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**SOCIAL ACCOUNTING MATRICES FOR
VIETNAM 1996 AND 1997**

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Abstract

This paper documents the construction of social accounting matrices (SAMs) for Vietnam for 1996 and 1997. The data sources used to construct the SAMs include national accounts statistics, government budget data, the official 1996 input-output table, the 1997/98 Vietnam Living Standards Survey (VLSS), and COMTRADE trade data. The agri-food sectors are particularly well represented in the SAMs: the resulting VIETSAM includes 97 producing sectors with eight agricultural sectors, two agricultural service sectors and 13 food processing industries. In terms of institutional detail, the SAMs include five factors of production (three types of labor distinguished by skill level, one type of capital and one type of land), six household types (distinguished by rural/urban, agricultural/non-agricultural, wage/self-employed), and one account each for enterprises, government, investment/savings and rest-of-world. The rest-of-world account is a purely non-trade-related account that keeps track of financial transfers between Vietnamese institutions and the rest of the world. This is because the innovative feature of this SAM is that it takes detailed account of Vietnam's foreign trade flows. Imports and exports of goods and services are distinguished by trading partner – more specifically, 94 partner countries are identified. The SAM is estimated using a cross-entropy approach, which makes efficient use of all available data whilst at the same time allowing for the incorporation of prior information and constraints.

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Preface

In a world characterized by increasing interdependence and integration, developing countries face a number of challenges, not least in relation to improving their capacity to participate effectively in international trade. These tendencies place pressure on governments to reform domestic and trade-related policies in order to create an environment in which economic agents may respond efficiently to these changes. Given the key importance of agricultural production in most developing countries and the continued need for improving food security, there is a particular interest in evaluating how the agricultural sectors in the developing countries might respond to these changing national and international economic and policy conditions. This is the underlying theme of a Ph.D. project undertaken by Research Analyst Chantal Pohl Nielsen, of which the data work documented in this paper is an integrated part. The project is entitled *Supply-Side Issues in Developing Country Agriculture: Constraints and Opportunities*, and financial support hereof from the Danish Council for Development Research (Rådet for Ulandsforskning, RUF) is gratefully acknowledged.

The overall goal of the project is to analyze selected issues related to the agricultural supply response in developing countries, where Vietnam is the country case study. In terms of methodology, one of the main empirical tools applied in the project is the computable general equilibrium (CGE) model. CGE models are economy-wide in the sense that all sectors are included, and hence they capture agriculture's importance in these economies in terms of income generation and employment, as well as the sector's linkages to the rest of the economy. Such models have gained increasingly wide acknowledgement in terms of policy evaluation, yet there is substantial room for (a) improving the theoretical description of the functioning of the economies in question, and (b) improving the empirical validity hereof. The underpinning database for this type of model is a Social Accounting Matrix (SAM). The outcomes of the policy and trade liberalization scenarios conducted using CGE models depend critically on the underlying data. Hence there is a lot to be said for putting substantial efforts into compiling a database that captures the main structures of the economy at sufficient levels of detail to make policy analysis useful. In spite of the many difficulties related to data insufficiencies and incompatibilities encountered throughout the construction process and the acknowledged remaining areas for improvement, the SAMs documented here represent an attempt to update and improve the existing representations of the Vietnamese economy for subse-

quent CGE model analysis. The data manipulations have been performed using GAMS software and the resulting SAM data files are available from the author upon request (chantal@foi.dk).

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The 1997 SAM documented in this paper has been included in the GTAP Version 5 Database. Documentation hereof is available as Nielsen, Chantal Pohl (2001) "Chapter 11.G.: Vietnam" in Dimaranan, B. V. and R. A. McDougall (eds.). *Global Trade Assistance and Production: The GTAP 5 Data Base*, Center for Global Trade Analysis, Purdue University, and available for downloading at <http://ae761-e.agecon.purdue.edu/gtap/resources/download/626.pdf>.

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1. Introduction

This paper documents the construction of social accounting matrices (SAMs) for Vietnam for 1996 and 1997. The purpose of building these SAMs is to obtain core data bases for a computable general equilibrium (CGE) model of the Vietnamese economy that will be used to analyze an array of economic issues related in particular to Vietnam's increasing participation in international trade. This will include analyses of Vietnam's own domestic and trade policy liberalization efforts, the economic consequences of the trade policies of Vietnam's major trading partners, and the impact of the country's participation in regional and international trade agreements such as the ASEAN Free Trade Agreement (AFTA) and possible future membership of the World Trade Organization (WTO). This focus on international trade issues is reflected by the fact that the SAMs documented here are characterized by a very detailed representation of Vietnam's international trade relations. Apart from forming the basis for CGE model analysis, it is the intention that the SAMs may be used for other applications such as multiplier estimation and decomposition analysis.

The data sources used to construct the SAMs include national accounts statistics, government budget data, the official 1996 input-output table, the 1997/98 Vietnam Living Standards Survey (VLSS), and COMTRADE trade data. The construction process consists of three steps. First, an aggregate macro-SAM (VIETMAC) is assembled, providing a consistent macroeconomic framework of the Vietnamese economy. Second, selected accounts of the macro-SAM are disaggregated. For example, the factor account is split into three labor accounts and one of each land and capital. During the disaggregation process the macro-SAM cell entries serve as control totals for the various sub-matrices. The data are not always consistent, however, and various assumptions must be made either because information is simply not available or because the data are only available in formats that make direct use hereof in building a SAM inherently difficult. This results in an unbalanced, or "raw", micro-SAM. Hence, the third step is to use a cross-entropy approach to balance the micro-SAM (VIETSAM). This approach makes efficient use of all available data whilst at the same time allowing for the incorporation of prior information and constraints.

The resulting balanced and consistent VIETSAM includes 97 producing sectors – a very high degree of sectoral detail compared with most other SAMs. With

eight agricultural sectors, two agricultural service sectors, and 13 food processing industries, the agri-food sectors are particularly well represented. There are five factors of production (three types of labor distinguished by skill level, one type of capital and one type of land), six household types (distinguished by rural/urban, agricultural/non-agricultural, wage/self-employed), and one account each for enterprises, government, investment/savings and rest-of-world. The rest-of-world account is a purely non-trade-related account that keeps track of financial transfers between Vietnamese institutions (households, enterprises, government, etc.) and the rest of the world. This is because imports and exports of goods and services are distinguished by trading partner in these SAMs – more specifically, 94 partner countries are identified. This too is a special feature of the SAMs documented here since almost all other national SAMs track external trade by commodity only and not also by trading partner.

In 1986 Vietnam embarked on the difficult transition process from being a centrally-planned to a market-based economy when the Communist Party Congress declared the beginning of a comprehensive reform program known under the name of *doi moi* ('renovation'). Since then the country has strongly increased its participation in international trade and has initiated both domestic and trade policy reforms. Consequently there has been an increasing interest in analyzing the economic implications of these dramatic changes. This has often been done using CGE models and multiplier analyses, thereby requiring the construction of social accounting matrices as the core database. Most other existing SAMs for Vietnam describe the economy as it was in 1995, but more importantly, they are more aggregate in their sectoral coverage, and they often have a different focus than the ones described here.

For example, the SAM used in the analysis of Chan et al. (1999) has 1995 as its base year and only nine producing sectors. On the other hand, due to its focus on tax reform and hence incidence, that SAM distinguishes between five different household types. Similarly, the Dessus et al. (2000) SAM is for 1989 and has 50 sectors, but is supplemented by an emissions data base since the focus of the subsequent model analysis has been on environmental issues. Another example of a SAM with a slightly different focus is the regional SAM for the Central Region of Vietnam that was prepared by Bautista (2000) for a multiplier analysis. Other examples of national SAMs for Vietnam include the UNIDO (1997) study that combined information from input-output tables from 1989 and 1995 to create a 1995 SAM with 40 sectors, while the Ezaki and Son

(1997) study uses a five-sector 1995 SAM. Yet other applications of the 1995 input-output table include a supply-side model developed by Omori and a CGE model constructed by ESCAP in collaboration with CIEM (CIEM 1998). Others have used the multi-regional Global Trade Analysis Project (GTAP) database for analyses of Vietnam's accession to both regional and bilateral trade agreements, e.g. Fukase and Martin (1999a,b) and Ianchovichina et al. (2000).

As mentioned above, the construction of the SAMs documented here uses the official input-output table for 1996 and the 1997/98 Vietnam Living Standards Survey. As far as the author is aware, there are no published applications of the 1996 input-output table at the time of writing. Hence, there are three aspects in which the SAMs documented here differentiate themselves from other SAMs for Vietnam:

- (a) The most recent input-output table (1996) and the most recent living standards survey (1997/98) are used.
- (b) The input-output table is used in its fully disaggregated version implying a very high level of sectoral detail.
- (c) Imports and exports of goods and services have been identified by trading partner; more specifically, ninety-four partner countries are identified.

The availability of macroeconomic indicators and other aggregates necessary for assembling a macro-SAM has allowed the author to update the micro-SAM to 1997 using the disaggregation strategy applied to the 1996 macro-SAM. The necessary macro data are also available for 1998. However, when using a SAM for CGE analysis, for example, the question arises as to which is the appropriate choice of base year for the model. Although it may be argued that Vietnam has not been as adversely affected by the Asian crisis as many of its neighbors – it avoided serious balance-of-payment, fiscal and banking crises experienced elsewhere in the region – the outbreak of the crisis in 1998 can to some extent be traced in certain macroeconomic indicators. The growth rate in aggregate exports, for example, was substantially lower in 1998 as compared with the two previous years. Hence this may well be an indication that 1998 is in some sense a 'disequilibrium year'. Therefore, it seems sensible to use either the 1996 or the 1997 SAM for economic policy analysis.

When constructing social accounting matrices there are recurring problems of

data unavailability and inconsistencies – not least when dealing with developing country data sources. This is also the case for Vietnam. The construction process documented here has highlighted several data problems. For example, although the high level of sectoral detail in the 1996 input-output table is clearly a desirable property, parts of the table are problematic due to ‘abnormal’ input-output relations. Hence part of the data compilation effort and some of the data adjustments and disaggregations have been based on ‘common sense’ judgments and prudent assumptions. Furthermore, the chosen disaggregation strategy (which parts of the macro-SAM and to what degree of detail) clearly reflects the intended use of the database, but also the data limitations.

The structure of this paper follows the three steps in the SAM construction process described above. Section 2 starts by describing the assembly of the macro-SAM. Each cell entry of the macro-SAM is documented with reference being made to the data sources used. Section 3.a. describes the process of constructing the preliminary micro-SAM based on raw data from the living standards survey, various industry surveys, etc. Given the inherent data inconsistencies and the required assumptions, this ‘raw’ micro-SAM is unbalanced, and hence Section 3.b. describes the cross-entropy approach used to obtain a balanced VIETSAM. Section 3.c. briefly presents the macro data for 1997 and the method used to update VIETSAM from 1996 to 1997. Section 4 summarizes important structural characteristics of the Vietnamese economy from the perspective of the 1997 VIETSAM. Given the key role of agricultural production in the Vietnamese economy, Section 5 illustrates the influence of this sector’s activities on the rest of the economy (‘the agro-industrial complex’) by using an input-output model based on the 1997 SAM data. As is evident from the brief description of data inconsistencies and insufficiencies, it is clear that the construction of social accounting matrices is not an exact science, and it is indeed an ongoing process. Hence the final section provides some concluding remarks as to possible directions in which the social accounting matrix could be developed further.

