (Instituto Nacional de Estadística) (2001b), Bolivia: Valor Agregado Bruto A Sus
           Componentes Segun Actividad Economica 1998, La Paz (unpublished
           manuscript).
INE (Instituto Nacional de Estadística) (2001c), Encuesta Mecovi: Noviembre 1999, La
           Paz.

Jemio, L.C. (1993), Micro- and Macroeconomic Adjustment in Bolivia (1970–89): A Neostructuralist Analysis of External Shocks, Adjustment and Stabilization Policies (The Hague, PhD Dissertation, Institute of Social Studies).

Jemio, L.C. (2001a), Macroeconomic Adjustment in Bolivia since the 1970s: Adjustment to What, By Whom, and How? Analytical Insights from a SAM Model, *Kiel Working Paper 1031* (Kiel, Institute of World Economics).

Jemio, L.C. (2001b), *Debt, Crisis and Reform in Bolivia: Biting the Bullet* (Hampshire, Basingstoke).

Kehoe, T. (1998), Social Accounting Matrices and Applied General Equilibrium Models, in: I. Begg (ed.), *Applied Economics and Public Policy* (Cambridge University Press).

Lysy, F. (1977), Creating a Consistent Data Set for the Research Model of Malaysia (unpublished manuscript).

Paes de Barros, R. and C.H. Corseuil (2001), Apertura Económica y Distribución del Ingreso en Brasil, in : E. Ganuza, R. Paes de Barros, L. Taylor, and R. Vos (eds.), *Liberalización, Desigualdad y Pobreza: America Latina y el Caribe en los 90* (Eudeba, Buenos Aires).

Pyatt, G. and J. Round (1985), *Social Accounting Matrices: A Basis for Planning* (World Bank, Washington, D.C.).

Robinson, S., A. Cataneo and M. El-Said (2001), Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods. *Economic Systems Research* 13 (1): 47–67.

Thiele, R. (2003), The Social Impact of Structural Adjustment in Bolivia. *Journal of International Development* 15 (1): 1–21.

Thiele, R. and M. Wiebelt (2000), Sind die Anpassungsprogramme von IWF und Weltbank gescheitert? Eine Bestandsaufnahme der Erfahrungen aus zwei Jahrzehnten. *Discussion Paper* 357 (Kiel, Institute of World Economics).

Vos, R. (1991), Social Accounting, Flow of Funds and Capital Accumulation, in: J.V. Alarcón, I. van Heemst, S. Keuning, W. de Ruijter, and R. Vos (eds), *The Social Accounting Framework: Concepts, Construction and Applications* (Aldershot).

Vos, R. (2001), Liberalización Económica, Ajuste, Distribución y Pobreza en Ecuador, 1988-1999, in: E. Ganuza, R. Paes de Barros, L. Taylor, and R. Vos (eds.), *Liberalización, Desigualdad y Pobreza: America Latina y el Caribe en los 90* (Eudeba, Buenos Aires).

APPENDIX 1 — ACCOUNTING IDENTITIES AND BUDGET CONSTRAINTS

This Appendix specifies in algebraic form the main identities and constraints that can be derived from the aggregate SAM given in Table 1. The commodity account can be written as

(1) $C+I+X+M=VA+TI-SUB$

where $C = C^{hh} + C^g$; $I = I^{hh} + I^c + I^g$; $VA = W + P + MI$.

Equation (1) expresses GDP *at market prices* from the expenditure side as

(1a) $Y=C+I+X-M$

and from the value-added side as

(1b) $Y=VA+TI-SUB$.

Rewriting equation (1a) gives *domestic absorption*:

(2) $A=Y+M-X=C+I$

By combining the information given in the current and capital accounts, the budget constraints of the institutions identified in the SAM can be derived. For the government, the current balance is

(3) $T=C^g+NT+INT+S^g$

where $\begin{aligned} &T=TI-SUB+T^{hh}+T^c; \ \ NT=NT^{hhg}+NT^{cg}-NT^{gf}; \\ &INT=INT^{hhg}+INT^{cg}+INT^{fg}. \end{aligned}$

The government's capital balance is

(4) $S^g+\Delta L^g=I^g$,

where: $\Delta L^g=\Delta L^{gc}+\Delta L^{ghh}+\Delta L^{gfi}+\Delta L^{gf}$.

