Working Paper Series

WORKING PAPER NO. 544

DATA, LINKAGES, AND MODELS: U. S. NATIONAL INCOME AND PRODUCT ACCOUNTS IN THE FRAMEWORK OF A SOCIAL ACCOUNTING MATRIX

by

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

BERKELEY

CALIFORNIA AGRICULTURAL EXPERIMENT STATION

University of California

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
DIVISION OF AGRICULTURE AND NATURAL RESOURCES
UNIVERSITY OF CALIFORNIA

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Paper presented at a conference on "A SAM for Europe," Valencia, Spain, September 3-4, 1990. The paper is a revised version of Staff Report No. AGES 89-5, Economic Research Service, U. S. Department of Agriculture.

California Agricultural Experiment Station
Giannini Foundation of Agricultural Economics
August, 1990

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ABSTRACT

In policy analysis, there is a continuing tension and interplay between issues, models, and data. Issues and models have changed in recent years and there is a need for evolution in the underlying economywide economic database. We discuss accounting frameworks for integrating micro survey data with macro data from the national economic accounts. We take a modeler's perspective, arguing that new accounts are needed to support policy modeling. We discuss in detail the use of a social accounting matrix (SAM). A SAM provides a data framework which reflects an actor/transaction view of the economy and supports disaggregated economywide modeling. We discuss the relationship between a SAM and the existing national economic accounts for the United States, including the national income and product accounts (NIPA) and the input-output accounts.

ACKNOWLEDGMENTS

We thank Gerald Schluter and Thomas F. Hady for helpful comments on earlier drafts of this paper. We also thank Mark Planting for helpful discussions on the national economic accounts.

INTRODUCTION

The United Nations is currently revising the system of national accounts (SNA). Such revisions occur only rarely, the last major one being in 1968.[1] There has been an active literature on proposed changes to the U.S. national income and product accounts (NIPA). Carson (1975) describes the historical roots of the U.S. national economic accounts.[2] During the development phase of the 1930's and 1940's, the prevailing economic issues were macroeconomic in nature. The accounts were designed to provide a consistent economywide macro framework for policy analysis. The methodological revolution in Keynesian macro theory and models strongly influenced their evolution.

In the last 25 years, the economic problems facing U.S. policymakers have changed. Distributional and structural issues appeared on the policy agenda. In the 1960's, attention focused on the extent and incidence of poverty. In the 1970's and 1980's, focus shifted to issues such as the sectoral impact of changes in relative prices (for example the oil crises), the slowdown in productivity growth, and changes in the structure of international trade. Policies affecting the distribution of income and industrial structure require analysis at a sectoral and/or micro level. However, such analysis must be reconciled with macro analysis, since macro shocks have been a major force behind many of the structural changes and policy problems.

To support policy analysis, the economic accounts need to reflect these new concerns. One school of thought, led by Ruggles and Ruggles (1982, 1986), argues that the NIPA should be better grounded in micro survey data of households and enterprises. Ruggles and Ruggles want the accounts to reflect an actor/transaction view of the economy.[3] They propose an elaborate set of detailed revisions to the NIPA in their system of integrated economic accounts (or IEA). In principle, the proposed IEA provide a better micro-foundation for the national economic accounts. However, they do not focus on linkages among actors. For example, they neglect inter-industry linkages, ignoring the input-output accounts.

In this paper, we argue for a wider set of accounts called a social accounting matrix (SAM). Sir Richard Stone was a pioneer in the development of the SAM framework.[4] In principle, a SAM provides an accounting framework that includes all economic transactions among actors. Like the IEA, it can provide a basis for integrating micro survey data into the national economic accounts. Indeed, we argue that the IEA are easily accommodated in a SAM framework.

In proposing a SAM framework for the United States, we start from the perspective of a modeler. We wish to develop the accounting basis for models that incorporate both macro and micro phenomena. Two

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[1]That revision was strongly influenced by Richard Stone. See Stone (1986a) for a description of the process. Young (1987) reviews the various proposals for revising the U.S. accounts.

[2]For an introduction to the national economic accounts (NEA), see Young and Tice (1985). The macro accounts--the national income and product accounts--are described in Carson and Jaszi (1981) and the data sources and estimation methods are described in Carson (1987).

[3]The 1982 reference is an article in a symposium issue of the Survey of Current Business devoted to discussions of their proposals.

[4]The United Nations SNA, which he helped design, includes many SAM elements. The SAM framework is widely used in developing countries. See Pyatt and Round (1985) for an introduction to social accounting methods and applications of SAM's in a variety of countries.

broad types of models attempt to address economic issues from an actor/transaction yet economywide perspective: microsimulation models and computable general equilibrium (CGE) models.[5] Orcutt pioneered the use of microsimulation models.[6] Recent examples of CGE models applied to the United States explore a variety of issues, including tax policy, energy policy, trade and macro policy, agricultural policy, and the economic impact of defense spending.[7] Recently, CGE models have been used in Europe to study issues of trade liberalization.[8] Such models are also widely used in developing countries.[9]

Crucial issues of model design include the specification of actors in an economywide model and the rules governing their behavior and interaction. The actors in a CGE model commonly include households, producers, government, the rest of the world, and a capital account which equilibrates aggregate savings and investment. Each of these can be disaggregated, refining the model's specification of average or representative actors. Microsimulation models, on the other hand, often start with representative samples of micro units such as individual households and firms, simulate their interactions, and aggregate the results. In both these types of models, the proper choice of aggregation depends on the problem at hand and represents a significant part of the modeler's art.

Integrating micro data from household and firm surveys with macro data from the national economic accounts into a social accounting matrix (SAM) provides the data base for disaggregated economywide modeling, both CGE and microsimulation. The SAM builds on the input-output accounts, which provide the starting point for any reconciliation between micro and macro accounts.[10] In this paper, we show that the SAM framework supports disaggregated economywide models in a manner analogous to the way the NIPA and the SNA supports macro models. We also suggest some revisions of the national economic accounts to reflect an actor/transaction view of the economy and to capture market interactions in a SAM framework.

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[5]There are some economywide models that mix input-output and macroeconometric models. They are usually less based in micro theory than either CGE or microsimulation models, but the dividing line is fuzzy. See, for example, Almon et al. (1974), whose multisectoral input-output models of the United States include econometrically estimated investment equations and focus on dynamic behavior.

[6]Recent examples of U.S. applications include Orcutt, et al. (1976); Forrester, Mass, and Ryan (1976); and Bennett and Bergman (1986). See also the collection of applications in Orcutt, Merz, and Quinke (1986), Haveman and Hollenbeck (1980), and Feldstein (1983).

[7]See Ballard, et al (1985); Hudson and Jorgenson (1974); Adelman and Robinson (1988); Goulder and Eichengreen (1988); Kilkenny and Robinson (1990); Roland-Holst, Robinson, and Tyson (1988); and Hanson, Robinson, and Tokarick (1990). A core U.S. CGE model is presented in Robinson, Kilkenny, and Hanson (1990).

[8]See, for example, articles in Goldin and Knudsen (1990) and Stoeckel, Vincent, and Cuthbertson (1989).

[9]Tax and trade CGE models of developed countries have recently been surveyed by Shoven and Whalley (1984). CGE models of developing countries have been surveyed by Robinson (1989) and Dervis, de Melo, and Robinson (1982).

[10]The United States is fortunate that the same agency produces both the input-output accounts and the NIPA. Since 1964, the two sets of accounts have been reconciled, a major task in most other countries. See Young and Tice (1985) and U.S. Department of Commerce (1984) for a discussion of the reconciliation.

THE SAM FRAMEWORK

There are two important motivations for using a social accounting matrix as part of the national economic accounts. One is flexibility in data organization and the other is compatibility with alternative analytical uses. The SAM provides a convenient presentation of the network of transactions which occur throughout the economy. Much has been written about the definition and properties of a SAM, so our discussion is brief.[11] We focus more on how to reconcile the national economic accounts in a SAM framework, a necessary step for disaggregated economywide modeling. We also discuss some issues of imputation and aggregation.