2. VIETMAC: A macroeconomic social accounting matrix

A social accounting matrix provides a comprehensive and consistent description of the transactions taking place in an economy in a given year – between

production sectors, factors, households, government institutions and the rest of the world. Each transactor or macro account in the SAM is represented by a column and a row, with columns tracking expenditures and rows tracking incomes. SAMs follow the principles of double-entry accounting. This has two implications: (1) any purchase, expenditure or financial outlay by one account is a sale, income or financial inflow to one or more other accounts, and (2) for each account total income must be equal to total expenditure.

The structure of the Vietnam macro SAM can be briefly described by going through Table 1, which contains verbal explanations of the numerical entries.¹ The SAM structure shown in the table is fairly standard and represents the entries of the numerical macro-SAM for Vietnam with the exception that, for the sake of simplicity, the government account is shown receiving tax payments directly. In the numerical MACVIET, taxes are paid to six separate tax accounts, each of which forwards its revenue to the core government account. Following through the accounts in Table 1, one sees that the production activities account purchases intermediate inputs from the commodities account and the services of factors from the factor account². Furthermore, producers must pay activity and turnover taxes to the government. The output of these production activities is sold to either the domestic market (for intermediate input use, final private or government consumption, and investment purposes) or to foreign markets in the form of exports – both of which are tracked by the commodity account. This account also keeps track of the imports of goods and services entering the country. The primary factors of production – labor, capital and land – earn income earned by supplying services to the production activities. This income is then distributed to households in the form of labor earnings, and to enterprises as capital income. Enterprises save part of their income for investment purposes, some earnings are retained and distributed to households, and profits taxes and other transfers are paid to the government. Incomes received by households are spent on purchasing final goods and services, paying income

¹ For a more detailed discussion of the general structure of social accounting matrices, see e.g. Pyatt and Round (1985) and Reinert and Roland-Holst (1997).

² The distinction between activities and commodities is not a standard feature of all social accounting matrices. It can, however, prove very useful in many circumstances because it allows for two interesting situations:

- (a) One production activity produces several commodities, e.g. dairy production results in at least two outputs, such as milk and cheese.
- (b) Several production activities contribute to the delivery of one commodity. For example, in a SAM where production activities are distinguished by where in the country they take place, several regional activities (e.g. maize production in the highlands and maize production in the lowlands) may result in the production of one commodity (maize).

taxes, saving and transferring resources abroad. The receipts of the government consist of income taxes paid by households, profits taxes paid by enterprises, indirect tax revenue (activity taxes, commodity sales taxes, turnover taxes, import tariffs and export duties), and aid transfers from the rest of the world. The savings/investment account is where the savings of households, enterprises and the government are placed. This account also records the current account deficit (foreign savings) of the country. These savings are used for investment purposes in the various production sectors. The rest-of-world account documents transactions between Vietnam and the rest of the world. This concerns mainly imports and exports of commodities, but also financial transfers between Vietnamese institutions and foreign private and government entities.

TABLE 1. Contents of the macroeconomic social accounting matrix for Vietnam (VIETMAC)

	Activities	Commodities	Factors	Households	Enterprises	Government	Savings – investment	Rest of world	Total
Activities	Sales								Gross output
Commodities	Intermediate inputs			Final private consumption		Final government consumption	Investment expenditure	Exports	Demand
Factors	Value added								Factor income
Households			Factor income		Distributed profits, social security and other transfers	Transfers		Foreign transfers	Household income
Enterprises			Factor income			Interest payments		Foreign transfers	Enterprise income
Government	Activity taxes, Turnover taxes	Sales taxes, Import tariffs, Export duties	Factor taxes	Income tax	Profits taxes and transfers			Foreign grants	Government revenue
Savings – investment				Household saving	Enterprise saving	Government saving		Foreign saving	Savings
Rest of world	Imports			Transfers to ROW					Foreign exchange outflow
Total	Cost of production	Supply	Factor expenditure	Household expenditure	Enterprise expenditure	Government expenditure	Investment	Foreign exchange inflow	

Most of the aggregate macro transactions in an economy are quantified in a country's national accounts statistics. The sources used for compiling the macro data to be used for constructing the Vietnam macro-SAM include the CIEM (2000) publication presenting the Vietnamese national accounting framework, the GSO (1999a) input-output publication, which contains a national accounts section for 1996, and the statistical appendices of the IMF (1999, 2000) and World Bank (1999) publications. In particular, the latter is the source used for government revenue data. Information on aggregate intermediate demand and factor payments for 1996 is provided in the GSO (1999a) input-output publication. Apart from the latter items, the various data sources have been compared for consistency, and adjustments have been made where appropriate. Drawing on these different data sources, Table 2 provides a recompilation in the form of various income-and-expenditure balance sheets for 1996. As is evident in Table 3, several of these aggregates enter the macro-SAM directly. E.g. GDP at factor costs, final private and government consumption, gross capital formation, exports, imports, and foreign savings are reported in the macro-SAM as they appear in the balance sheet.

To put the macro data into perspective (before indulging in the documentation of the macro SAM cell entries), it may be noted that, with a population of around 25 billion people, the national GDP figure of 272,037 billion Dong reported in the balance sheet (Table 2) for 1996 translates into 336 *U.S. Dollars per capita*, thereby placing Vietnam in the group of low income developing countries. The Vietnamese economy has been growing very rapidly up until the mid-1990s with an average annual growth rate for real GDP at 9% over the years 1995-1997. Inflation rates have been kept at manageable levels (17% in 1995, but only 6% in 1996 and 3% in 1997), and the government budget deficit is negligible (less than 2% of GDP over the period 1995-97) (IMF 2000).

TABLE 2. Vietnam National Accounts balance sheet for 1996 (billions of Dong)

Gross Domestic Product	Income		Expenditure	
Value-added at factor costs	237,613	Private final consumption	202,703	
Indirect taxes	34,424	Government final consumption	22,722	
		Gross fixed capital formation plus changes in stocks	76,450	
		Exports of goods and services	111,177	
		Less: Imports of goods and services	-141,015	
Total (GDP m.p.)	272,037	Total (GDP m.p.)	272,037	
<hr/>				
National Disposable Income	Income		Expenditure	
Value-added at factor costs	237,613	Private final consumption	202,703	
Indirect taxes	34,424	Government final consumption	22,722	
Net factor income from abroad	-1,474	Domestic savings	70,451	
Net current transfers from abroad	25,313			
Total	295,876	Total	295,876	
<hr/>				
Capital accounts	Income		Expenditure	
Domestic savings	70,451	Gross fixed capital formation plus changes in stocks	76,450	
Foreign saving	5,999			
Total	76,450	Total	76,450	
<hr/>				
Rest of world	Income		Expenditure	
Imports of goods and services	141,015	Exports of goods and services	111,177	
Net factor income from abroad	1,474	Foreign saving	5,999	
Net current transfers from abroad	-25,313			
Total	117,176	Total	117,176	

TABLE 3. VIETMAC 1996 Macroeconomic social accounting matrix for Vietnam (in billions of Dong)

	Activities	Com- modities	Factors	House- holds	Enter- prises	Income taxes	Import tariffs	Export duties	Turnover taxes	Activity taxes	Sales taxes	Govern- ment	Savings – invest- ment	Rest of world	Total
Activities		581,512													581,512
Commodities	331,557			202,703								22,722	76,450	111,177	744,609
Factors	237,613														237,613
Households			175,153		844							28,125		11,576	215,698
Enterprises			57,494									1,500		12,194	71,188
Income taxes			4,966	1,354	20,266										26,586
Import tariffs		9,322													9,322
Export duties		5,783													5,783
Turnover taxes	10,062														10,062
Activity taxes	2,280														2,280
Sales taxes		6,977													6,977
Government						26,586	9,322	5,783	10,062	2,280	6,977			1,543	62,553
Savings – investment				10,167	50,078							10,206		5,999	76,450
Rest of world		141,015		1,474											142,489
Total	581,512	744,609	237,613	215,698	71,188	26,586	9,322	5,783	10,062	2,280	6,977	62,553	76,450	142,489	

Cell entries for the macro-SAM

The following describes the macro-SAM entries as shown in Table 3 and identifies their sources. The cell entries are referenced by their ('row', 'column') placement. I.e. intermediate inputs are in the ('commodities', 'activities') cell. All entries are in billions of Dong. The main strategy in compiling the macro-SAM has been to use all available and consistent national accounts data from the GSO (1999a) and CIEM (2000) publications, and to use the government revenue information from the World Bank (1999) publication. Cell entries for which consistent/reliable data are not available have been left to balance relevant accounts at the end of the compilation procedure.

GDP at market prices (from the expenditure side) and GNP:

- 1. Final private consumption [commodities, households]:** 202,703. Final private consumption as recorded in the national accounts data is adjusted by adding a statistical discrepancy of 194, i.e. $202,509 + 194 = 202,703$. The statistical discrepancy of 194 is due to an adjustment in GDP calculations. It is the difference between production-based estimates of GDP (which are considered to be more accurate, CIEM 2000) and expenditure-based estimates. In the national accounts data presented in the input-output publication of the General Statistics Office (GSO 1999), the figure is added to 'Compensation to labor', which is the procedure adopted in the 'Value-added to factors' cell. Since the discrepancy was added to labor income, it seems reasonable to add it to private final consumption here. *Source:* GSO (1999a) Table II and p. 287.
- 2. Final government consumption [commodities, government]:** 22,722. *Source:* GSO (1999a) Table II. p. 158.
- 3. Exports [commodities, rest of world]:** 111,177. *Source:* GSO (1999a) Table II. p. 158 and p. 218.
- 4. Gross capital formation [commodities, savings and investment]:** 76,450. Gross fixed capital formation (66,602) + changes in stocks (9,848). *Source:* GSO (1999a) Table II. p. 158.
- 5. Imports of goods and services [rest of world, commodities]:** 141,015. Total imports of goods and services, excluding import tariffs: $150,337 - 9,322 = 141,015$. *Source:* GSO (1999a) Tables I and III. pp. 98 and 218.