Substituting equation (3) into equation (4) and rearranging the resulting expression yields the *government budget constraint*:

(5) $C^g + NT + INT + I^g - T = \Delta L^g.$

        Equation (5) states that the overall fiscal deficit (left-hand side) has to be financed by borrowing from other institutions.
        The budget constraint for households can be derived in a similar fashion, using the identity between the sources and uses of income

(6) $W + MI + NT + INT + NFP^{hhf} = C^{hh} + T^{hh} + S^{hh},$

where $INT = INT^{hhg} + INT^{hhc}$; $NT = NT^{hhg} + NT^{hhf},$

and the balance of capital transactions

(7) $S^{hh} = I^{hh} + \Delta A^{hh}$

where $\Delta A^{hh} = \Delta A^{chh} + \Delta A^{fihh} + \Delta A^{fhh}.$

        Substituting equation (7) into equation (6) yields the *household budget constraint*

(8) $W + MI + NT + INT + NFP^{hhf} - C^{hh} - T^{hh} = I^{hh} + \Delta A^{hh},$

which implies that income in excess of consumption and tax payments is used for physical and financial investment.

        For companies, the current balance

(9) $P + NT^{cg} + INT^{cg} = T^c + INT^{hhc} + INT^{fc} + S^c$

and the capital balance

(10) $S^c + \Delta L^c = I^c,$

where $\Delta L^c = \Delta L^c + \Delta L^c + \Delta L^c - \Delta A^c$

lead to the company budget constraint

(11) $P + NT^c + INT^c + \Delta L - T^c - INT^c - INT^c = I^c.$
In the external sector, the current account equation is given as

(12) $M + INT^{fg} + INT^{fc} = X + NT^{gf} + NT^{hhf} + NFP^{hhf} + CA,$
the capital account equation as

(13) $CA = \Delta A^f,$

where $\Delta A^f = \Delta A^{gf} + \Delta A^{cf} - \Delta L^{fhh},$

and therefore the *external sector budget constraint* as

(14) $M + INT^{fg} + INT^{fc} - X - NT^{gf} - NT^{hhf} - NFP^{hhf} = \Delta A^f$.

Equation (14) simply states that Bolivia's current account deficit is financed by net foreign borrowing.

Finally, adding up all the budget constraints yields the *savings-investment balance*

(15) $I = S + \Delta A^f$,

where $I = I^{hh} + I^c + I^g$; $S = S^{hh} + S^c + S^g$.

The savings-investment states that aggregate domestic investment is financed by domestic saving (*S*) and foreign saving (ΔA^f).

SYMBOLS

hh, g, c, f, fi   superscripts denoting the institutions (households, government, companies, rest of the world, financial institutions); in case of two superscripts the first indicates the institution that receives a payment

C	consumption,	MI	mixed income,
I	investment,	A	absorption,
X	exports,	NT	net transfers,
M	imports,	INT	interest payments,
VA	value added,	S	savings,
TI	indirect taxes,	T	taxes,
SUB	subsidies,	ΔL	change in net liabilities,
W	wages,	ΔA	change in net assets,
P	profits,	CA	current account.

APPENDIX TABLE 1 — SOCIAL ACCOUNTING MATRIX FOR BOLIVIA 1997 (Millions of Bolivianos)