SAM Accounting Principles

A SAM provides a complete account of the circular flow of income in an economy. Table 1 provides a simple macro SAM for the United States for 1982 that reconciles with the NIPA data. It is a macro SAM because it only includes the macro aggregates and nets out payments for intermediate inputs. A SAM is always square. Each row and corresponding column represents the expenditure and receipt accounts of an economic actor. Expenditures flow from a column account to a row account. Corresponding row and column sums must always be equal by the conventions of double-entry bookkeeping. The accounts effectively define five actors (suppliers, households, government, capital account, and the rest of the world). These last four actors receive income and close the circular flow by generating demands for goods produced by suppliers.

The first row of the macro SAM includes the expenditure aggregates: consumption, government purchases of goods and services, investment, and exports. Imports of goods are included as a purchase by suppliers from the rest of the world. The last three accounts capture the major macro balances: the government deficit, savings-investment, and the balance of trade. The government deficit appears in the column as a withdrawal from the capital account. The capital account collects all savings and spends it on investment goods, thus serving as the net loanable funds market.

The definition of the balance of trade (exports minus imports) depends on whether the supplier account in the SAM defines Gross National Product (GNP) or Gross Domestic Product (GDP). The SAM presented in Table 1 is based on the GNP accounts, and the balance of trade is thus defined as the current account balance (following the NIPA definition), including trade in factor services. In a GDP-based SAM, the trade balance is defined in terms of goods and non-factor services, and there will be a separate entry for net factor income from abroad.

The SAM includes three different types of flows. First, market transactions are nominal payments from one actor to another across a market. A real flow crosses the market in the opposite direction (from a row to a column). The entries in the first row and column are of this type (except entries 3 and 4 in column 1). Second, financial flows reflect the working of asset markets. Corresponding to the nominal flow, the purchasing account receives ownership of an asset. The entries in the capital account row are of this type. They summarize the workings of the financial system, generating financial assets corresponding to the new real capital created by the investment expenditure in the column. Finally, all the remaining entries

[11] See Pyatt and Round (1985), especially the chapter by King (1985), for an introduction to SAM's.

Table 1--Macroeconomic SAM for the United States, 1982

Billions of dollars	Expenditures					
Receipts	Suppliers	Households	Government	Capital	World	Total
Suppliers		2050.7	641.7	447.3	361.9	3501.6
Households	2171.5	55.6	443.7			2670.8
Government	591.4	409.3				1000.7
Capital account	403.1	154.0	-110.8			446.3
Rest of world	335.6	1.2	26.1	-1.0		361.9
Total	3501.6	2670.8	1000.7	446.3	361.9	

represent pure transfers, either voluntary or involuntary. Nothing goes from the row account to the column account in response to the nominal flow from column to row. Household tax payments and government transfer payments to households (for example social security) are two examples. In the NIPA, both pure transfers and financial transactions are defined as nonproductive in that they do not generate any value added.

A Macro SAM From the NIPA

The simple macro SAM in Table 1 hides a lot of detail. For example, GNP must be separately computed from the macro aggregates and value added (factor income) is not shown. Figure 1 is a macro SAM which reconciles with the standard five summary tables of the NIPA.[12] The accounts in the SAM are designed to ease reconciliation with the NIPA, with separate subtotals for GNP and national income.

The supplier account has been split into commodities and activities. Activities produce value added and represent the production side of the economy, paying out value added to factors of production. A separate indirect tax account is convenient for distinguishing value added at factor cost (entry 3,1) and GNP. GNP is defined as value added at factor cost plus indirect taxes (net of subsidies but including tariffs), or value added at market prices.

The commodity account represents a giant department store. It buys goods from domestic producers and foreigners (imports) down the column and sells them to demanders (including exports) along the row. The commodity account defines GNP from the expenditure side: GNP equals the row sum minus imports (entry 13,1). Following U.S. national economic accounting conventions, exports are treated as a sale by the commodity account. Alternative treatments are discussed below.

[12]The standard five tables are presented annually in the July issue of the Survey of Current Business. The summary tables for 1982 were published in July 1983, although the data for table 1 are based on revised data from the July 1986 issue. In appendices, we present a set of the summary tables for 1982, a mapping from these tables to the SAM entries, and a time series of macro SAM's for 1977-87. The data for the time series come from Wharton Econometric Forecasting. A spreadsheet program for generating the SAM's from the NIPA data is described in Hanson (1988).

Figure 1--United States Macro SAM from NIPA Data, 1982

	Expenditures													
Billions of dollars	1	2	3	4	5	6	7	8	9	10	11	12	13	
Receipts	Com-modity	Activity	Value added	Indirect taxes	Employee comp.	Proprietor income	Property income	Stat. dis-crepancy	Enter-prise	House-hold	Govern-ment	Capital account	Rest of world	Row totals
1 Commodity		0								2050.6	641.7	447.3	361.9	3501.6
2 Activity	3165.9													3165.9
3 Value added		2907.2												2907.2
4 Indirect tax		258.8												258.8
GNP		3166.0												
5 Employee comp.			1907.0											1907.0
6 Proprietors			175.5											175.5
7 Property			435.9											435.9
National income			2518.4											
8 Stat. discrepancy		-0.1												-0.1
9 Enterprise			388.8			175.5	435.9			55.6	47.5			1103.4
10 Household					1637.5				637.1		396.3			2670.8
11 Government				258.8	269.6				63.1	409.3				1000.8
12 Capital account								-0.1	403.2	154.0	-110.8			446.3
13 Rest of world	335.6									1.3	26.1	-1.0		361.9
Column totals	3501.6	3165.9	2907.2	258.8	1907.0	175.5	435.9	-0.1	1103.4	2670.8	1000.8	446.3	361.9	

The SAM presentation with separate accounts for activities and commodities neatly distinguishes factor markets and product markets. The commodity account describes the product markets. It buys from activities (entry 2,1) and sells to demanders along the first row.[13] Activities represent producers who purchase inputs in the factor markets, paying out value added. The macro SAM nets out intermediate inputs, which can be entered as commodities purchased by activities (entry 1,2).

Column 3 maps from value added at factor cost to national income.[14] In the NIPA, there are four categories of non-labor income: proprietors income, rental income of persons, corporate profits, and net interest. The property income account in the SAM aggregates three of these: rental income, corporate profits, and net interest. These three categories represent returns to different types of assets. The distinction is not important for most models, which is why we aggregate them in the SAM into a single enterprise account.

The enterprise account collects net, non-labor income, including depreciation. This enterprise account has no counterpart in the NIPA.[15] Enterprise income (row 9) represents the before-tax return to property, including depreciation.[16] Column 9 distributes this return to households (10,9), pays corporate profit taxes to the government (11,9), and saves the remainder as retained earnings (12,9), which includes depreciation. Including all of proprietor income in enterprise income effectively treats non-corporate producers, such as farmers and lawyers, as enterprises.

The statistical discrepancy account includes the NIPA statistical discrepancy between GNP computed from the expenditure and income sides. By convention, the NIPA assigns it to savings (entry 12,8). In principle, this account could include all data inconsistencies encountered while compiling the accounts. These inconsistencies could then be treated together. For example, a number of mathematical techniques exist for balancing matrices. They distribute discrepancies across entries, minimizing some criterion function while maintaining equality in row and column sums (as required in the SAM).[17] Such techniques potentially provide a better approach to data reconciliation than current practice in most national statistical agencies, and follow naturally from the SAM approach.

The final four accounts (households, government, capital, and rest of world) have exact NIPA counterparts. The capital account provides a summary description of the loanable funds market and corresponds to the gross savings and investment account in the NIPA. The government deficit ($-110.8 billion in 1982, rising to $-144.2 billion in 1986) appears as a withdrawal by government from the capital account, representing crowding out in the loanable funds market. Net foreign investment (entry 13,12) was $-1.0 billion in 1982 and rose to $-142.4 billion in 1986, representing a foreign injection into the loanable funds market.

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[13]The indirect tax account can also be used to distinguish between indirect taxes at the producer level and sales taxes at the retail level. The approach here follows the NIPA convention of treating all indirect taxes as a payment by producers.

[14]Entry (9,3) includes depreciations, business transfer payments, and subsidies less current surplus of government enterprises, all of which are part of value added but not of national income.

[15]There was once a sixth table in the NIPA which represented a kind of enterprise account. However, it was dropped when the accounts were revised in 1958. See Carson (1975), p. 179.