Gross domestic product (GDP) calculated from these entries is consistent with the national accounts data in both the GSO (1999a) and the CIEM (2000) publications:

Private consumption + government consumption + investment + exports – imports
 $202,703 + 22,722 + 76,450 + 111,177 - 141,015 = 272,037$

6. Net factor income sent abroad [factors, rest of world]: $1,474 = 3,100 - 1,626$.
Source: CIEM (2000) Table I.8.

Gross national product is thus calculated as:

$GNP = GDP + \text{net factor income from abroad} = 272,037 + (1,626 - 3,100) = 270,563$

Intermediate demand and product sales

7. Intermediate demand [commodities, activities]: 331,557. Total intermediate demand (at purchaser values, i.e. including imported intermediate inputs, tariffs and marketing margins). *Source:* GSO (1999a) Table I. p. 94.

8. Product sales [activities, commodities]: Total value of sales, which is equal to the sum of costs in the activities account.

Value-added (GDP at factor costs)

9. Value-added to factors [factors, activities]: $232,647 = 175,152 + 57,495 + 4,966$. Compensation of employees + statistical discrepancy (c.f. point 1 above) ($174,958 + 194 = 175,152$) + Consumption of fixed capital + operating surplus: ($29,124 + 28,371 = 57,495$) + Value of factor tax payments (4,966). *Source:* GSO (1999a) National Accounts p. 287.

Total value-added to factors is adjusted upward by the value of total factor taxes for the following reason: In the input-output publication (GSO 1999), which is the primary source for this part of the SAM, the applied definition of indirect ('production') taxes includes taxes that in a SAM context would be classified as factor taxes (i.e. land taxes, natural resource taxes and capital use charges) (See also CIEM (2000) for this terminology). Tax revenue from these items is therefore deducted from the calculation of indirect tax revenues. In order to retain the equality between calculating GDP at market prices as the sum of total value-added plus indirect taxes on the one hand, and calculating GDP at market prices from the expenditure side (i.e. "C + G + I + X - M") on the other, value-added to factors is increased by this amount.

- 10. Labor payments [household, factors]:** 175,152. Compensation of employees.
- 11. Capital payments [enterprises, factors]:** 57,495. Non-labor value-added.
- 12. Direct factor taxes [income taxes, factors]:** 4,966. Sum of land taxes (380), natural resource taxes (3,081) and capital use charges (1,505). *Source: World Bank (1999). Table 5.2A.*

Recurrent government revenue

- 13. Income tax [income taxes, households]:** 1,354. Personal income tax. *Source: World Bank (1999). Table 5.2A.*
- 14. Enterprise taxes and transfers [income taxes, enterprises]:** 20,266. Profits tax on State-Owned Enterprises (SOEs) (7,761) + Profits tax on Non-SOEs (1,850) + Joint venture revenue (2,992) + other revenue (6,856) + transfers from SOEs (807) = 20,266. *Source: World Bank (1999). Table 5.2A.*
- 15. Turnover taxes [turnover taxes, activities]:** 10,062. Turnover tax on SOEs (7,450) + Turnover tax on non-SOEs (2,612) *Source: World Bank (1999). Table 5.2A.*
- 16. Activity taxes [activity taxes, activities]:** 2,280. License taxes SOE (10) + License taxes non-SOE (258), Agriculture taxes non-SOE (1,902), Slaughter taxes non-SOE (110). *Source: World Bank (1999). Table 5.2A.*
- 17. Import tariffs [import tariffs, commodities]:** 9,322. The *World Bank (1999) Table 5.2A* provides the value of the sum of export and import duties, which is 15,105. The GSO (1999a) p.218 provides a figure for total import tariffs and total export duties separately, but they add up to 17,625. The import duty figure of 9,322 applied in the GSO (1999a) publication is used, and the export tax figure is adjusted downward so that the sum is equal to that of the *World Bank* publication. No other data sources on import tariff revenue are available at the time of writing.
- 18. Export duties [export duties, commodities]:** 5,783. Adjusted down from the figure reported in GSO (1999a) p.218 so as to agree with the total value of export and import duties in the *World Bank* publication, as described above.
- 19. Commodity sales taxes [sales taxes, commodities]:** 6,977. Special consumption tax (excise) SOE (3,200) + and other taxes SOE (2,073) + other taxes non-SOE (1,539) + adjustment to equalize total indirect taxes from two sources, see comment below (165) = 30,068. *Source: World Bank (1999). Table 5.2A.*
- 20. Grants [government, rest of world]:** 1,543. *Source: World Bank (1999). Table 5.2A.*

Adding up the World Bank data yields total government recurrent revenue equal to 62,388, which in turn is obtained from the Ministry of Finance. According to the GSO (1999a) publication indirect taxes (which is the figure recorded under ‘production taxes’ in the input-output publication and therefore includes what is defined here as factor taxes, as discussed in point 9 above concerning the Vietnamese terminology) should sum to 39,390 to be in accordance with calculating GDP at market prices as the value of GDP at factor costs plus net indirect taxes. The indirect taxes plus factor taxes in the SAM, based on the World Bank government budget data, add up to 39,225. The discrepancy is 165. Because this discrepancy amounts to just 0.4% of the total value of indirect taxes, it is added to the commodity sales taxes cell (see point 19 above) so that the two totals are equal, i.e. 39,390.

All the tax revenue collected in the individual tax accounts is passed on to the core government account in the relevant [government, * taxes] cells.

Other government expenditure

- 21. Transfers to households [households, government]:** 28,125. *Source:* CIEM (2000) Table AI.2
- 22. Interest payments on state debt to domestic lenders [enterprises, government]:** 1,500 (IMF Table 19). According to the CIEM (2000) publication, there are apparently no current transfers from the state to enterprises, but there are interest payments to domestic lenders according to the IMF tables.

Other non-factor household income and household saving

- 23. Net transfers to households [households, enterprises]:** 844 = Transfers 1,132 + distributed profits (-288). *Source:* CIEM (2000) Table A.1.3.
- 24. Transfers from ROW to households [households, ROW]:** 11,576. *Source:* CIEM (2000) Table A.1.2.
- 25. Household saving [S-I, households]:** Residual balancing the household account

Transfers to enterprises

- 26. Transfers from ROW to enterprises [enterprises, ROW]:** 12,194. *Source:* CIEM (2000) Table A.1.4.

Enterprise and government saving, and the current account balance

- 27. Enterprise savings [S-I, enterprises]:** Balances the enterprise account.

28. Net capital inflow [S-I, ROW]: Balances the ROW account (this residual ends up equalling the foreign savings recorded in CIEM (2000) Table A.1.5 precisely, namely 5,999)

29. Government saving [saving & investment, government]: Balances the government account, i.e. total current revenue (incl. grants) minus final govt. consumption, transfers to households and interest payments on state debt

Balancing the macro-SAM:

These entries leave the macro-SAM with only a very minor imbalance equal to 0.219 billion Dong between the 'savings-investment' and 'commodity' accounts. In order to minimize adjustments this discrepancy is added to the ('commodities', 'savings-investment') cell, after which MACVIET is balanced.

3. VIETSAM: A disaggregated social accounting matrix for 1996

a. Building the raw VIETSAM

The macro-SAM provides the basis from which a disaggregated micro-SAM may be developed. In order to add more detail to the SAM, several of the cells in the macro-SAM are disaggregated by using data and information obtained from input-output tables, household surveys and other economic surveys. Each of the non-zero cells in the macro-SAM serve as a control total for the disaggregated vectors or matrices in the micro-SAM. The level of disaggregation for each of the main macro accounts depends on two things. First, the purpose of the subsequent analyses using the SAM, and second, the availability of data. The purpose of constructing the SAM will also dictate the focus of the micro-SAM disaggregation strategy. For example, apart from wanting to have as disaggregated and agriculture-focused a sectoral representation as possible, the strategy chosen here has been particularly focused on obtaining a rich representation of Vietnam's trade pattern by partner country. In terms of the issue of data availability, the original plan was to disaggregate the enterprise account into state-owned, private, and foreign-invested enterprises. However, the data currently available are inadequate to make such a split without having to make unreasonable assumptions. Hence, data availability problems clearly limit the extent to which the SAM can be disaggregated.

To begin with, as much disaggregated data is read in directly from the GSO (1999a) input-output tables as possible. This is done for the following cells, which then become matrices or vectors:

Disaggregation of the activity and commodity accounts

- 1. Intermediate demand [commodities, activities]:** The intermediate demand cell in the macro-SAM is disaggregated into a 97 x 97 matrix in accordance with the 1996 input-output table available for Vietnam. Ten of these 97 sectors/commodities are agricultural, forestry and fishery sectors, two are agricultural service sectors, and thirteen are processed food and beverage sectors. The commodity flows are in purchaser values (i.e. including trade and transportation mark-ups, and for imported intermediates the values include tariffs).

It is indeed desirable to have an input-output table characterised by such a high level of sectoral disaggregation. However, when taking a closer look at the input-output matrix, there are a few small negative entries, but more worrying is that several en-

tries seem abnormal. For example, according to the GSO (1999a) input-output data, processed fruits and vegetables are used in paddy rice production, and non-alcoholic beverages are used as intermediate inputs in the fisheries sector. Clearly, these input-output relations seem abnormal and it is counter-intuitive that processed foods are used as inputs in primary agricultural and fisheries production.

The first reaction to these nonsensical input-output relations is to compare them with other databases for Vietnam. As mentioned earlier, there are no other published applications of the 1996 input-output table, and so such a comparison cannot be made. The next possible comparison to be made is with the Vietnam part of the Global Trade Analysis Project (GTAP) database. Yu (2001) has conducted an exploratory and systematic search for abnormal flows in this immense database for all included countries and regions. Discouragingly, the Vietnamese input-output flows seemingly stick out like a sore thumb in this analysis. According to Yu (2001), the Vietnamese input-output table in the GTAP database seems to be the worst one, in the sense that there are several abnormal input-output relations such as fish in construction, and paddy rice in wearing apparel, and furthermore, these entries are not small numbers.

For this reason, the GSO (1999a) input-output table was not used in its raw form. First of all, it was ‘cleaned’ of the most nonsensical input-output entries such as the ones mentioned above.³ This of course meant that the rows and columns no longer added up to their original values. Hence, the second step was to re-adjust the individual cell entries whilst retaining the original column and row totals for each individual sector. This was done using an adjusted version of the so-called RAS approach to balancing such matrices. Using the original transactions matrix as a prior, this procedure produces a new transactions matrix that is consistent with the given row and column sums. Essentially, the RAS procedure interactively adjusts the row and column entries proportionately until the specified totals are obtained.

- 2. Final private consumption [commodities, households]:** The split of final private consumption across commodities. Note that the sum of the individual entries from the GSO (1999a) input-output table yields a slightly larger number than the aggre-

³ According to the 1996 input-output table all the primary agricultural sectors use air transportation rather extensively in their production. This amounts to no less than 14.4% of total production costs in the case of coffee beans but is 5% or less in the other sectors. At present these entries are not adjusted given that there are examples of air transportation being used in agriculture in other developing countries either for spraying fields with chemical treatments or for transporting harvested crops where roads and other means of transportation are not available. Whether this is the case in Vietnam is still to be investigated.

gate private consumption number provided by GSO (1999a) and the IMF (1999). The individual entries are brought in unadjusted and the discrepancies are left for the final entropy balancing procedure described below to tackle.