#	Account	TA (1)	MA (2)	CS (3)	OG (4)	M (5)	CG (6)	IG (7)	CAG (8)	EGW (9)	C (10)	IS (11)	FS (12)	PS (13)	Total 1-13	SL (14)	UL (15)	CC (16)	UCDP (17)	UCMI (18)	Total 14-18
1	Traditional Agriculture (TA)	413	135	0	0	3	2301	4	0	0	9	43	97	67	3071						
2	Modern Agriculture (MA)	92	83	0	0	16	1422	15	0	0	42	8	19	19	1716						
3	Coca Sector (CS)	0	0	0	0	0	0	1	0	0	0	0	0	0	1						
4	Crude Oil & Natural Gas (OG)	0	0	0	32	0	33	1190	0	83	0	1	2	1	1342						
5	Mining (M)	1	1	1	0	1	2	742	0	0	188	0	3		940						
6	Consumer Goods (CG)	161	90	16	10	50	2520	79	11	24	115	588	1370	286	5307						
7	Intermediate Goods (IG)	181	155	5	251	157	699	608	154	175	1196	714	1722	251	6280						
8	Capital Goods (CAG)	16	24	0	20	91	160	65	56	62	81	171	384	171	1305						
9	Electricity, Gas & Water (EGW)	2	3	2	29	50	156	118	6	13	8	106	219	85	794						
10	Construction (C)	0	0	0	0	0	0	2	0	8	0	4	137	2	155						
11	Informal Services (IS)	154	126	2	87	50	944	144	29	51	147	531	895	207	3367						
12	Formal Services (FS)	283	320	3	231	173	1365	363	57	219	218	1521	3133	600	8486						
13	Public Sector (PS)	1	2	0	2	1	10	2	0	1	1	10	14	3	47						
1-13	Total	1305	940	27	663	592	9612	3333	313	635	2004	3699	7994	1693	32810						
14	Skilled Labor (SL)		122	23	278	82	440	207	16	226	222		3408	4237							9261
15	Unskilled Labor (UL)		486	94	142	270	624	278	23	27	311		215	427							2895
16	Corporate Capital (CC)		486	4	404	319	801	394	7	780	94	0	2548	0							5839
17	Unincorporated Capital (UC) Distributed Profits (UCDP)		748	7		490	1232	606	10		145		3918								7156
18	Mixed Income (UCMI)	3876		249		521	823	147	44		380	2978	1748								10766
14-18	Total	3876	1842	377	825	1682	3920	1633	99	1032	1151	2978	11837	4664	35917						
19	Smallholder (SH)																			4125	4125
20	Agricultural Workers (AW)																580				580
21	Employees (E)															9321					9321
22	Non-Agricultural Workers (NAW)																2315				2315
23	Urban Informals (UI)																			4372	4372
24	Employers (EM)																		7156	2269	9425
25	Priv. Ent. (PE)																	4373			4373
26	Pub. Ent. (PUBE)																	1466			1466
27	Government (GOV)	16	37	0	648	150	1021	1617	906	118	329	0	881	5	5727						
19-27	Total	16	37	0	648	150	1021	1617	906	118	329	0	881	5	5727	9321	2895	5839	7156	10766	35977
	Total	16	37	0	648	150	1021	1617	906	118	329	0	881	5	5727	9321	2895	5839	7156	10766	35977

APPENDIX TABLE 1 CONTINUED

		TA	MA	CS	OG	M	CG	Commodities IG	CAG	EGW	C	IS	FS	PS	Total	SL	UL	Factors CC	UCDP	UCMI	Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	1-13	14	15	16	17	18	14-18
Rest of World (RoW)	28	398	104	0	0	89	2079	3254	5230	0	0	220	852	0	12226	28					28
Imports		398	104	0	0	89	2079	3254	5230	0	0	220	852	0	12226						
Other																28					28
Changes in Stocks (STKA)	29																				
Smallholder (SH)	30																				
Agricultural Workers (AW)	31																				
Employees (E)	32																				
Non-Agricultural Workers (NAW)	33																				
Urban Informals (UI)	34																				
Employers (EM)	35																				
Priv. Ent. (PE)	36																				
Pub. Ent. (PUBE)	37																				
Government (GOV)	38																				
Central Bank (CB)	39																				
Commercial Banks (PB)	40																				
Other Fin. Inst. (OFI)	41																				
Pension Funds (PF)	42																				
Rest of World (RoW)	43																				
Total	30-43																				
Total Expenditures	1-43	5594	2923	405	2136	2513	16632	9836	6548	1785	3485	6897	21564	6361	9349	2895	5839	7156	10766		