[16]Note that the employer contribution to social insurance has been included as part of employee compensation, and hence is treated as a return to labor. Note also that property includes not only capital, but also land, copyrights, and royalties.

[17]See, for example, Bacharach (1970) and Byron (1978). More advanced techniques, based on network theory, are described in Zenios, Drud, and Mulrey (1986). An early proposal for applying this adjustment technique to national accounts is Stone, Champernowne, and Meade (1942). One could also use a simple "reduction" procedure due to Pyatt (1985).

The SAM in figure 1 is divided into blocks of accounts. The first two rows and columns describe the product and factor markets. The middle diagonal block, defined by rows and columns 3-8, describes the functional distribution of income, mapping from factor income (value added) to categories of national income. The particular functional categories used in the NIPA have a long history. They represent an uneasy compromise between categories appropriate for economic theory and convenient units for data gathering. We shall discuss these choices further below. The bottom middle block (rows 9-13 and columns 3-8) present the mapping from the functional distribution to the institutional distribution. Accounts 9-13 reflect an institutional categorization of economic actors and provide the basic building blocks for macro models. Finally, the lower right diagonal block (rows and columns 9-13) gives the inter-institutional linkages in the economy.

The two lower blocks (middle and right, rows 9-13, columns 3-13) contain only transfer entries. No productive activities or market transactions take place in this region of the SAM. There are financial transactions in the capital account row, where new assets are sold. These transactions neither generate value added nor involve the exchange of goods. These transfer entries, however, are very important for understanding how the economy operates and for modeling that operation.

The institutions in the SAM represent actors whose interrelationships make up much of the macro structure of the economy. For example, consider aggregate savings. From the SAM, retained earnings of enterprises (which include depreciation) amounted to 90 percent of aggregate savings in 1982. The government deficit represented a negative 25 percent in 1982 and grew rapidly in the 1982-86 period. Net foreign investment also grew enormously. Household savings played a relatively minor role. Any consideration of savings-investment equilibrium must account for the behavior of these actors and for their changes over time.

From figure 1, note that about 15 percent of total household income comes from government transfers. These include social security and government pensions, as well as welfare programs. This transfer income roughly equalled the value of direct taxes from households. An examination of these transfers is crucial for any consideration of the distribution of household income (the size distribution). The distribution of wages and profits (the functional distribution) is important, but is clearly only part of the story.

There is no information in the macro SAM that is not readily available in the standard NIPA tables. The SAM, however, presents that data in a form that emphasizes the linkages among institutional actors. It shows clearly how income moves from producers to factors to institutions. The matrix presentation emphasizes the circular flow in the economy, showing the closed nature of the system in a way difficult to appreciate from the standard tables. One could construct a more elaborate macro SAM from the detailed NIPA tables, further disaggregating the institutional accounts and elaborating on the bottom blocks of the SAM in figure 1. Many macro models take this approach. Instead, we pick up the story from a microsimulation modeler's point of view. In particular, we elaborate on the actor/transaction approach and view the accounts in a manner consistent with micro theory.

THE SAM AS A BASIS FOR CGE AND MICROSIMULATION MODELS

In a disaggregated economywide model, the specification of actors and accounts follows economic theory more than legal definitions of organizations and sources of data. Moving from an accounting definition to an approach based on economic theory involves a number of issues. First, the definition of the

accounts must be clarified, particularly those concerning product and factor markets. Second, imputations are necessary where productive activities occur, but the goods and services do not flow across markets. There is a long history of debate about imputations and the definition of the appropriate boundaries of the economy in national economic accounting, with no resolution in sight. A modeler's perspective, however, adds some new twists to the discussion. Third, we consider some issues relating to defining actors and disaggregating their accounts.

Markets and Accounts

Focusing on markets requires disaggregation of the accounts relating to the product and factor markets. Figure 2 is a schematic SAM and Figure 3 provides an illustrative U.S. SAM for 1982, including a three-sector input-output table. Figures 2 and 3 do not reconcile exactly. To keep the size of the numeric SAM small, we combine the commodity and activity accounts in Figure 3 into supplier accounts, which include both domestic production and imports. In both, we have eliminated the various categories of income recipients in national income, as well as the statistical discrepancy account. Instead, we have divided value added by functional categories, separating returns to labor and capital.[18] Gross returns to capital include all non-labor income, including capital consumption allowances (depreciation). In Figure 3, households have been disaggregated into three types by major source of income (transfer recipients, wage earners, and rentiers). The other institutional actors remain as before, although we have netted out some of the gross inter-institutional transfers.[19] Note that the "rest of world" account in Figure 2 is defined to sum to the total value of imports, with the various capital flow items in the column. In Figure 3, these items are placed along the row (with opposite signs) to be consistent with the treatment in the U.S. NIPA tables.

The supplier accounts in Figure 3 are useful for ease of presentation. It is very important, however, to maintain the distinction between activities and commodities in the underlying data. The two accounts represent different types of product markets, each with its own sectoral prices. Domestically produced goods, which are supplied by activities, are valued in producer prices. In the commodity account, goods from domestic producers are combined with imports to provide composite commodities which are sold to intermediate and final demand. The corresponding price is a wholesale (or "supplier") price, which includes imports.

The "make" table maps from activities (row) to commodities (column). The make table describes the supply of domestically produced goods, whereas the "use" table describes intermediate demand for composite commodities (including imports).[20] In the United States, the make table has the same sectoring as the use table, with off-diagonal entries to incorporate secondary production. The make and use tables are often combined into an industry-by-industry transactions table, as in Figure 3.

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[18]In many multisectoral economywide models, labor is further disaggregated by skill category and land is distinguished as a separate factor.

[19]Interest paid by consumers to business has been removed from household expenditures and receipts.

[20]It is feasible to separate intermediate demand for domestically produced and imported commodities in the input-output table. Many countries produce separate use tables for imports and domestic commodities. The published U.S. input-output tables do not make this distinction.

Figure 2--A Schematic Social Accounting Matrix (SAM)

	Expenditures									
	1	2	3	4	5	6	7	8	9	
	Suppliers:		Value added:				Institutions:			
Receipts	Commodity	Activity	Labor	Capital	Enterprise	Household	Government	Capital	World	Row totals
Suppliers:										
1 Commodity		intermediate demand				household consumption	government purchases	investment		domestic sales
2 Activity	domestic supply						export subsidies		exports	total receipts
Value added:										
3 Labor		employee compensation								employee compensation
4 Capital		capital income								capital income
Institutions:										
5 Enterprise				gross bus. income			transfers to bus.		net foreign factor income	enterprise income
6 Household			labor income		distributed profits		transfers		net foreign remittances	household income
7 Government	tariffs	indirect tax	soical security tax		business profit tax	household income tax			net foreign transfers	government income
8 Capital account					bus. savings + depreciation	household savings	government savings		net foreign savings	total savings
9 Rest of world	imports									total imports
Column totals	total absorption	total costs	employee compensation	capital income	enterprise expenditure	household expenditure	government expenditure	total investment	foreign exchange	

Figure 3--United States Three-Sector SAM, 1982

	Expenditures												
Billions of dollars	1	2	3	4	5	6	7	8	9	10	11	12	
		Suppliers:		Value added:				Households:					
Receipts	farming	industry	services	labor	capital	Enter-prise	transfer	labor	rentier	Govern-ment	Capital	Rest of world	Row totals
Suppliers:													
1 farming	42.1	86.1	4.3				4.2	12.4	2.4	8.6	-0.5	19.6	179.0
2 industry	44.4	1094.6	389.2				96.2	354.6	78.6	173.9	439.4	192.2	2861.1
3 services	31.6	458.0	658.5				291.5	978.6	234.3	459.2	8.5	150.1	3270.2
Value added:													
4 labor	13.0	640.2	1253.8										1907.0
5 capital	41.3	230.6	728.3										1000.2
6 Enterprise					1000.2					47.5			1047.8
Households:													
7 transfer										396.3			396.3
8 labor				1637.5									1637.5
9 rentier						581.5							581.5
10 Government	3.1	66.7	189.0	269.5		63.1		206.3	203.1				1000.7
11 Capital account						403.2	4.5	85.6	63.8	-110.8			446.3
12 Rest of world	3.5	285.0	47.2						1.3	26.1	-1.0		361.9
Column totals	179.0	2861.1	3270.1	1907.0	1000.2	1047.8	396.3	1637.5	581.5	1000.7	446.3	361.9	

In most input-output tables, exports are also treated as a delivery from the commodity account. This treatment, while standard, raises problems. Ideally, each row in the commodity account should represent a single market with a single price. Without exports, the commodity account corresponds to the domestic wholesale market, with the appropriate price being a wholesale price index including domestic and imported goods. Exports, however, are sold on the world market, and measuring their price with an index including imports would be inappropriate.