3. **Final government consumption [commodities, government]:** The commodity-disaggregated values for government consumption are also brought in directly from the GSO (1999a) input-output table.
4. **Gross capital formation [commodities, savings and investment]:** The values of commodity-specific investments are available in the GSO (1999a) input-output table. Since these figures are the sum of gross fixed capital formation plus changes in stocks, there are six sectors with negative entries. These are processed vegetable and animal oils and fats, processed and preserved fruits and vegetables, processed coffee, processed tea, ceramics & by-products, and products of leather tanneries
5. **Exports [commodities, rest of world]:** The values of commodity-specific exports are also available in the GSO (1999a) input-output table. It should be noted that according to the input-output table there is no domestic gasoline production in Vietnam. Nevertheless, the table reports exports of the product. Hence there seems to be an incidence of re-exports, which will prove problematic in the subsequent modeling framework. Therefore, for this commodity, this is dealt with in the raw micro-SAM by eliminating the recorded gasoline exports and adjusting the imports of gasoline downward by the same amount. This adjustment naturally means that the resulting trade aggregates will not be precisely equal to the aggregates recorded in VIET-MAC.
6. **Imports of goods and services [rest of world, commodities]:** Import values in the GSO IO tables include import tariffs and there is no information about tariff revenue collected by commodity. Hence commodity-specific import tariff revenue has to be separated out and this is done according to the latest available tariff rate schedule (1999) as will be described below in connection with the split of commodity-specific imports by source country.
7. **Value-added to labor [labor, activities]:** In the first round, the factor payments by activity are disaggregated into aggregate labor and capital according to the information provided in the GSO (1999a) input-output table. In a later step the labor account will be disaggregated further.
8. **Value-added to capital [capital, activities]:** Value-added to capital is disaggregated by sectors according to the information provided in the GSO (1999a) input-output table.
9. **Value-added to land [land, activities]:** The GSO input-output table provides data

for value-added paid out to labor and capital but does not separate out payments to land. At the time of writing there is no information available about value-added to land. Private households do not freely own land in Vietnam, yet as of 1997 the Vietnamese Land Law has provided more than 50% of households with longer-term land use rights, incl. the right to transfer and lease agricultural land among farmers. Given the lack of information on the overall size of land value-added, it has been assumed that 40% of value-added generated in the land-using sectors, i.e. paddy rice, rubber, coffee, sugar, other crops, forestry and fisheries, accrues to land. The use of land in the fisheries sector is for aqua-culture. The assumed share of 40% is similar in magnitude to that of other developing countries. The split of this land value-added across the seven land-using sectors is based on information about the number of hectares dedicated to sown crops, productive forest, and fish culture (GSO 1999b) and the selling price of land distinguished by use, i.e. annual crops, perennial crops, water surface and forestry (GSO 2000). The value-added payments to labor and capital are then adjusted so that (a) the initial capital/labor ratio within each sector is retained and (b) the relative size of total value-added payments in total costs is retained for each sector. Using this land information meant that the land payments in the rubber sector exceeded the initial total value-added. In order to retain the size of the rubber sector and the initial level of value-added payments in this sector, the land payments in rubber were reduced. This was done by using the land-labor-capital ratios applicable in the rubber sector of a 1990 SAM for Indonesia (Robinson et al. 1997).

- 10. Land payments [household, land]:** In the first step all land returns are assumed to go to households.
- 11. Factor taxes [income taxes, factors]:** Land taxes are of course paid by the newly created land account, while the capital account pays the natural resource taxes and the capital use charges. With reference to the adjustments made in the macro-SAM to take account of the different definitions of ‘indirect taxes’, the necessary adjustments are made in the [factors, activities] matrix of the micro-SAM.
- 12. Turnover taxes [turnover taxes, activities]:** As mentioned above, the GSO (1999a) input-output table has information on ‘production tax’ payments by sector. The turnover tax is split across activities according to these shares.
- 13. Activity taxes [activity taxes, activities]:** The activity taxes consist of agricultural taxes, slaughter taxes and license taxes. Hence the processed meat sector pays the slaughter tax, the primary agricultural sectors pay the agricultural taxes, while the non-agricultural sectors are assumed to pay the license taxes.
- 14. Commodity sales taxes [sales taxes, commodities]:** The commodity sales taxes are

assumed to be paid according to each sector's share in 'production tax' payments as recorded in the GSO input-output table.

15. Export duties [export duties, commodities]: Export duties are imposed on a range of primary products and raw materials including rubber, coffee, seafood and wood products. The rates of export duties vary significantly across these commodities and average rates adopted from information provided in CIE (1998) have been used to split export duty revenue across commodities.

Disaggregation of labor categories

Three labor categories are identified:

1. LABUNSK: Unskilled labor (no education and primary education)
2. LABSMSK: Semi-skilled labor (secondary education and vocational training)
3. LABHGSK: Highly skilled labor (university degree)

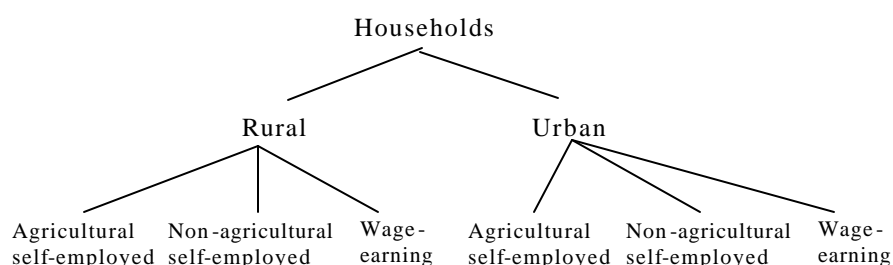
The data used for this disaggregation are from the economic surveys (GSO 1998) and the 1997/98 Vietnamese Living Standards Survey (VLSS) (GSO 2000). The split of labor payments between the three categories is based on information about the number of workers by each skill category in broadly defined occupation categories (GSO 1998) and the average monthly wage plus compensation for each skill category (GSO 2000). These splits within the broadly defined occupations/sectors are then assumed to apply in similar, more disaggregated sectors of the 97-sector IO table. E.g. all eight disaggregated agricultural sectors are assumed to have the same split between labor categories as the more aggregated agriculture sector according to the VLSS data. This is of course a simplification of reality, and hopefully access to more detailed level will allow a better representation at a later point in time. The data applied shows that the split by number of persons employed by skill level is 87–11–2. In terms of earnings (value-added to labor) this amounts to a split of 83–13–4. The split in the agricultural sectors is 93.7–6.1–0.2 while the split in non-agriculture is 52.5–31.2–16.4. The average monthly wage plus compensation levels for each skill category are Dong thou. 571–719–1128. I.e. semi-skilled labor earns 1.3 times that of unskilled labor and the highly skilled earned 2.0 times that of unskilled labor.

Disaggregation of household categories

Six different household categories are distinguished, three of which are rural and three are urban:

1. HHRAGS: rural agricultural self-employed households
2. HHRNAS: rural non- agricultural self-employed households
3. HHRWAG: rural wage earning households
4. HHUAGS: urban agricultural self-employed households
5. HHUNAS: urban non- agricultural self-employed households
6. HHUWAG: urban wage-earning households

The diagram below illustrates the disaggregation approach.



The Vietnam Living Standards Survey (VLSS) for 1997/98 is based on a sample of 6000 households selected throughout the country. The rural/urban stratification corresponds to the 1997-1998 classification of urban areas as defined by the GSO (2000). This results in an estimated 77.6% of the population living in rural areas and 22.4% living in urban areas. The household questionnaire covered a broad range of topics including education, health, employment, migration, housing, agricultural production, non-farm economic activities, food and non-food expenditures, income, savings, etc. The distinction between self-employed and wage-earning households is seemingly important in Vietnam given the focus of the VLSS survey. As illustrated in the diagram, a distinction has been introduced between agricultural self-employed, non-agricultural self-employed and wage-earning households within each broad group of households, i.e. rural and urban. In the VLSS, agriculture is a broadly defined concept including aquaculture and forestry and so income from agricultural activities include income from crop cultivation, livestock breeding, aquaculture, and other related activities such as the processing of farm products made by the household itself. Income from selling land use rights are not included. In the VLSS approach, income from

non-agricultural activities was calculated as net income plus household consumption related to these activities during the period in which the household was involved herein. Wage income includes income from wages, salaries, bonuses, and various types of allowances related to work paid in cash and kind.

- 16. Labor payments [households, labor]:** Labor payments in the different skill categories have to be distributed among the different types of household. The distribution of labor income by skill category has been obtained by using the following information: the rural/urban split of the working population by skill category, and the shares of employed persons in farm self-employment, non-farm self-employment and wage employment by rural/urban categories. All this information was obtained from the 1997/98 VLSS data. It may be noted that the VLSS statistics assume a 78.8–21.2 rural–urban split for all labor categories.
- 17. Land payments [household, land]:** Land payments are distributed among households that are engaged in agricultural self-employment, i.e. HHRAGS and HHUAGS. The split is determined by the share of each household type in their combined labor income.
- 18. Transfers from enterprises [households, enterprises]:** Since transfers from enterprises to households include not only distributed profits, but also transfers such as welfare allowances, bonuses, etc. (CIEM 2000), this transfer is made to all households. The amount is distributed according to the shares of each household in total wage income.
- 19. Government transfers to households [household, government]:** In the micro-SAM these transfers are distributed using information about the value of pensions, subsidies and scholarships received by rural and urban households (VLSS data). The calculated number of rural and urban households is used and the further split among households is done according to overall labor income shares.
- 20. Transfers from abroad [household, rest of world]:** For the micro-SAM this value is distributed among households according to information from the VLSS about the value of so-called ‘other income’ received by rural and urban households. As above the calculated number of rural and urban households is used and the further split among households is done according to overall labor income shares.
- 21. Household saving [saving and investment, household]:** This disaggregation is obtained using information about the average amount of savings in rural and urban households and the calculated number of households in rural and urban areas based on VLSS information. The further split among households is done according to

overall labor income shares.