APPENDIX TABLE 1 CONTINUED

	SH 19	AW 20	E 21	NAW 22	UI 23	EM 24	PE 25	PUBE 26	GOV 27	Total 19-27	RoW 28	STKA 29	SH 30	AW 31	E 32	NAW 33	UI 34	EM 35	PE 36	PUBE 37	GOV 38	CB 39	PB 40	OFI 41	PF 42	RoW 43	Total 30-43	Total Receipts 1-43
TA 1	519	62	542	197	343	484			0	2147	454	-79	0	0	0	0	0	0	0	0	0						0	5594
MA 2	49	7	95	32	55	84			0	322	714	40	16	0	0	0	0	0	115	0	0						131	2923
CS 3	33	5	7	8	15	9			0	77	327	0	0	0	0	0	0	0	0	0	0						0	405
OG 4	0	0	0	0	0	0			0	0	525	-55	0	0	0	0	0	0	185	138	0						323	2136
M 5	0	0	0	0	0	0			0	0	1587	-13	0	0	0	0	0	0	0	0	0						0	2513
CG 6	1561	235	2668	818	1426	2336			0	9044	2222	60	0	0	0	0	0	0	0	0	0						0	16632
IG 7	290	44	839	141	289	729			0	2332	1009	79	0	0	0	0	0	0	136	0	0						136	9836
CAG 8	167	25	482	81	166	422			0	1344	58	244	21	0	0	0	23	72	1879	1195	407						3597	6548
EGW 9	84	14	380	56	126	332			0	991	0	0	0	0	0	0	0	0	0	0	0						0	1785
C 10	0	0	0	0	0	0			0	0	0	0	104	6	268	29	139	205	382	622	1574						3330	3485
IS 11	121	18	1175	371	694	1153			0	3531	0	0	0	0	0	0	0	0	0	0	0						0	6897
FS 12	1144	166	3989	642	1201	3659			0	10800	1897	0	8	0	0	0	9	15	143	104	105						382	21564
PS 13	39	6	209	31	58	182			5790	6315	0	0	0	0	0	0	0	0	0	0	0						0	6361
Total 1-13	4008	581	10386	2379	4371	9388			5790	36903	8791	276	149	6	268	29	170	292	2840	2059	2086						7899	
SL 14											88																	
UL 15																												
CC 16																												
UCDP 17																												
UCMI 18																												
Total 14-18										88	88																	
SM 19									74	74	24																	4223
AW 20									11	11	4																	595
E 21							1400	76	2249	3725	54																	13100
NAW 22									42	42	13																	2370
UI 23									79	79	25																	4476
EM 24							1423	77		1500	54																	10979
PE 25			448				617		123	1199	477																	6050
PUBE 26	179	4			60	455		566		1243	283																	2992
GOV 27			1834			127	1314	172	387	3859	925																	10511
Total 19-27	179	4	2282		60	582	4754	891	2965	11732	1860																	

APPENDIX TABLE 1 CONTINUED

Institutions (Current)

		SH 19	AW 20	E 21	NAW 22	UI 23	EM 24	PE 25	PUBE 26	GOV 27	Total 19-27	RoW 28	STKA 29
RoW Imports	28							654	89	675	1418		
Other								654	89	675	1418		
STKA	29												
SM	30	35									35		
AW	31		10								10		
E	32			431							431		
NAW	33				-23						-23		
UI	34					45					45		
EM	35						1009				1009		
PE	36							641			641		
PUBE	37								2012		2012		
GOV	38									1081	1081		
CB	39												
PB	40												
OFI	41												
PF	42												
RoW	43											2933	
Total	30-43	35	10	431	-23	45	1009	641	2012	1081	5242	2933	
Total Expenditure	1-43	4223	595	13100	2370	4476	10979	6050	2992	10511		13672	276

Institutions (Capital)