In Figure 2, exports are shown as a delivery by the activity account. This treatment has two advantages from the point of view of economic theory and modelling. First, firms are viewed as producing a single good which is sold either on the domestic or foreign markets at a single price in domestic currency. Thus, each row in the activity account represents a single goods market with a single price. Second, the commodity account defined without exports corresponds to the trade-theory notion of "absorption." Aggregate absorption is the sum of the commodity account net of intermediate demand. It equals GDP plus imports minus exports, or the total delivery of goods to final demand within the country.

A problem with treating exports as part of the activity account is that export data often are classified differently from industry production data. This difference underlies the argument for including them in the commodity account. Unfortunately, in terms of markets, domestic and export commodities are different. An obvious solution is to create two commodity accounts, one for the domestic market and one for the export market. This approach has the advantage that different make matrices can be defined for export commodities and domestic commodities, with appropriately defined different price indices.

With the use table defined in wholesale (or supplier) prices, final demanders pay separately for trade and transportation services. There are large final demands for these services in the input-output account. However, expenditure data based on household surveys are always at purchaser prices, with no final demand for trade and transportation. In principle, the commodity account, with separate make and use tables, can convert goods sold by activities at producer prices into commodities purchased by demanders at purchaser prices.[21] Alternatively, one can define another "transition" matrix to spread the trade and transportation margins and so map from commodities in supplier prices (which include imports) to commodities in purchaser prices.[22] This approach yields an additional set of sectoral accounts in the SAM.[23] Defining a separate commodity account for exports, which would also permit different trade and transportation margins for exports (defining the c.i.f. price) adds another pair of sectoral accounts.

The treatment of indirect taxes, tariffs, and subsidies raise additional questions. In Figure 2, the sum of the two value added rows yields total value added at factor cost. Value added at market prices (which equals GDP) equals value added at factor cost plus indirect taxes, plus tariffs, and minus subsidies, including export subsidies (entry 2,7 in Figure 2). By definition, in the NIPA and SNA, exports and

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[21]In the published U.S.input-output accounts both activities and commodities are given in "producer" prices. The treatment is confusing because imports are included in commodities. The underlying data tapes provide data on trade and transportation margins. Thus, it is possible to construct a use table to generate commodities in purchaser prices.

[22]This is the approach used by Ballard et al (1985) for consumer expenditures. Their transition table is compiled from table B in the input-output account [U.S. Department of Commerce (1984)]. The problem of reconciling commodity classifications among micro data files, the NIPA, and the input-output account also arises with merchandise trade data and investment by type of equipment and structure.

[23]Note that the choice of sector aggregation for the commodity and activity accounts need not be the same. Final demand in purchaser prices can use a different commodity classification scheme.

imports are valued in world prices times the exchange rate, net of tariffs and subsidies. In the SNA, tariffs are shown separately in going from value added to GDP, and are not treated as part of sectoral value added. In the U.S. NIPA, tariffs are counted as part of value added in the wholesale trade sector and are aggregated with domestic indirect taxes. The U.S. treatment is difficult to reconcile with economic theory and modelling, especially when analyzing trade policy where it is important to keep track of sectoral tariffs.

In the national accounts, export subsidies are treated analogously with indirect taxes. Many countries report sectoral indirect taxes net of all subsidies. For trade policy analysis, however, it is important to keep export subsidies separate from domestic market subsidies. With the growth of agricultural export subsidies in the U.S. over the past five years, this accounting issue needs to be dealt with in the NIPA.

Accounting for all these complications leads to an expansion of the SAM. The reason for this proliferation of accounts is the need to have the various activity and commodity accounts reflect market transactions. As noted earlier, along each commodity and activity row, the price of a good should be the same for each demander (column account). Only then does a given nominal dollar flow reflect the same real flow across a single market, regardless of the purchaser. While published input-output tables and SAMs often violate this principle, it is important to maintain the underlying data properly. Otherwise, it is not possible to recover the real flows corresponding to recorded nominal flows. The input-output data are then much less useful for models or, indeed, for any economic analysis.

Definitions and Imputations

From the beginning, vexing problems of imputation have been a matter of continuing controversy among the designers of the national accounts. The root problem is defining the boundaries of productive activities which produce a flow of goods and services and generate value added. The issues are still controversial, which suggests that no one definition will serve all purposes. Economists and national accountants, however, must still define an acceptable production boundary, delineating the productive sphere of the economy. The next problem is to impute values for those flows that do not pass through product and/or factor markets.

Views on the subject range along a continuum.[24] At one extreme, we could define as productive only those activities that involve market transactions. Problems of imputation thus never arise since we define nonmarket activities as nonproductive and hence of no interest. At the other extreme, some economists want to expand the definition to include flows of services from various durable goods and property not now considered in the accounts. These flows do not cross markets and hence their values must be imputed.

From a modeler's perspective, it would be easier to define the economy to include only market activities. Unfortunately, such a definition leaves out nonmarket activities that influence the economic behavior of households and firms on both the product and factor markets. Important examples include the treatment of durable goods and fixed assets.

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[24]See Young (1987) for a survey of proposals for revising the U.S. national accounts. Ruggles and Ruggles (1986), and Stone (1986b) discuss imputation problems and proposals for defining the production boundary.

Both governments and private entities own and use assets, raising similar imputation issues. Eisner (1985) suggests including in GNP an imputed income flow from government-owned tangible assets such as natural resources and national parks. From our modeling perspective, Eisner's arguments are not persuasive. Whether to include the flow of services from nonmarket activities in a model is a difficult decision. It depends on what actors and what aspects of their behavior the model seeks to capture. For instance, CGE models focus on household demand and producer supply, usually treating government behavior very simply. Of course, a different modeling perspective will suggest other imputations, so this debate is open ended.

Owner-occupied housing is an example of a nonmarket productive activity which is now included in the NIPA, but in a manner inconsistent with the needs of microsimulation models. The current treatment of owner-occupied housing in the NIPA and input-output accounts involves creating a synthetic production sector as a part of real estate. This sector makes expenditures for dwelling maintenance, insurance, taxes, and depreciation. It also receives an imputed rental payment as part of household consumption expenditure and pays out an imputed rental income to homeowners, which the NIPA include as a part of household income.

As an alternative, Ruggles and Ruggles (1986) use household survey data to assign the costs of owner occupancy as a current consumption expense and compute a capital consumption allowance as an element of household savings and income.[25] In contrast with the existing treatment of owner-occupied housing, they do not impute a rental income to households. Nor do they attribute an income flow between households and the synthetic production sector. Instead, the household account produces these housing services. This approach defines income flows consistent with the actual transactions by households and is more useful from the perspective of microsimulation models.

An unfortunate aspect of their approach, however, is that households directly generate value added. The depreciation on homes is counted as services produced by households and is also part of household income and savings. From an economywide modeler's perspective, it is cleaner to keep the generation of all value added in the production accounts. In the SAM, all value added comes from input-output activities. The SAM then maps the income flows emanating from production activities through the economy, reconciling the input-output and national income accounts. Ruggles and Ruggles (1986) do not treat the NIPA and input-output accounts together and thus have not worried about their relationship. We suggest keeping the synthetic production sector in the input-output system, but include the income flows as proposed by Ruggles and Ruggles.

Consumer durable goods pose an imputation problem similar to owner occupied housing, but the NIPA treat them differently. In the accounts, consumer durable expenditures are current flows, involving no depreciation or imputed flow of services over time. On the other hand, Ruggles and Ruggles (1986) propose treating consumer durables analogously to owner occupied housing, which is more consistent with the micro theory of household behavior. Disaggregated economywide models are taking greater advantage of micro data to specify household behavior. The NIPA definitions need to evolve to be consistent with the changing models.