- 22. Income tax [income taxes, households]:** At the time of writing there is no direct information on the income tax payments of different types of household. It is therefore assumed that personal income tax is paid in proportion to the labor income share of the individual household types. One might consider a different split if one wants to reflect difficulties associated with tax collection in rural areas.
- 23. Final private consumption [commodities, households]:** Consumption of each commodity is split across the six households using more aggregate information on the composition of consumption among people living in urban and rural areas. This split of aggregate private consumption of each commodity in the 97-sector GSO data is done as follows: First of all, the VLSS data provide information about the composition of consumption for people living in rural and urban areas. This is of course at a much more aggregated level (13 categories) than the 97 commodities in the GSO input-output tables. These structures are extrapolated to the disaggregated 97-commodity level by establishing a concordance between the two. The consumption pattern for the aggregate rural population is then taken to be the consumption pattern of the three rural households, whilst the resulting consumption pattern for the aggregate urban population is taken to be the consumption pattern of the urban households. By using information from the 1997/98 VLSS about average per capita expenditure levels by skill level, the expenditure shares of the six households can be derived. This is applied to the aggregate value of consumption to obtain a split of the total value of consumption across households. The patterns of consumption for each of the households are then used to obtain values of consumption for each of the households, which in turn are used to obtain the applied share of each household in total consumption of each commodity, e.g. the share of each household type in the total consumption rice.
- 24. Factor payments sent abroad [ROW, households]:** It is assumed that it is the urban households that send the factor payments abroad. The split across the three urban households is according to labor income shares.

Foreign trade matrices

As mentioned above, one of the main purposes of building these SAMs is to analyze trade issues. Therefore, the rest of world account has been disaggregated so as to allow for a very detailed tracking of Vietnam's trade flows by partner country. Ninety-six partner countries have been identified from COMTRADE bilateral trade data⁴. The COMTRADE trade data

⁴ Thanks are due to Mark Gehlhar at the USDA/ERS for kindly providing the necessary trade data.

available are at the HS 6-digit and SITC 4 and 6 levels for agricultural products, and at the SITC 4 and 5 digit levels for non-agricultural products. Concordance was established with the 73 goods identified in the input-output matrix (GSO 1999). It was decided to retain the by-commodity split of exports and imports as provided in the input-output table, and use the COMTRADE data to split trade across destinations and sources, respectively.

The COMTRADE data do not provide information about trade in services, yet trade in 22 of the 24 services in the input-output tables (GSO 1999) was registered. In order to split this data according to partner country, the preliminary version 5.2 of the GTAP database was used. A split across partners was made according to the shares identified in similar services in the GTAP database.

The imports reported in the GSO (1999a) input-output tables are tariff inclusive. The tariff revenue is extracted from the tariff-ridden by-commodity import values by using average tariff rates (calculated from a 1996/1997 tariff rate schedule at the HS 4-digit level obtained from the Ministry of Trade) and the commodity specific COMTRADE data. The tariff-exclusive import values are then spread across partners according to the shares calculated from the COMTRADE and GTAP data mentioned above.

In 1999 the structure of the Vietnamese tariff schedule was changed radically. A three-tier tariff schedule has been adopted consisting of (1) Normal tariffs, (2) Most-Favored Nation (MFN) tariffs, and (3) Preferential tariffs. ASEAN member states are given preferential access to the Vietnamese market. The MFN rates are valid for imports from the European Union, Japan, most Asian countries not in ASEAN, and the United States. The so-called normal rates, that are 50% higher than the MFN rates, apply to imports from all other countries. According to unofficial sources, the preferential aspect of the rates facing ASEAN countries is still more in principle than in practice. Through its membership of ASEAN, Vietnam has committed itself to gradually reducing its tariffs to between 0 and 5 % according by 2006 through the Common Effective Preferential Tariff (CEPT) scheme. As part of these commitments Vietnam has reduced its maximum tariff rates and reduced the number of tariff lines. However, up till now Vietnam has committed itself on products that already bear low or zero tariffs, and so there are not yet substantial differences between the CEPT and the MFN rates. At a later point in time, it may be interesting to estimate the impact of this change in tariff structure.

Cells directly from the macro-SAM

A number of the macro-SAM cell entries are not disaggregated further. Several of these are related to the enterprise account, which could not be disaggregated further based on the currently available data. The cells that remain as entered in MACVIET are: Enterprise savings [savings and investment, enterprises], Enterprise taxes and transfers [income taxes, enterprises], Domestic interest payments by government [enterprises, government], Capital payments [enterprises, capital], Transfers from ROW to enterprises [enterprises, ROW], Government saving [saving & investment, government], Foreign grants received by government [government, ROW], Foreign savings [savings and investment, ROW], and finally the six entries containing tax revenue being transferred from the six tax accounts to the core government account.

This disaggregation procedure has resulted in a very large micro-SAM; more specifically it is a 309 x 309 matrix (97 activities + 97 commodities + 5 factors + 6 households + 94 countries + 6 tax accounts + 4 'other institutional accounts'). Table 4 provides an overview of the accounts contained in the disaggregated micro-SAM.

TABLE 4. Accounts in VIETSAM

Activities	<p>APADDY Paddy ARWRUBBER Raw rubber ACOFFBEANS Coffee beans ASUGARCANE Sugarcane AOTHCROPS Other crops nec APORK Pig APOULTRY Poultry AOTHLVPLT Other livestock and poultry nec AIRRIGSRV Irrigation services AOTHAGSRV Other agricultural services AFORESTRY Forestry AFISHERY Fishery ACOAL Coal AURANIUM Uranium and thorium AMETORE Metallic ore AMINERAL Stone, other non-metallic minerals AOILNGAS Crude oils, nat.gas(exc.exploration) APRCMEAT Proc., preserved meat and by -prods APVAOIL Proc. veg. & animal oils and fats ADAIRY Milk, butter and other dairy prods. ACKECFOC Cakes,jams,candy,cocoa,choc.prodsP APERTVEG roc. & pres. fruits and vegetables ALCOHOL Alcohol, beer and liquors ANALDRNK Non-alcoholic water & soft drinks AREFSUGAR Sugar, refined APRCOFFEE Coffee, processed APRTEA Tea, processed ACIGTBCC Cigarettes and other tobacco prods. APRSEAFD Processed seafood and by -products AOTHFOOD Other food manufactures nec AGLASS Glass and glass products ACERAMIC Ceramics and by-products</p>	<p>APAPER Paper,pulp,paper prods.& byprod. APRWOOD Processed wood & wood products ACEMENT Cement ABRICKS Bricks, tiles ACONCRETE Concrete,mortar, cement prods. AOTHBLDMT Other building materials AORGCHEM Basic organic chemicals AINORGCHEM Basic inorganic chemicals AFERTILIZER Fertilizer APESTVETMED Pesticides & veterinary medicine AHEALTHMED Health medicine APRCRUBBER Processed rubber and by -products ASOAP Soap, detergent, perf., toiletries APLASTICS Plastic, incl. semi-plastic prods. AOTHPLAST Other plastic products APAINT Paint, ink, varnish, painting mat. AOTHCHEM Other chemical products AHLTHINST Health instruments and apparatus AOPT EQUIP Precise and optics equipment AMTRVEHICL Motor veh., motor bikes, bikes AHOMEAPPL Home appliances & spare parts AGENMACHIN General purpose machinery ASPCMACHIN Special purpose machinery AOTHTRANS Other transport means nec AELECMACHN Elec. machinery and equipment ATVMCHEQUI Mach.&equip. broadcasting,TV,IT ANFERMETAL Non-ferrous metals and products AFERMETAL Ferrous metals & prods ex.mach. AFBWEAVCLTH Fibers, thread & cloth weaving ARMCLOTHES Ready -made clothes, sheets ACARPETS Carpets AWEAVTEXT Weaving, textile embroidery</p>	<p>Paper,pulp,paper prods.& byprod. Processed wood & wood products Cement Bricks, tiles Concrete,mortar, cement prods. Other building materials Basic organic chemicals Basic inorganic chemicals Fertilizer Pesticides & veterinary medicine Health medicine Processed rubber and by -products Soap, detergent, perf., toiletries Plastic, incl. semi-plastic prods. Other plastic products Paint, ink, varnish, painting mat. Other chemical products Health instruments and apparatus Precise and optics equipment Motor veh., motor bikes, bikes Home appliances & spare parts General purpose machinery Special purpose machinery Other transport means nec Elec. machinery and equipment Mach.&equip. broadcasting,TV,IT Non-ferrous metals and products Ferrous metals & prods ex.mach. Fibers, thread & cloth weaving Ready -made clothes, sheets Carpets Weaving, textile embroidery</p>	<p>ALEATHTAN Products of leather tanneries ALEATHGDS Leather goods ANIMFEED Animal feeds APRNTACT Printing activities ex. publishing AOTHIND Prods of other indust. activities APUBLISH Newspapers, periodicals, books AOTHGDS Other physical goods nec AGASOLINE Gasoline ALUBRICNT Lubricants AELECTRCTY Electricity AGAS Gas AWATER Water ACONSTRCT Construction ATRADE Trade AREPAIRS Repairs of small prtprt means AHOTELRES Hotels and restaurants ALANDTRNS Land transportation services ARAILTRNS Railway transportation services AWATRTRNS Water transport services AIRTRNS Air transport services ACOMNCSRV Communication services ATOURISM Tourism ABNKCRDT Banking, credit, treasury, lotto AINSURNCE Insurance & retirement subsidy ASCITECH Science and technology ARLESTATE Real est., business, consultancy ASTATEMNG State manage.,defence.soc.sec. AEDUTRAIN Education and training AHLTHCARE Health care, social relief ACLTRSPORT Culture and sport APARTYASSOC Party organization, trade unions APERSCOMMSRV Personal & community services AHHLDSRV Household services</p>	<p>Products of leather tanneries Leather goods Animal feeds Printing activities ex. publishing Prods of other indust. activities Newspapers, periodicals, books Other physical goods nec Gasoline Lubricants Electricity Gas Water Construction Trade Repairs of small prtprt means Hotels and restaurants Land transportation services Railway transportation services Water transport services Air transport services Communication services Tourism Banking, credit, treasury, lotto Insurance & retirement subsidy Science and technology Real est., business, consultancy State manage.,defence.soc.sec. Education and training Health care, social relief Culture and sport Party organization, trade unions Personal & community services Household services</p>
Commodities	<p>CPADDY Paddy CRWRUBBER Raw rubber CCERAMIC Ceramics and by-products</p>	<p>CPAPER Paper,pulp,paper prods.& byprod. CPRWOOD Processed wood & wood products CWEAVTEXT Weaving, textile embroidery</p>	<p>Paper,pulp,paper prods.& byprod. Processed wood & wood products Weaving, textile embroidery</p>	<p>CLEATHTAN Products of leather tanneries CLEATHGDS Leather goods CHHLDSRV Household services</p>	<p>Products of leather tanneries Leather goods Household services</p>
Factors	<p>LABUNSK Unskilled labor LABMSK Semi-skilled labor LABHGSK Highly skilled labor CAP Capital LND Land</p>				
Households	<p>HHRAGS Rural agricultural self-employed household HHRNAS Rural non-agricultural self-employed household HHRWAG Rural wage-earning household HHUAGS Urban agricultural self-employed household HHUNAS Urban non-agricultural self-employed household HHUWAG Urban wage-earning household</p>				
Tax accounts	<p>YTAX Income taxes MTAX Import tariffs ETAX Export duties TTAX Turnover taxes ATAX Activity taxes CTAX Sales taxes</p>		Other 'institutions'	<p>ENT GOV S-I ROW</p>	<p>Enterprises Government Savings and investment Rest of world (non-trade related)</p>