		SH 30	AW 31	E 32	NAW 33	UI 34	EM 35	PE 36	PUBE 37	GOV 38	CB 39	PB 40	OFI 41	PF 42	RoW 43	Total 30-43	Total Receipts 1-43
RoW Imports	28																13672
Other																	
STKA	29	-188				-199	-103	578	189							276	276
SM	30												27			27	62
AW	31															0	10
E	32										575					575	1006
NAW	33															0	-23
UI	34												9			9	54
EM	35										582					582	1590
PE	36										1226		-227		4293	5463	6104
PUBE	37							-1								115	2127
GOV	38							105								1050	2132
CB	39	100	4		-52	83		172								3250	3250
PB	40							1526								125	125
OFI	41							266								-148	-148
PF	42															605	605
RoW	43							617								2451	5384
Total	30-43	100	4	738	-52	83	1402	2686	-120	46	3250	125	-148	605	5384	14104	
Total Expenditure	1-43	62	10	1006	-23	54	1590	6104	2127	2132	3250	125	-148	605	5384		

APPENDIX TABLE 2 — ACCUMULATION BALANCES FOR BOLIVIA 1997
(Millions of Bolivianos)

		Institutions (Capital)														Total Liab.	Net Wealth
		SH 1	AW 2	E 3	NAW 4	UI 5	EM 6	PE 7	PUBE 8	GOV 9	CB 10	PB 11	OFI 12	PF 13	RoW 14	1-14	
SH	1	0	0	0	0	0	0	0	0	0	0	0	1821	0	0	1821	5108
AW	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	308
E	3	0	0	0	0	0	0	0	0	0	0	3609	0	0	0	3609	14696
NAW	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1459
UI	5	0	0	0	0	0	0	0	0	0	0	0	607	0	0	607	7301
EM	6	0	0	0	0	0	0	0	0	0	0	3649	0	0	0	3649	15689
PE	7	0	0	695	0	0	586	0	279	0	0	11577	1666	0	5485	20288	34452
PUBE	8	0	0	0	0	0	0	1991	0	0	0	0	0	0	1784	3775	9087
GOV	9	0	0	0	0	0	0	0	0	0	3326	1715	119	0	14810	19969	28458
CB	10	82	22	409	151	110	567	607	514	3302	0	414	113	0	3681	9971	2342
PB	11	0	0	4307	0	0	3806	4745	25	133	2653	521	937	0	3054	20181	2402
OFI	12	0	0	919	0	0	1023	1032	4	8	54	906	0	0	46	3992	1534
PF	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RoW	14	0	0	0	0	0	218	371	0	0	6280	192	264	0	0	7324	21535
Physical Capital	15	6847	286	11975	1308	7798	13140	45995	12040	44984	0	0	0	0	0	144372	
Total Assets	1-15	6929	308	18305	1459	7908	19339	54740	12863	48427	12313	22584	5526	0	28859		144372
TA	17	0	0	0	0	0	0	0	0	0							
MA	18	16	0	0	0	0	0	115	0	0							
CS	19	0	0	0	0	0	0	0	0	0							
OG	20	0	0	0	0	0	0	185	138	0							
M	21	0	0	0	0	0	0	0	0	0							
CG	22	0	0	0	0	0	0	0	0	0							
IG	23	0	0	0	0	0	0	136	0	0							
CAG	24	21	0	0	0	23	72	1879	1195	407							
EGW	25	0	0	0	0	0	0	0	0	0							
C	26	104	6	268	29	139	205	382	622	1574							
IS	27	0	0	0	0	0	0	0	0	0							
FS	28	8	0	0	0	9	15	143	104	105							
PS	29	0	0	0	0	0	0	0	0	0							
Total Fixed Investment	17-29	149	6	268	29	170	292	2840	2059	2086							
STKA	30	-188				-199	-103	578	189								
SH	31	0	0	0	0	0	0	0	0	0	0	0	27	0	0	27	
AW	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EM	33	0	0	0	0	0	0	0	0	0	0	575	0	0	0	575	
NAW	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
UI	35	0	0	0	0	0	0	0	0	0	0	0	9	0	0	9	
E	36	0	0	0	0	0	0	0	0	0	0	582	0	0	0	582	
PE	37	0	0	25	0	0	147	0	-1	0	0	1226	-227	0	4293	5463	
PUBE	38	0	0	0	0	0	0	0	105	0	0	0	0	0	10	115	
GOV	39	0	0	0	0	0	0	0	0	0	-4	-186	-4	436	808	1050	
CB	40	100	4	-5	-52	83	-164	172	-121	64	0	309	-5	169	-428	125	
PB	41	0	0	117	0	0	689	1526	1	-18	145	26	61	0	703	3250	
OFI	42	0	0	-3	0	0	-100	266	1	1	-28	-283	0	0	-2	-148	
PF	43	0	0	605	0	0	0	0	0	0	0	0	0	0	0	605	
RoW	44	0	0	0	0	0	831	617	0	0	12	1000	-9	0	0	2451	
Total Change in Assets	31-44	100	4	738	-52	83	1402	2686	-120	46	125	3250	-148	605	5384	14104	