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[25]Capital consumption of owner occupied dwellings can be computed as either historical cost or replacement cost. The difference can be significant during times of inflation and, under the Ruggles' proposal, would have a sizable impact on measured household savings.

A factor market imputation problem arises from the treatment of proprietors' income. Proprietors are households that have their own business, contributing both labor and capital services. In agriculture, returns to land are also included in proprietor income. Capturing their participation in factor markets requires separating the returns to labor, capital, and land. Many economists have dealt with the problem, both modelers and those interested in measuring factor productivity. One approach to separating the labor share of proprietor income is to impute a proprietor's wage as being equal to the average wage for hired labor. Another approach is to assume a wage share of value added for proprietors equal to that in some reference industry.[26]

Given data limitations, imputations can only approximate the answer that a hypothetical market would generate. Evaluating the adequacy of such approximations is a necessary part of any analysis or modeling exercise. Making the imputations explicit in the accounts would aid such evaluation. In the NIPA, the imputations are hidden in the summary tables and must be dug out of detailed supplementary tables. Ruggles and Ruggles (1986) suggest the formation of a core account for market activities and supplementary accounts for nonmarket activities. Their proposed structure of accounts makes it much easier to analyze and modify the treatment of nonmarket activities.

Actors and Accounts

An actor/transaction view of the economy, with a focus on market interactions, leads naturally to some criteria for defining institutional actors. Specifying the actor accounts in the NIPA along the lines of micro theory will bring greater consistency between data and models. Disaggregating actor accounts using micro data allows for a richer network of linkages in an economywide model. The SAM derived from the NIPA provides the account control totals for reconciliation with disaggregated accounts. What disaggregation to use depends on the issues. Examples include labor occupations, enterprise type, financial transactions in the capital account, and social and demographic characteristics of households.

Special Sectors in the Production Accounts

The input-output accounts include several special sectors that provide consistency between input-output totals and national aggregates in the NIPA.[27] From an accounting perspective, these special sectors are convenient and pose no theoretical difficulty. When modeling the production activities of the economy, however, income flows attributed to these sectors may not be consistent with the behavior of suppliers in micro theory. To deal with the modeling problem, special sectors are often combined with other sectors into some catchall sector. Aggregation is a way to sweep a small problem under a relatively large rug. Sometimes, however, the problems are too large or the available rugs are too small.

The "rest of world industry" sector is a good example. The sector records the international flow of factor services in the input-output accounts. The accounts treat services provided to foreigners from factors of

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[26]Kravis (1959) compares several approaches to imputing labor and capital share of proprietors' income. The first approach is used by Ballard, et al. (1985). Christensen and Jorgenson (1973) also use this approach in their factor productivity analysis of the United States. Adelman and Robinson (1978), however, use the second approach in their study of Korea.

[27]Discussion on the input-output accounts and how they are reconciled with the NIPA can be found in U.S. Department of Commerce (1984) and in Young and Tice (1985).

production owned by U.S. residents as exports. The services provided to the United States by factors of production owned by foreigners are imports.[28] During the 1980's these factor income flows changed dramatically. The net balance remained in surplus, but fell from $47.6 billion in 1980 to $25.5 billion in 1987. Given the increase in foreign ownership of U.S. assets, the net surplus will undoubtedly change to a deficit in the future. In the input-output table, the sector will then show negative value added.

The micro theory underlying disaggregated economywide modeling has little to say about international factor income flows. It would be difficult to treat "rest of world industry" as analogous to sectors producing goods, for example with a production function. One way around the problem is to work with gross domestic product (GDP), which excludes value added from the rest of the world. A model would then treat international factor income flows separately from production. As value added in this sector turns negative, the GDP framework becomes more attractive.

Another problem area is the treatment of "noncomparable" imports. These are defined as imported goods for which there is no comparable domestic goods. The classification of such goods can be arbitrary and may well change over time as domestic producers enter or exit the market. For example, in the U.S., imported televisions may soon be noncomparable! If this distinction is used, it is important that the noncomparable imports be classified by sector or commodity, and not be lumped into a single row in the input-output table (as is now the case in the U.S. accounts).

Households and Enterprises

In the SAM in Figure 3, each category of household receives income from a different source in a one-to-one correspondence. Transfer recipients receive government transfers, wage earners receive employee compensation, and rentiers receive income from the ownership of property. This classification uses only NIPA data and reflects the functional distribution of income. Analysis of the size distribution requires further disaggregation of households and income sources. It requires combining and reconciling micro data from household surveys (including the population census) with the NIPA. In the United States, microsimulation studies of government transfer programs use such data.[29]

There is an extensive literature on integrating the size distribution of household income in the SAM framework.[30] There is a need for such an approach in the U.S. national economic accounts. The existing household account in the NIPA could, in principle, provide control totals for such a disaggregation. Unfortunately, the definition of households in the NIPA includes nonprofit institutions. NIPA data are thus inconsistent with data from micro surveys which use a different definition of households.

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[28]Payments to labor and capital, or value added, are included in the expenditure side of the account. Compensation paid U.S. residents is netted against wages and salaries paid to foreigners in the employee compensation account. Similarly, receipts of income on foreign investment are netted against payments of income on foreign assets in the United States and in the property income account. For the U.S., the international flow of factor income is almost entirely property income.

[29]For symposiums of microsimulation models using household survey data, see: Orcutt, Merz, and Quinke (1986), Haveman and Hollenbeck (1980), and Feldstein (1983).

[30]Most of this work refers to developing countries. See, for example, Pyatt and Round (1985), Pyatt and Thorbecke (1976), and United Nations (1975).

Within the SAM framework, activities are aggregations of establishments within a sector. They purchase inputs on factor and product markets and sell output on product markets. They are different from enterprises which collect gross capital income and distribute it to other institutions. The distinction provides a framework for capturing an establishment-firm dichotomy, which exists in both data and theory. The SAM in figure 2 simplifies the mapping of capital income from production by having only a single enterprise. In principle, one could define enterprise accounts corresponding to multi-product firms, collecting capital income from more than one activity.

In their IEA, Ruggles and Ruggles include nonprofit institutions in the enterprise sector rather than in the household sector. They argue that these institutions do not behave like households and are not included in any micro-based, household survey data. A micro modeler would agree with this argument. It certainly makes no sense to view them as utility maximizing consumers. A modeler would add the argument that on the factor markets, nonprofit institutions behave like other enterprises. They are cost-minimizing producers, even though the value of their output has to be imputed as equalling the cost of production.

Carson and Jaszi (1982, p. 57) criticize the Ruggles and Ruggles because they "have not addressed the problems of relating input-output accounts to their system" and are thus "avoiding what is probably the most important obstacle to a comprehensive integration of economic accounts --the 'establishment-firm' dichotomy." We agree that the IEA do not adequately incorporate the input-output accounts. However, the Ruggles and Ruggles do recognize the dichotomy. They define an enterprise account as part of the IEA, a necessary step in reconciling production accounts based on establishments and income and outlay accounts based on firms.[31] This approach is consistent with the SAM approach in which enterprises are seen as important actors.

The Capital Account

In recent years, macro models have emphasized the interplay between real and financial activities. Examples of such issues include the effect of credit rationing on producer supply and household demand, and the impact of government deficits on international capital flows. Analysis of such macro issues in a disaggregated economywide framework requires specifying enterprise current and capital accounts. The goal is to disaggregate the financial activities underlying the investment-savings process. The flow of funds accounts provide the necessary data.[32]

Various supplementary tables reconcile the flow of funds accounts with the NIPA. Reconciling flows, however, is only the first step in integrating current and capital accounts. Stone (1986a) discusses the development of SAM's with financial accounts. Ruggles and Ruggles (1982) propose a set of integrated accounts, but do not use a SAM framework. Ruggles (1987) proposes revisions to the SNA to integrate capital accounts in the national economic accounts.

Defining enterprise accounts in the NIPA that correspond to the enterprises in the flow of funds accounts is necessary for integrating the two accounts and capturing real-financial linkages. Enterprises in the flow of funds accounts are disaggregated by legal form of organization. The types of organizations include

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[31]As noted earlier, the BEA dropped any attempt to define an enterprise account in 1958. Given the criticism of Carson and Jaszi, this decision is hard to understand.