Countries	BRN	Brunei	CHE	Switzerland / Lichtenstein	COL	Colombia
	KHM	Cambodia	CYP	Cyprus	CRI	Costa Rica
	IDN	Indonesia	TUR	Turkey	ECU	Ecuador
	LAO	Laos	ISL	Iceland	GRD	Grenada
	MYS	Malaysia	NOR	Norway	MEX	Mexico
	MMR	Myanmar	ISR	Israel	NIC	Nicaragua
	PHL	Philippines	ALB	Albania	PER	Peru
	SGP	Singapore	BGR	Bulgaria	PRY	Paraguay
	THA	Thailand	BLR	Belarus	SLV	El Salvador
	JPN	Japan	CZE	Czech Republic	URY	Uruguay
	TWN	Taiwan	EST	Estonia	VEN	Venezuela
	CHN	China	HRV	Croatia	DZA	Algeria
	HKG	Hong Kong	HUN	Hungary	EGY	Egypt
	KOR	Korea	KAZ	Kazakhstan	KEN	Kenya
	IND	India	LTU	Lithuania	MAR	Morocco
	BGD	Bangladesh	LVA	Latvia	MDG	Madagascar
	MAC	Macau	MDA	Moldova	MLT	Malta
	PAK	Pakistan	MKD	Macedonia	MUS	Mauritius
	AUT	Austria	POL	Poland	NGA	Nigeria
	BLX	Belgium / Luxembourg	ROM	Romania	TUN	Tunisia
	DEU	Germany	RUS	Russia	ZAF	South African Customs Union
	DNK	Denmark	SVK	Slovakia	ZWE	Zimbabwe
	ESP	Spain	SVN	Slovenia	KWT	Kuwait
	FRA	France	YUG	Yugoslavia	OMN	Oman
	FIN	Finland	AUS	Australia	SAU	Saudi Arabia
	GBR	United Kingdom	NZL	New Zealand	LCA	St Lucia
	GRE	Greece	USA	USA	TTO	Trinidad
	IRL	Ireland	CAN	Canada	BRB	Barbados
	ITA	Italy	ARG	Argentina	GRL	Greenland
	NLD	Netherlands	BOL	Bolivia	KAN	St Kittsnevis
	PRT	Portugal	BRA	Brazil		
	SWE	Sweden	CHL	Chile		

b. Balancing VIETSAM using the cross-entropy approach

As is evident from the description of the disaggregation strategy above, the data sources used in this process are both numerous, disagreeing and have often had to be supplemented by additional assumptions. Hence it is no surprise that the resulting micro-SAM is not balanced. The largest discrepancies are found in the household accounts due to the assumptions that have been necessary to spread the various incomes, transfers and expenditures of households.

There are several ways of balancing inconsistent social accounting or any other matrices. One approach is to use the RAS technique mentioned briefly above in connection with the intermediate input demand adjustments. This approach is typically used for updating SAMs for which new row and column sums are known. As discussed briefly above, the RAS technique produces a new transaction matrix that is consistent with the new row and column sums by interactively adjusting the row and column entries proportionately until the new totals are obtained. This approach has several drawbacks – particularly when dealing with social accounting matrices for developing countries. First of all, the RAS technique assumes that the initial SAM is consistent and that there is no measurement error in the row and column sums. Secondly, the only information imposed on the RAS procedure is the row and column sums. When dealing with social accounting matrices in general, and for developing countries in particular, the initial SAM will often not be consistent, there will typically be measurement errors, and there will certainly be some data entries that the analyst finds more

reliable than others. For these reasons, another approach is adopted for balancing the micro-SAM, namely the cross-entropy approach, which allows us to take these factors into account when balancing the SAM.

The cross-entropy method is an approach which originates from information theory (see e.g. Kapur and Kesavan 1992, and Golan et al. 1996) and has been applied to social accounting matrix estimation in e.g. Robinson et al. (1998) and Robinson and El-Said (2000). Only a concise presentation of the technique will be given here, and the reader is referred to the afore-mentioned references for further detail.

The entropy technique is a method of solving underdetermined estimation problems. The problem is underdetermined because, for an $n \times n$ matrix, we are seeking to identify n^2 unknown, non-negative parameters, i.e. the cells of the SAM. However, there are only $2n-1$ independent row and column adding-up restrictions. In other words, restrictions must be imposed on the estimation problem so that we have enough information to obtain a unique solution and to provide enough degrees of freedom. The underlying philosophy of entropy estimation is to use *all* and *only* the information available for the problem at hand: the estimation procedure should not ignore any available information nor should it add any false information.⁵

In the case of SAM estimation, ‘information’ may be the knowledge that there is measurement error concerning the variables, and that some parts of the SAM are known with more certainty than others. There may be a prior in the form a SAM from a previous year, whereby the entropy problem is to estimate a new set of coefficients ‘close’ to the prior using new information to update it. Furthermore, ‘information’ could consist of moment constraints on e.g. row and column sums, e.g. the average of the column sums. In addition to the row and column sums, ‘information’ may also consist of certain economic aggregates such as total value-added, aggregate consumption, investment, government consumption, exports and imports. Such information may be incorporated as linear adding-up restrictions on the relevant elements of the SAM. In addition to equality constraints such as these, information may also be incorporated in the form of inequality constraints placing bounds the mentioned macro aggregates. Finally, one may want to restrict cells that are zero in the prior to remain so also after the entropy balancing procedure.

⁵ See Shannon (1948) and Theil (1967) for a discussion of the concept of ‘information’.

Following Robinson et al. (2000) and Robinson and El-Said (2000), let the SAM be defined as a matrix T with elements $T_{i,j}$ representing a payment from the column account j to the row account i . As mentioned above, social accounting matrices are consistent accounting frameworks that do not allow leakages. In other words, every row sum (y_i) in the SAM must equal the corresponding column sum (y_j):

$$(1) \quad y_i = \sum_j T_{i,j} = \sum_j T_{j,i}$$

Dividing each cell entry in the matrix by its respective column total generates a matrix of column coefficients A :

$$(2) \quad A_{i,j} = \frac{T_{i,j}}{y_j}$$

It is assumed that the entropy problem starts with a prior, \bar{A} , which perhaps is a SAM from a previous year, or as in this case, a raw and unbalanced SAM. \bar{A} represents the starting point from which the cross-entropy balancing procedure departs in deriving the new matrix of coefficients A^* . The entropy problem is to find a new set of A coefficients which minimize the so-called Kullback-Leibler (1951) measure of the ‘cross entropy’ (CE) distance between the prior \bar{A} and the new estimated coefficient matrix A^* .

$$(3) \quad \min_{\{A\}} I = \left[\sum_i \sum_j A_{i,j} \ln \frac{A_{i,j}}{\bar{A}} \right] = \left[\sum_i \sum_j A_{i,j} \ln A_{i,j} - \sum_i \sum_j A_{i,j} \ln \bar{A} \right]$$

subject to

$$(4) \quad \sum_j A_{i,j} y_i^*$$

$$(5) \quad \sum_j A_{j,i} = 1 \text{ and } 0 \leq A_{j,i} \leq 1$$

Analogous to Walras’ Law in general equilibrium theory, note that one equation can be dropped in the second set of constraints: If all but one column and row sum are equal, the last one must also be equal. The solution of the above problem is solved by setting up the

Langrangian. The k macro aggregates can be added to the set of constraints on the problem above as follows:

$$(6) \quad \sum_i \sum_j G_{i,j}^{(k)} T_{i,j} = \mathbf{g}^{(k)}$$

where G is an $n \times n$ aggregator matrix with ones for cells that represent the macro constraints and zeros otherwise, and \mathbf{g} is the value of the aggregate constraint.

As mentioned above, in the real world one faces economic data measured with error. The cross entropy problem can also be formulated as an ‘error-in-variables’ system where the independent variables are measured with noise. If, for example, we assume the known column sums are measured with error, the row/column consistency constraint can be written as:

$$(7) \quad y = \bar{x} + e$$

where y is the vector of row sums and \bar{x} , the known vector of column sums, is measured with error e . The prior estimate of the column sums could be the initial column sums, the average of the initial column and row sums, or e.g. the row sums.

Following Golan et al. (1996) the errors are written as weighted averages of known constants v :

$$(8) \quad e_i = \sum_w w_i v_{i,w}$$

where w is a set of weights that fulfill the following constraints:

$$(9) \quad \sum_w w_{i,w} = 1 \text{ and } 0 \leq w_{i,w} \leq 1$$

In the estimation problem the weights are treated as probabilities to be estimated, and the prior for the error distribution in this case is chosen to be a symmetric distribution around zero with predefined lower and upper bounds, and using either three or five weights. Naturally, not only the column and row sums can be measured with error. The macro aggregates

by which we constrain our estimation problem may also be measured with error and so we can operate with two sets of errors with separate weights $w1$'s on the column sum errors, and weights $w2$'s on the macro aggregate errors. The optimization problem in the 'errors-in-variables' formulation is now the problem of finding A 's, $w1$'s and $w2$'s that minimize the cross entropy measure including a terms for the error weights:

$$(10) \quad \min_{\{A, w1, w2\}} I = \left[\sum_i \sum_j A_{i,j} \ln A_{i,j} - \sum_i \sum_j A_{i,j} \ln \bar{A} \right] +$$

$$\left[\sum_i \sum_w w1_{i,w} \ln w1_{i,w} - \sum_i \sum_w w1_{i,w} \ln \bar{w1}_{i,j} \right] +$$

$$\left[\sum_i \sum_w w2_{i,w} \ln w2_{i,w} - \sum_i \sum_w w2_{i,w} \ln \bar{w2}_{i,j} \right]$$

The cross-entropy measures reflect how much the information we have introduced has moved our solution estimates away from the inconsistent prior, whilst also accounting for the imprecision of the moments assumed to be measured with error. Hence if the information constraints are binding, the distance from the prior will increase. If they are not binding, the cross entropy distance will be zero.

The application of the cross entropy estimation technique on the raw and unbalanced micro-SAM for Vietnam uses the 'error-in-specification' formulation described above, and the standard errors for both the column sum and macro aggregate constraints have been set to 1%. The prior for the column sums equal to the average of the initial column and row sums since that there is no *a priori* belief that the one should be more accurate than the other. In addition to the column constraints, a number of macro aggregates have been introduced as constraints on the estimation process. The total value of factor payments is fixed to the aggregate value as specified in the macro-SAM. In other words total GDP at factor costs is constrained to its original value. Furthermore, the foreign trade entries are constrained to their macro aggregates, as are the entries for total private consumption, total government consumption and total investments. Hence also total GDP at market prices and measured from the expenditure side is also bound to the macro figures, taking into account the margin allowed for measurement errors.

c. Up-dating VIETSAM to 1997

Macro data availability has made it possible to update the 1996 social accounting matrix to 1997. The procedure applied is very similar to the procedure applied in constructing the

macro and micro-SAMs for 1996, and the data sources are basically the same, i.e. CIEM (2000), IMF (1999,2000) and World Bank (1999). The only split in the macro-SAM which had to be imposed using information from the 1996 macro-SAM was the split between tariff revenue and other indirect tax revenue. Here the same share of tariff revenue in total indirect tax revenues for 1996 was applied to the 1997 data. Otherwise information was available from the above-mentioned sources. The compiled national accounts balance sheet for 1997 is as presented in Table 5. Total intermediate demand in the macro-SAM (Table 6) was obtained by adjusting the 1996 figure using broadly defined sectoral GDP growth rates in IMF (2000) to the sector specific demands in the 1996 input-output table.