APPENDIX TABLE 2 CONTINUED

		Institutions (Capital)													Total Liab.	Net Wealth
		SH 1	AW 2	E 3	NAW 4	UI 5	EM 6	PE 7	PUBE 8	GOV 9	CB 10	PB 11	OFI 12	PF 13	RoW 14	1-14	
Depreciation	45	137	6	239	26	156	263	920	241	900							
SM	46	0	0	0	0	0	0	0	0	0	0	0	67	0	0	67	
AW	47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
E	48	0	0	0	0	0	0	0	0	0	0	134	0	0	0	134	
NAW	49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
UI	50	0	0	0	0	0	0	0	0	0	0	0	22	0	0	22	
E	51	0	0	0	0	0	0	0	0	0	0	135	0	0	0	135	
PE	52	0	0	26	0	0	22	0	10	0	0	396	62	0	203	719	
PUBE	53	0	0	0	0	0	0	64	0	0	0	0	0	0	62	126	
GOV	54	0	0	0	0	0	0	0	0	0	123	64	4	0	544	734	
CB	55	3	1	15	6	4	21	22	19	123	0	51	4	0	136	405	
PB	56	0	0	175	0	0	155	182	1	5	98	19	34	0	113	782	
OFI	57	0	0	41	0	0	46	38	0	0	3	44	0	0	1	173	
PF	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RoW	59	0	0	0	0	0	22	15	0	0	234	7	10	0	0	287	
Physical Capital	60	238	10	416	45	271	456	1596	418	1561						5010	
Total Revaluations	46-60	241	11	672	51	275	721	1916	448	1688	457	850	204	0	1059	8594	
SM	61	0	0	0	0	0	0	0	0	0	0	0	1915	0	0	1915	5180
AW	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	323
E	63	0	0	0	0	0	0	0	0	0	0	4318	0	0	0	4318	15427
NAW	64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1461
UI	65	0	0	0	0	0	0	0	0	0	0	0	638	0	0	638	7442
E	66	0	0	0	0	0	0	0	0	0	0	4366	0	0	0	4366	17021
PE	67	0	0	746	0	0	754	0	289	0	0	13200	1500	0	9981	26470	35371
PUBE	68	0	0	0	0	0	0	2160	0	0	0	0	0	0	1856	4016	11181
GOV	69	0	0	0	0	0	0	0	0	0	3445	1593	119	436	16161	21754	29594
CB	70	186	26	419	104	197	424	801	412	3488	0	775	112	169	3389	10502	2394
PB	71	0	0	4598	0	0	4650	6453	27	120	2896	566	1033	0	3870	24213	2471
OFI	72	0	0	957	0	0	968	1336	5	9	29	667	0	0	46	4017	1565
PF	73	0	0	605	0	0	0	0	0	0	0	0	0	0	0	605	0
RoW	74	0	0	0	0	0	1070	1002	0	0	6526	1199	265	0	0	10062	25241
Physical Capital	75	6909	297	12419	1356	7884	13521	50089	14464	47731	0	0	0	0	0	154670	0
Total Assets	61-75	7095	323	19745	1461	8081	21387	61841	15197	51348	12896	26684	5582	605	35303		154670