[32]See Board of Governors of the Federal Reserve System (1980).

corporate and noncorporate private business, government enterprises, and private nonprofit institutions. As for disaggregation by industrial sector, the flow of funds accounts distinguish only among farm, nonfarm, and financial.

CONCLUSION

U.S. policies in the 1980's have not resolved problems that emerged in the 1970's. Major swings in macro aggregates in the 1980's have exacerbated the structural shocks forcing adjustment in the economy. The issues facing the United States in the 1990's will be ones of structural adjustment in production, employment, and trade in a changing world macro environment. Historically, eras of new policy issues have ushered in theoretical and model developments. The development of new models demands the collection and organization of new data.

There is an interplay among issue formation, model development, and data organization. During the 1930's and 1940's, the Keynesian theoretical revolution stimulated the evolution of the NIPA for data organization. The energy crises led to disaggregated economywide energy models integrating the NIPA and input-output accounts. The expansion of government transfer programs in the 1970's motivated the development of microsimulation models based on household data.

Both microsimulation and CGE models focus on the underlying structure of the economic system. They both emphasize market and nonmarket linkages among micro actors. It is through these linkages that the structural adjustment processes we are observing will work themselves out. With the increased focus on structure, there is also an increased need for data to support structural analysis in an economywide framework. The SAM accounting system provides the best available framework for reconciling the accounts of micro actors with the macro aggregates which have traditionally been the focus of statistical data.

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APPENDIX 1: National Income and Product Accounts, 1982
(Billions of dollars)

Source: Survey of Current Business, July 1986.

Account 1: National Income and Product Accounts

	Expenditures	
1	compensation of employees	1907.00
2	wages and salaries	1586.12
3	disbursements (2-7)	1586.15
4	wage accurals less disb. (3-12,5-4)	-0.03
5	supplements to wages and salaries	320.88
6	employer contrib. to social ins. (3-20)	157.25
7	other labor income (2-8)	163.63
8	proprietors income with iva/cca (2-9)	175.53
9	rental income of persons with cca (2-10)	13.65
10	corporate profits with iva/cca	149.98
11	profits before tax	169.58
12	profit tax liability (3-17)	63.08
13	profits after tax	106.50
14	dividends (2-12)	66.88
15	undistributed profits (5-6)	39.63
16	inventory valuation adjustment (5-7)	-10.35
17	capital consumption adjustment (5-8)	-9.25
18	net interest (2-15)	272.30
19	national income (value added)	2518.45
20	business transfer payments (2-20)	14.33
21	indirect bus. tax and nontax liability (3-18)	258.83
22	less:subsidies less cur. surplus of gov. ent (3-11)	8.65
23	charges against net national product	2782.95
24	capital consumption allowances with cca (5-9)	383.15
25	charges against gross national product	3166.10
26	statistical discrepancy (5-12)	-0.05
	gross national product	3166.05

Account 1: NIPA, cont.

	Receipts	
27	personal consumption exp. (2-3)	2050.65
28	durable goods	252.65
29	nondurable goods	770.99
30	services	1027.01
31	gross priv. dom. investment (5-1)	447.33
32	fixed investment	471.83
33	nonresidential	366.70
34	structures	143.30
35	producers durable equipment	223.40
36	residential	105.13
37	change in business inventories	-24.50
38	net exports of goods and services	26.30
39	exports (4-1)	361.93
40	imports (4-3)	335.63
41	gov. purchases of goods and services (3-1)	641.70
42	federal	272.68
43	national defense	193.83
44	nondefense	78.85
45	state and local	369.03
	gross national product	3165.97

Account 2: Personal Income and Outlay

	Expenditures	
1	personal tax and nontax payments (3-16)	409.33
2	personal outlays	2107.45
3	consumption exp. (1-27)	2050.65
4	interest paid by consumers to bus. (2-18)	55.55
5	transfer payments to foreigners, net (4-5)	1.25
6	saving (5-3)	153.95
	personal taxes, outlays and savings	2670.72
	Receipts	
7	wage and salery disbursements(1-3)	1586.15
8	other labor income (1-7)	163.63
9	proprietors income with iva/cca (1-8)	175.53
10	rental income of persons with cca (1-9)	13.65
11	personal dividend income	63.93
12	dividends (1-14)	66.88
13	less: dividends received by gov. (3-10)	2.95
14	personal interest income	369.68
15	net interest (1-18)	272.30
16	interest paid by gov. to pers. and bus. (3-7)	110.00
17	less: interest received by gov. (3-9)	68.18
18	interest paid by consumers to business (2-4)	55.55
19	transfer payments to persons	410.58
20	from business (1-20)	14.33
21	from gov. (3-3)	396.25
22	less: personal contrib. for social ins. (3-21)	112.30
	personal income	2670.82

Account 3: Government Receipts and Expenditures

	Expenditures	
1	purchases of goods and services (1-41)	641.70
2	transfer payments	404.03
3	to persons (2-21)	396.25
4	to foreigners, net (4-6)	7.78
5	net interest paid	60.13
6	interest paid	128.30
7	to persons and business (2-16)	110.00
8	to foreigners (4-7)	18.30
9	less: interest received by gov. (2-17)	68.18
10	less: dividends received by gov. (2-13)	2.95
11	subsidies less current surplus of gov. ent. (1-22)	8.65
12	less: wage accurals less disbursements (1-4)	-0.03
13	surplus or deficit (5-10)	-110.75
14	federal	-145.88
15	state and local	35.13
	government expenditures and surplus	1000.83
	Receipts	
16	personal tax and nontax payments (2-1)	409.33
17	corporate profits tax liability (1-12)	63.08
18	indirect business tax and nontax liability (1-21)	258.83
19	contributions for social ins.	269.55
20	employer (1-6)	157.25
21	personal (2-22)	112.30
	government receipts	1000.78

Account 4: Foreign Transactions

	Receipts	
1	exports of goods and services (1-39)	361.93
2	capital grants received by U.S., net (5-11)	0.00
	receipts from foreigners	361.93
	Expenditures	
3	imports of goods and services (1-40)	335.63
4	transfer payments to foreigners, net	9.03
5	from persons, net (2-5)	1.25
6	from gov., net (3-4)	7.78
7	interest paid by gov. to foreigners (3-8)	18.30
8	net foreign investment (5-2)	-0.98
	payments to foreigners	361.98

Account 5: Gross Saving and Investment

	Expenditures	
1	gross private domestic investment (1-31)	447.33
2	net foreign investment (4-8)	-0.98
	gross investment	446.35
	Receipts	
3	personal saving (2-6)	153.95
4	wage accurals less disbursements (1-4)	-0.03
5	undistributed corp. profits with iva/cca	20.03
6	undistributed corp. profits (1-15)	39.63
7	inventory valuation adj. (1-16)	-10.35
8	capital consumption adj. (1-17)	-9.25
9	capital consumption allowance with cca (1-24)	383.15
10	gov. surplus or deficit (-), (3-13)	-110.75
11	capital grants received by U.S., net (4-2)	0.00
12	statistical discrepancy (1-26)	-0.05
	gross saving and stat. discrepancy	446.30