In constructing the raw micro-SAM the same procedures were applied. In compiling the 1996 SAM commodity-specific intermediate demands, final household and government demands, investments, exports and imports were obtained directly (recalling that the intermediate demands were adjusted and RAS'ed) from the GSO (1999a) input-output table. For constructing the 1997 micro-SAM, the same commodity structure was imposed on the new totals for final household and government demands, investments, exports and imports. For intermediate demands, the sectoral growth rates from IMF (2000) were used on a commodity-specific basis to update the column totals (total intermediate demand by activity). The commodity-use structure for each activity was then imposed from the adjusted and RAS'ed 1996 structure. Precisely as with the 1996 matrix, the 1997 macro-SAM was used as a prior in the cross entropy procedure, which produced the balanced 1997 micro-SAM for Vietnam.

TABLE 5. Vietnam National Accounts balance sheet for 1997 (billions of Dong)

Gross Domestic Product	Income		Expenditure	
Value-added at factor costs	279,793	Private final consumption		224,895
Indirect taxes	33,830	Government final consumption		25,500
		Gross fixed capital formation		
		plus changes in stocks		88,754
		Exports of goods and services		135,180
		Less: Imports of goods and services		-160,706
Total (GDP m.p.)	313,623	Total (GDP m.p.)		313,623
<hr/>				
National Disposable Income	Income		Expenditure	
Value-added at factor costs	279,793	Private final consumption		224,895
Indirect taxes	33,830	Government final consumption		25,500
Net factor income from abroad	-2,558	Domestic savings		79,823
Net current transfers from abroad	19,253			
Total	330,318	Total		330,318
<hr/>				
Capital accounts	Income		Expenditure	
Domestic saving	79,923	Gross fixed capital formation		
		plus changes in stocks		88,754
Foreign saving	8,831			
Total	88,754	Total		88,754
<hr/>				
Rest of world	Income		Expenditure	
Imports of goods and services	160,706	Exports of goods and services		135,180
Net factor income from abroad	2,558	Foreign saving		8,831
Net current transfers from abroad	-19,253			
Total	144,011	Total		144,011

TABLE 6. VIETMAC 1997 Macroeconomic social accounting matrix for Vietnam (in billions of Dong)

	Activities	Com- modities	Factors	House- holds	Enter- prises	Income taxes	Import tariffs	Export duties	Turnover taxes	Activity taxes	Sales taxes	Govern- ment	Savings – invest- ment	Rest of world	Total
Activities		659,233													659,233
Commodities	366,761			224,895								25,500	88,754	135,180	841,090
Factors	279,793														279,793
Households			199,612		893							29,504		8,310	238,319
Enterprises			75,023									1,000		8,357	84,380
Income taxes			5,158	1,482	23,196										29,836
Import tariffs		9,227													9,227
Export duties		4,319													4,319
Turnover taxes	10,511														10,511
Activity taxes	2,168														2,168
Sales taxes		7,605													7,605
Government						29,836	9,227	4,319	10,511	2,168	7,605			2,586	66,252
Savings – investment				9,384	60,291							10,248		8,831	88,754
Rest of world		160,706		2,558											163,264
Total	659,233	841,090	279,793	238,319	84,380	29,836	9,227	4,319	10,511	2,168	7,605	66,252	88,754	163,264	

4. Structure of the Vietnamese economy: a SAM perspective

This section provides an overview of the main structural characteristics of the Vietnamese economy from the perspective of the 1997 VIETSAM. More detailed data tables can be found in the Appendix, and the fully disaggregated SAM data file can be obtained from the author upon request.

As is the case in many developing countries, the agricultural sector holds a dominant position in the Vietnamese economy both in terms of income generation and production value. Primary agriculture makes up 25% of total GDP at factor costs and 17% of the total value of production (Table 7). Food processing is also important and makes up 15% of the total value of production in Vietnam. Although a large share of the labor force (measured in terms of the number of persons) is employed the agricultural sector, in value terms this amounts to just 27% of total labor value-added due to the low wages earned in this sector. It is also worth noting that the fisheries and mining sectors are rather large sectors in the Vietnamese economy.

TABLE 7. Sectoral structure of the Vietnamese economy (percent)

	Primary agri- culture	Forestry	Fisheries	Mining	Food process- sing	Manufact- uring	Elec., gas & water	Construc- tion	Trade & transpor- tation ser- vices	Other services	Total	Value (bill. Dong)
GDP fc	24.9	1.6	4.3	6.5	5.7	10.1	2.4	6.6	12.4	25.5	100	279,816
Production	17.1	1.0	3.0	5.5	15.0	21.8	2.5	9.1	8.2	16.8	100	658,431
Labor	27.4	0.5	4.7	2.2	5.4	10.0	2.9	6.7	13.1	27.1	100	175,051
Capital	2.9	0.1	1.1	18.3	8.1	13.8	2.1	8.4	14.8	30.4	100	78,868
Land	75.1	13.5	11.4								100	25,896

Within the combined agriculture, forestry and fisheries component of the Vietnamese economy, it is clearly crop production that dominates (Table 8). Crop cultivation makes up 65% of both GDP and production value generated in the primary sectors, and paddy rice production is by far the largest. 'Other crop' production, which includes fruits and vegetables, tea, jute, cashew nuts, etc. is also significant. Livestock breeding accounts for 15% of total primary sector GDP, and here pig breeding is the largest sector. With the land use terminology applied here, one sees that 75% is allocated to crop cultivation. The rest is used in what is termed 'productive forestry' and aquaculture. Table 9 shows the relative sizes of the food processing industries. The two largest sectors are the 'other processed food' industries, which include rice processing, and the seafood industry.

TABLE 8. The agricultural, forestry and fisheries sectors (percent)

	Paddy	Rubber	Coffee	Sugar cane	Other crops	Port	Poultry	Other livestock	Forestry	Fishing	Total	Value (bill. Dong)
GDP fc	36.1	0.8	3.3	2.9	22.5	8.1	4.8	2.5	5.2	13.9	100	86,156
Production	39.1	0.9	3.7	2.1	18.8	9.9	3.5	3.0	4.9	14.1	100	138,852
Labor	34.0	0.9	2.2	3.6	21.4	11.5	7.2	3.3	1.6	14.3	100	57,008
Capital	20.5	0.6	9.1	1.0	15.5	14.3	1.0	7.8	2.4	27.7	100	3,251
Land	42.5	0.6	5.0	1.4	25.6	0.0	0.0	0.0	13.5	11.4	100	25,896

TABLE 9. The food processing industries (percent)

	Proces- sed meats	Vege- table oils	Dairy prods	Cake, choc. etc.	Proc. fruits, vege- tables	Alco- holic bever- ages	Non- alco- holic bever- ages	Refined sugar	Proc coffee	Proc. tea	Cig. & tobac- co	Proc. seafood	Other proc. food	Total	Value (bill. Dong)
GDP fc	2.8	2.7	2.9	2.1	2.2	15.4	4.9	4.6	1.5	0.6	9.0	19.2	32.2	100	15,816
Production	2.4	1.8	2.1	1.6	2.1	5.8	2.9	4.8	0.7	0.8	5.0	12.5	57.5	100	98,612
Labor	3.5	3.5	2.9	1.8	2.7	10.2	3.6	2.4	2.1	0.6	7.8	25.2	33.6	100	9,451
Capital	1.6	1.4	2.8	2.4	1.5	23.0	6.9	7.9	0.7	0.7	10.7	10.2	30.1	100	6,365

Tables 10 and 11 show the cost structures of the individual primary agricultural and food processing sectors, respectively. In terms of the split of total production costs between primary factors of production and intermediate inputs, the primary agricultural sectors spend between 51% and 84% of their total costs on land, labor and capital in combination.⁶ Very little of this is spent on capital – a clear indication of the very low capital intensity in Vietnamese agriculture. The costs of the food processing industries, on the other hand, are dominated by intermediate inputs (between 52% and 91%).

⁶ The split between primary factor and intermediate costs in the poultry sector seems unusual and will be checked with the General Statistics Office in Hanoi and other sources.

TABLE 10. Sectoral cost structures in agriculture (percent)

	Paddy	Rubber	Coffee	Sugar cane	Other crops	Pork	Poultry	Other live-stock	Forestry	Fishing
Unskilled labor	34.5	37.9	23.4	66.5	44.3	44.9	77.6	43.3	11.6	41.2
Semi-skilled labor	2.3	2.5	1.5	4.3	2.9	2.9	5.1	2.8	2.5	1.4
Highly skilled labor	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Capital	1.3	1.7	6.0	1.1	2.0	3.4	0.7	6.1	1.3	4.7
Land	20.9	12.2	26.2	12.7	25.6				56.3	15.4
Total value-added	59.0	54.3	57.2	84.8	74.9	51.3	83.5	52.3	71.8	62.8
Intermediate demand	41.0	45.7	42.8	15.2	25.1	48.7	16.5	47.7	28.2	37.2
Total costs	100	100	100	100	100	100	100	100	100	100
Value (bill. Dong)	54,321	1,268	5,076	2,947	26,118	13,682	4,929	4,138	6,770	19,604

TABLE 11. Sectoral cost structures in food processing (percent)

	Proces- sed meats	Vege- table oils	Dairy prod- ucts	Cake, choc. etc.	Proc. fruits, vege- tables	Alco- holic bever- ages	Non-alco- holic bever- ages	Refind suga- r	Proc. coffee	Proc. tea	Cig. & tobac- co	Proc. sea- food	Other proc. food
Unskilled labor	12.0	15.7	10.9	9.1	10.5	15.6	10.2	3.9	22.2	5.6	13.4	16.1	4.6
Semi-skilled labor	2.4	3.2	2.2	1.9	2.1	3.2	2.1	0.8	4.5	1.1	2.7	3.3	0.9
Highly skilled labor	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.1	0.2	0.2	0.1
Capital	4.5	5.3	8.6	9.6	4.7	28.8	16.0	10.7	5.7	5.5	15.1	5.4	3.4
Land													
Total value-added	19.2	24.3	21.8	20.7	17.4	47.9	28.4	15.4	32.7	12.3	31.4	24.9	9.0
Intermediate demand	80.8	75.7	78.2	79.3	82.6	52.1	71.6	84.6	67.3	87.7	68.6	75.1	91.0
Total costs	100	100	100	100	100	100	100	100	100	100	100	100	100
Value (bill. Dong)	2412	1742	2110	1592	2057	5689	2817	4747	730	812	4913	12278	56714

Given the focus on external trade in this social accounting matrix (both by commodity and partner country), the following tables and figures provide an overview of the most important features of Vietnam's trade patterns. Tables A.4 – A.9 in the Appendix provide more details. In terms of commodity structure, Table 12 reveals that Vietnam's exports are dominated by primary agricultural commodities and mining products, which together make up well over one third of total foreign exchange earnings. Manufactured goods (other than processed foods) make up yet another third, while processed food products account for one fifth of total export earnings. Of the primary agricultural exports, coffee and 'other crops' (mainly processed rice) are particularly important in value terms. Within the category of processed food exports, seafood products are particularly important. In terms of Vietnam's imports, Table 12 shows - not surprisingly - that these are dominated by manufactured goods.