APPENDIX 2: Bridge Between SAM and NIPA Summary Accounts

SAM column account	SAM row account	NIPA, Summary Tables table	description
1 commodity	2 activity	1.27	personal consumption expenditure
		1.31	gross private domestic investment
		1.39	exports
		1.40	imports (-)
		1.41	government purchases of goods and services
		NA	intermediate demand
1 commodity	13 rest of world	1.40	imports
2 activity	1 commodity	NA	intermediate demand
2 activity	3 value added	1.1	compensation of employees
		1.8	proprietors income with iva/cca
		1.9	rental income with cca
		1.10	corporate profits with iva/cca
		1.18	net interest
		1.20	business transfer payments
		1.22	subsidies less current surplus of govt.ent. (-)
		1.24	capital consumption allowances with cca
2 activity	4 indirect tax	1.21	indirect business tax and nontax liability
3 value added	5 emp. comp.	1.1	compensation of employees
3 value added	6 proprietors	1.8	proprietors income with iva/cca
3 value added	7 property	1.9	rental income of persons with cca
		1.10	corporate profits with iva/cca
		1.18	net interest
3 value added	8 stat. discrep.	1.26	statistical discrepancy
3 value added	9 enterprise	1.20	business transfer payments
		1.22	subsidies less current surplus of govt. ent. (-)
		1.24	capital consumption allowance with cca
4 indirect tax	11 government	1.21	indirect business tax and nontax liability
5 emp. comp.	10 households	1.3	wage and salary disbursements
		1.5	supplements to wages and salaries
		3.19	contributions for social insurance (-)
5 emp. comp.	11 government	3.19	contributions for social insurance
5 emp. comp.	12 capital account	1.4	wage accruals less disbursements
6 proprietors	9 enterprise	1.8	proprietors income with iva/cca
7 property	9 enterprise	1.9	rental income of persons with cca
		1.10	corporate profits with iva/cca
		1.18	net interest
8 stat. discrep.	12 capital account	1.26	statistical discrepancy
9 enterprise	10 households	1.8	proprietors income with iva/cca
		1.9	rental income of persons with cca
		1.18	net interest
		1.20	business transfer payments
		2.11	personal dividend income
		2.16	interest paid by govt. to persons and business
		2.17	interest received by government (-)
		2.18	interest paid by consumers to business
9 enterprise	11 government	1.12	corporate profit tax liability
9 enterprise	12 capital account	1.15	undistributed corporate profits
		1.16	inventory valuation adjustment (iva)
		1.17	capital consumption adjustment (cca)
		1.24	capital consumption allowance with cca
10 households	1 commodity	2.3	personal consumption expenditures
10 households	9 enterprise	2.4	interest paid by consumers to business
10 households	11 government	2.1	personal tax and nontax payments

10 households	12 capital account	2.6	personal saving
10 households	13 rest of world	2.5	personal transfer payments to foreigners (net)
11 government	1 commodity	3.1	govt. purchases of goods and services
11 government	9 enterprise	3.7 3.9 3.10 3.11	interest paid to persons and business interest received by government (-) dividends received by government (-) subsidies less current surplus of govt. ent.
11 government	10 households	3.3	transfer payments to persons
11 government	12 capital account	3.13	surplus or deficit
11 government	13 rest of world	3.4 3.8	transfer payments to foreigners (net) net interest paid to foreigners
12 capital account	1 commodity	5.1	gross private domestic investment
12 capital account	13 rest of world	5.2	net foreign investment
13 rest of world	1 commodity	4.1	exports of goods and services
13 rest of world	12 capital account	4.2	capital grants received by the U.S. (net)

Note:

The NIPA "table" column refers to the account number and line number in the NIPA Summary Tables published in the July issue of the Survey of Current Business. NA means "not applicable" since intermediate demand does not appear in the NIPA tables.

APPENDIX 3: Macro SAM's for the United States: 1977-87

The data come from Wharton Econometric Forecasting Associates, Core Data Banks, and is accessed through the USDA DARTS-2.0 system (Database and Automated Retrieval System). The data base is from July, 1988. Entries in the "statistical discrepancy" row, except for the value added column which is a NIPA entry, are round-off errors in the data.

UNITED STATES macro SAM from NIPA
1977 Billions of Dollars

RECEIPTS OR INCOME	EXPENDITURES OR OUTLAYS	1 Commodity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 Household	11 Government	12 Capital account	13 Rest of world	Row totals
1	Commodity		0								1257.20	387.33	344.05	191.63	2180.20
2	Activity	1990.48													1990.48
3	Value added		1824.78												1824.78
4	Indirect tax		165.65												165.65
	GNP		1990.43												
5	Employee compensation			1176.60											1176.60
6	Proprietors			152.93											152.93
7	Property			288.18											288.18
	National income			1617.70											
8	Statistical discrepancy		0.05	-0.05							-0.08	-0.05	0.08		-0.05
9	Enterprise			207.13			152.93	288.18			30.50	21.28			700.00
10	Household					1026.75				363.18		217.45			1607.38
11	Government				165.65	149.75				73.05	228.13				616.58
12	Capital account					0.10			-0.05	263.78	90.70	-19.13			335.40
13	Rest of world	189.73									0.93	9.70	-8.73		191.63
	Column totals	2180.20	1990.48	1824.78	165.65	1176.60	152.93	288.18	-0.05	700.00	1607.38	616.58	335.40	191.63	

UNITED STATES macro SAM from NIPA
1978 Billions of Dollars

		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	ROW totals
RECEIPTS OR INCOME	1 Commodity		0								1403.48	425.25	416.84	227.50	2473.06
	2 Activity	2249.69													2249.69
	3 Value added		2071.55												2071.55
	4 Indirect tax		178.05												178.05
	GNP		2249.60												
	5 Employee compensation			1329.18											1329.18
	6 Proprietors			176.23											176.23
	7 Property			332.80											332.80
	National income			1838.20											
	8 Statistical discrepancy		0.09	-1.93							-0.02	-0.27	0.24	-0.03	-1.92
	9 Enterprise			235.28			176.23	332.80			36.70	21.65			802.65
	10 Household					1157.23				420.30		234.80			1812.33
	11 Government				178.05	171.68				83.50	261.13				694.35
	12 Capital account					0.28			-1.93	298.85	110.18	-0.43			406.95
	13 Rest of world	223.38									0.88	13.35	-10.13		227.48
	Column totals	2473.06	2249.69	2071.55	178.05	1329.18	176.23	332.80	-1.93	802.65	1812.33	694.35	406.95	227.48	

UNITED STATES macro SAM from NIPA
1979 Billions of Dollars

		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
RECEIPTS OR INCOME	1 Commodity		0								1566.75	467.80	454.84	291.23	2780.62
	2 Activity	2508.14													2508.14
	3 Value added		2318.80												2318.80
	4 Indirect tax		189.33												189.33
	GNP		2508.13												
	5 Employee compensation			1491.40											1491.40
	6 Proprietors			191.88											191.88
	7 Property			363.95											363.95
	National income			2047.23											
	8 Statistical discrepancy		0.02	-0.98							0.03	0.15	-0.22	0.02	-0.97
	9 Enterprise			272.55			191.88	363.95			43.53	21.20			893.10
	10 Household					1293.83				477.35		262.80			2033.98
	11 Government				189.33	197.75				88.00	304.65				779.73
	12 Capital account					-0.18			-0.98	327.75	118.05	11.45		1.10	457.20
	13 Rest of world	272.48									0.98	16.33	2.58		292.35
	Column totals	2780.62	2508.14	2318.80	189.33	1491.40	191.88	363.95	-0.98	893.10	2033.98	779.73	457.20	292.35	

UNITED STATES macro SAM from NIPA
1980 Billions of Dollars

		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
RECEIPTS OR INCOME	1 Commodity		0								1732.58	530.33	436.99	350.98	3050.86
	2 Activity	2731.99													2731.99
	3 Value added		2518.73												2518.73
	4 Indirect tax		213.30												213.30
	GNP		2732.03												
	5 Employee compensation			1638.20											1638.20
	6 Proprietors			180.68											180.68
	7 Property			384.73											384.73
	National income			2203.60											
	8 Statistical discrepancy		-0.04	4.90							-0.05	0.10	0.01	-0.03	4.90
	9 Enterprise			310.23			180.68	384.73			47.38	27.53			950.53
	10 Household					1421.75				524.15		312.63			2258.53
	11 Government				213.30	216.50				84.80	340.55				855.15
	12 Capital account					-0.05			4.90	341.58	136.90	-34.53		1.20	450.00
	13 Rest of world	318.88									1.18	19.10	13.00		352.15
	Column totals	3050.86	2731.99	2518.73	213.30	1638.20	180.68	384.73	4.90	950.53	2258.53	855.15	450.00	352.15	

UNITED STATES macro SAM from NIPA
1981 Billions of Dollars

RECEIPTS OR INCOME	EXPENDITURES OR OUTLAYS													
	1 Commodity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
1 Commodity		0								1915.15	588.10	515.54	382.80	3401.59
2 Activity	3052.69													3052.69
3 Value added		2801.20												2801.20
4 Indirect tax		251.50												251.50
GNP		3052.70												
5 Employee compensation			1807.40											1807.40
6 Proprietors			186.78											186.78
7 Property			449.35											449.35
National income			2443.52											
8 Statistical discrepancy			4.10							-0.03		0.03		4.10
9 Enterprise			353.58			186.78	449.35			51.98	39.75			1081.43
10 Household					1556.10				609.18		355.65			2520.92
11 Government				251.50	251.23				81.15	393.35				977.23
12 Capital account					0.08			4.10	391.10	159.45	-29.68		1.10	526.15
13 Rest of world	348.90									1.03	23.40	10.58		383.90
Column totals	3401.59	3052.69	2801.20	251.50	1807.40	186.78	449.35	4.10	1081.43	2520.92	977.23	526.15	383.90	

UNITED STATES macro SAM from NIPA
1982 Billions of Dollars

RECEIPTS OR INCOME	EXPENDITURES OR OUTLAYS	1 Commodity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 Household	11 Government	12 Capital account	13 Rest of world	Row totals
	1 Commodity		0								2050.62	641.70	447.31	361.93	3501.56
	2 Activity	3165.93													3165.93
	3 Value added		2907.22												2907.22
	4 Indirect tax		258.83												258.83
	GNP		3166.05												
	5 Employee compensation			1907.00											1907.00
	6 Proprietors			175.53											175.53
	7 Property			435.93											435.93
	National income			2518.45											
	8 Statistical discrepancy		-0.11	-0.05							0.13	-0.03	-0.04	0.05	-0.05
	9 Enterprise			388.83			175.53	435.93			55.55	47.52			1103.35
	10 Household					1637.47				637.10		396.25			2670.82
	11 Government				258.83	269.55				63.08	409.33				1000.78
	12 Capital account					-0.03			-0.05	403.18	153.95	-110.75			446.30
	13 Rest of world	335.63									1.25	26.08	-0.98		361.98
	Column totals	3501.56	3165.93	2907.22	258.83	1907.00	175.53	435.93	-0.05	1103.35	2670.82	1000.78	446.30	361.98	

UNITED STATES macro SAM from NIPA
1983 Billions of Dollars

		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
RECEIPTS OR INCOME	1 Commodity		0								2234.55	675.05	502.29	352.53	3764.42
	2 Activity	3405.79													3405.79
	3 Value added		3123.18												3123.18
	4 Indirect tax		282.55												282.55
	GNP		3405.73												
	5 Employee compensation			2020.70											2020.70
	6 Proprietors			190.88											190.88
	7 Property			507.90											507.90
	National income			2719.48											
	8 Statistical discrepancy		0.07	5.20								0.37	-0.44		5.20
	9 Enterprise			398.50			190.88	507.90			61.88	61.47			1220.63
	10 Household					1730.13				681.83		426.63			2838.58
	11 Government				282.55	291.00				77.25	410.50				1061.30
	12 Capital account					-0.43			5.20	461.55	130.60	-128.55			468.38
	13 Rest of world	358.63									1.05	26.33	-33.48		352.53
	Column totals	3764.42	3405.79	3123.18	282.55	2020.70	190.88	507.90	5.20	1220.63	2838.58	1061.30	468.38	352.53	

UNITED STATES macro SAM from NIPA
1984 Billions of Dollars

RECEIPTS OR INCOME	EXPENDITURES OR OUTLAYS	1 Commodity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 Household	11 Government	12 Capital account	13 Rest of world	Row totals
	1 Commodity		0								2430.47	735.85	664.85	383.50	4214.67
	2 Activity	3772.22													3772.22
	3 Value added		3458.35												3458.35
	4 Indirect tax		313.90												313.90
	GNP		3772.25												
	5 Employee compensation			2213.95											2213.95
	6 Proprietors			234.50											234.50
	7 Property			580.25											580.25
	National income			3028.70											
	8 Statistical discrepancy		-0.03	5.35							-0.07	-0.18	0.22	0.05	5.35
	9 Enterprise			424.30			234.50	580.25			72.53	73.85			1385.43
	10 Household					1888.80				782.05		437.93			3108.78
	11 Government				313.90	324.90				93.93	440.20				1172.93
	12 Capital account					0.25			5.35	509.45	164.10	-105.03			574.13
	13 Rest of world	442.45									1.55	30.50	-90.95		383.55
	Column totals	4214.67	3772.22	3458.35	313.90	2213.95	234.50	580.25	5.35	1385.43	3108.78	1172.93	574.13	383.55	

UNITED STATES macro SAM from NIPA
1985 Billions of Dollars

RECEIPTS OR INCOME		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
R	1 Commodity		0								2628.99	820.75	643.08	370.93	4463.74
E	2 Activity	4014.89													4014.89
C	3 Value added		3681.17												3681.17
E	4 Indirect tax		333.63												333.63
I	GNP		4014.80												
P	5 Employee compensation			2367.52											2367.52
T	6 Proprietors			255.88											255.88
S	7 Property			610.55											610.55
	National income			3233.95											
O	8 Statistical discrepancy		0.10	-4.78							-0.02	0.20	-0.28		-4.78
R	9 Enterprise			452.00			255.88	610.55			82.58	79.08			1480.08
	10 Household					2013.62				843.83		467.83			3325.27
I	11 Government				333.63	354.13				96.43	486.63				1270.80
N	12 Capital account					-0.23			-4.78	539.83	125.38	-131.75			528.45
C	13 Rest of world	448.85									1.73	34.70	-114.35		370.93
O	Column totals	4463.74	4014.89	3681.17	333.63	2367.52	255.88	610.55	-4.78	1480.08	3325.27	1270.80	528.45	370.93	
M															
E															

UNITED STATES macro SAM from NIPA
1986 Billions of Dollars

RECEIPTS OR INCOME	EXPENDITURES OR OUTLAYS														
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
1	Commodity		0								2807.47	871.23	665.95	378.45	4723.10
2	Activity	4240.27													4240.27
3	Value added		3891.82												3891.82
4	Indirect tax		348.45												348.45
	GNP		4240.27												
5	Employee compensation			2507.10											2507.10
6	Proprietors			286.73											286.73
7	Property			643.20											643.20
	National income			3437.02											
8	Statistical discrepancy			-13.63							0.10	-0.07		-0.02	-13.62
9	Enterprise			468.43			286.73	643.20			89.08	85.23			1572.65
10	Household					2128.97				906.13		496.05			3531.15
11	Government				348.45	378.13				106.58	511.43				1344.58
12	Capital account					0.00			-13.63	559.95	121.65	-144.40			523.58
13	Rest of world	482.83									1.43	36.55	-142.38		378.43
	Column totals	4723.10	4240.27	3891.82	348.45	2507.10	286.73	643.20	-13.63	1572.65	3531.15	1344.58	523.58	378.43	

UNITED STATES macro SAM from NIPA
1987 Billions of Dollars

		EXPENDITURES OR OUTLAYS													
		1 Com-modity	2 Activity	3 Value added	4 Indirect taxes	5 Employee compensation	6 Proprietor income	7 Property income	8 Statistical discrepancy	9 Enterprise	10 House-hold	11 Govern-ment	12 Capital account	13 Rest of world	Row totals
RECEIPTS OR INCOME	1 Commodity		0								3012.06	924.78	712.91	428.05	5077.79
	2 Activity	4526.69													4526.69
	3 Value added		4160.38												4160.38
	4 Indirect tax		366.30												366.30
	GNP		4526.68												
	5 Employee compensation			2683.40											2683.40
	6 Proprietors			312.95											312.95
	7 Property			682.35											682.35
	National income			3678.70											
	8 Statistical discrepancy		0.02	-8.13							-0.11	0.05	-0.03	0.08	-8.12
	9 Enterprise			489.80			312.95	682.35			92.10	92.65			1669.85
	10 Household					2284.28				975.05		520.63			3779.95
	11 Government				366.30	399.13				133.78	570.35				1469.55
	12 Capital account					0.00			-8.13	561.03	104.23	-104.83			552.30
	13 Rest of world	551.10									1.33	36.28	-160.58		428.13
	Column totals	5077.79	4526.69	4160.38	366.30	2683.40	312.95	682.35	-8.13	1669.85	3779.95	1469.55	552.30	428.13	