TABLE 12. Vietnam's exports and imports by commodity (percent)

	Agricultural, for- estry & fisheries products	Mining products	Processed foods	Other manufac- tured goods	Service	Total	Value (bill. Dong)
Exports	17.5	18.2	21.3	30.9	12.2	100	135,236
Imports	7.5	0.2	4.7	67.5	20.1	100	160,990

Like most other Asian countries, the trade pattern of Vietnam is very regionally concentrated (Figure 1). Almost 60% of its exports are destined for other Asian countries. Outside the region, the European Union is by far the largest recipients of the country's exports, purchasing 21% of total Vietnamese exports. Exports to the United States accounted for just 8% of total exports in 1997, but this share may increase in the future as a result of the trade agreement recently signed between the two countries. Figure 2 shows that Vietnam's imports (mainly manufactured goods) are sourced from other ASEAN countries, China, the European Union, and the 'Rest of World' (mainly African and Middle Eastern countries, see Table A.10 in the Appendix for the aggregation scheme).

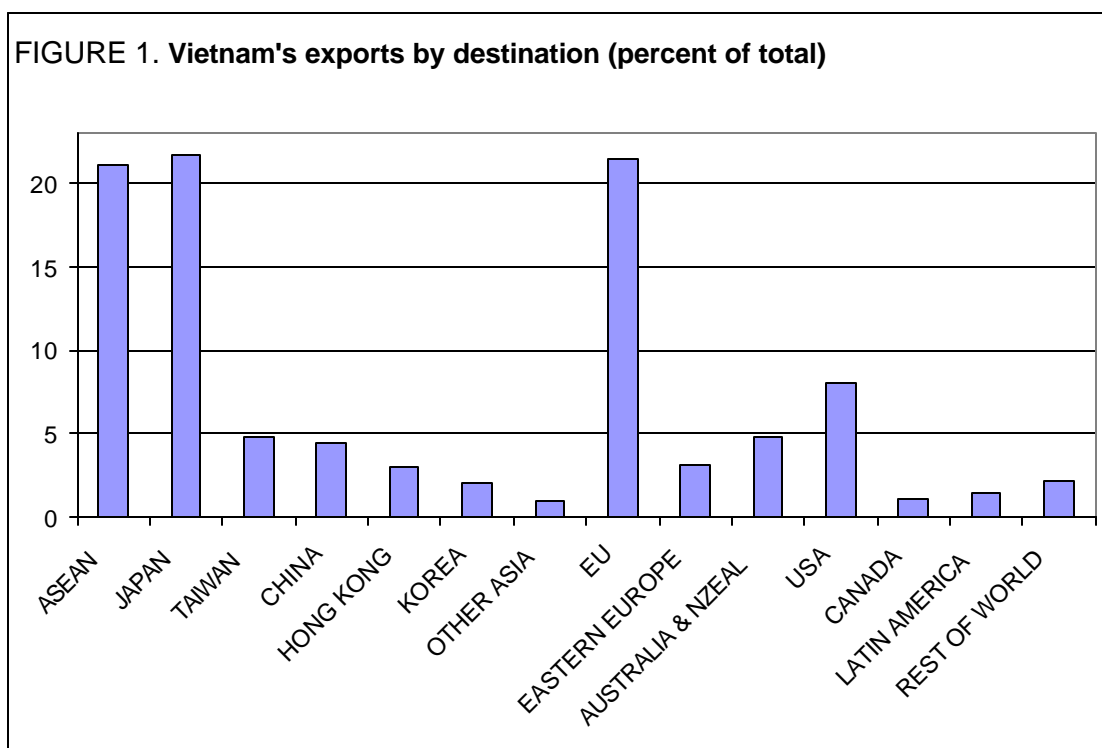


Figure 3 compares the destination structure of Vietnam's primary agricultural exports and its processed food exports. First of all, it is not surprising that 50% of Vietnam's primary agricultural exports are destined for other Asian countries spread evenly among ASEAN (23%) and non-ASEAN members (Japan: 3%, Taiwan: 6%, China; 5%, Hong Kong and Korea: 3% each, Other Asia: 5%). Twenty-four percent of the country's primary agricultural exports are sold on EU markets and 12% on the US market. Exports of processed

foods, however, do not travel as far, with three-fourths of these exports being sold on other Asian markets (mainly other ASEAN countries).

Other ASEAN members and the EU countries are both important destinations for Vietnam's exports. Yet, as is evident in Figure 4, the commodity structures of Vietnam's exports to these countries are very different. Exports to ASEAN countries consist primarily of processed foods and mining products and to a lesser extent manufactured goods. Vietnam's ex-

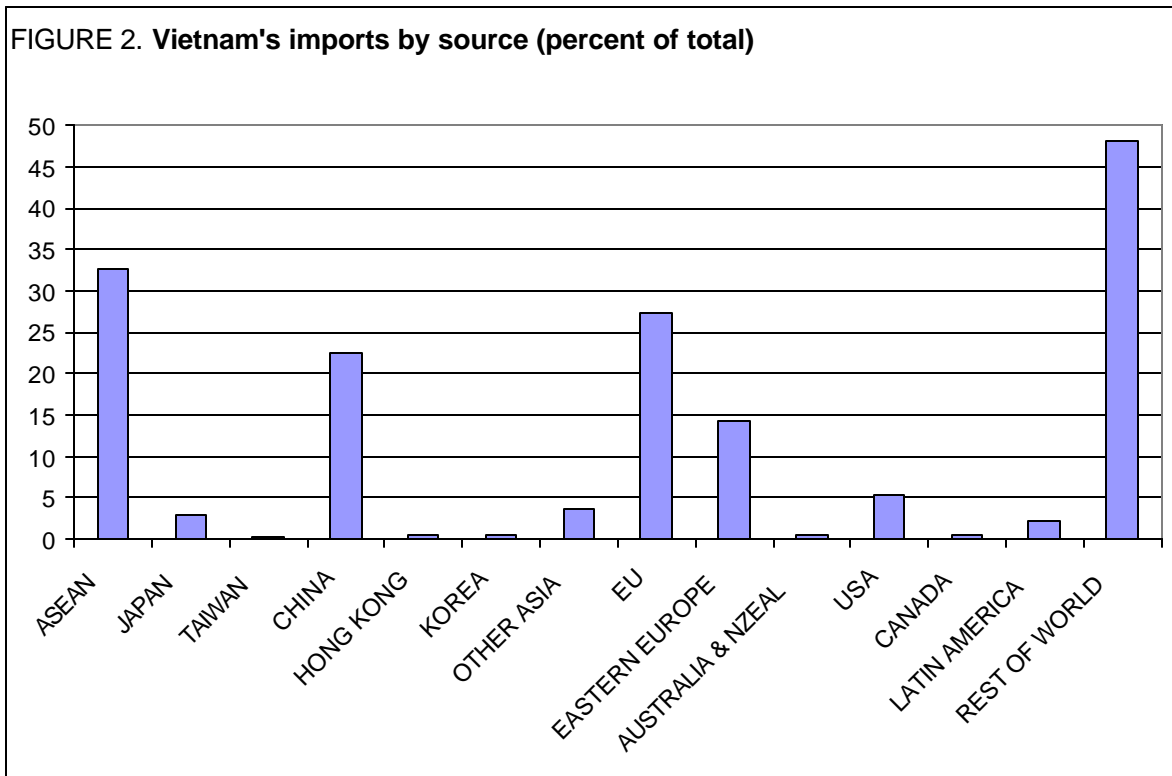


FIGURE 3. Destination structure of Vietnam's agri-food exports (percent of total)

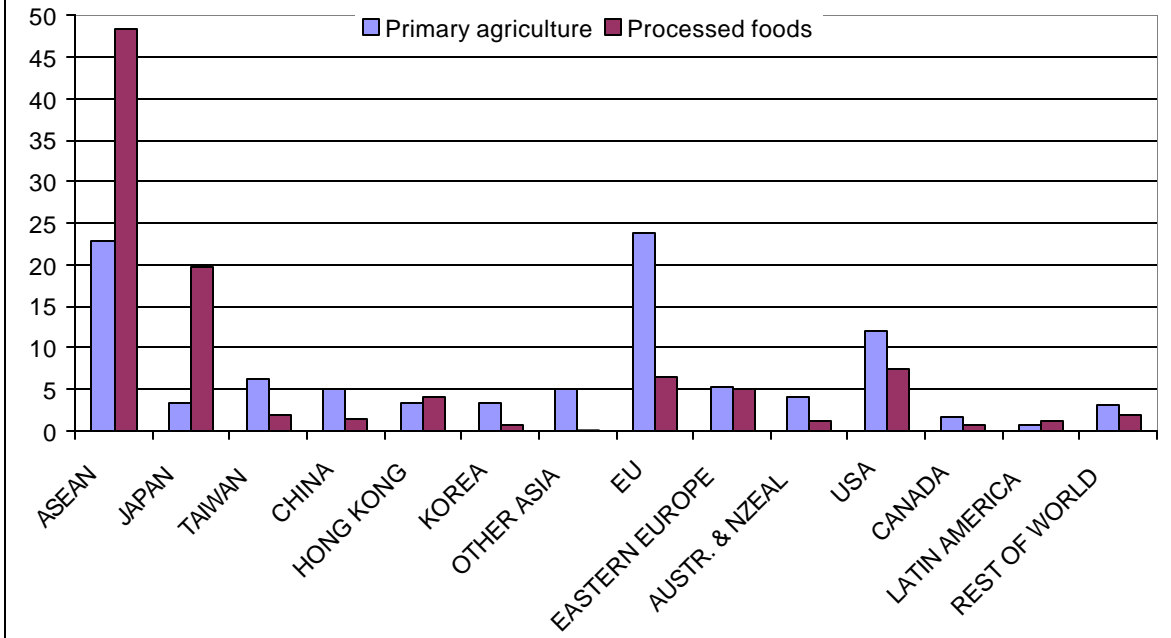
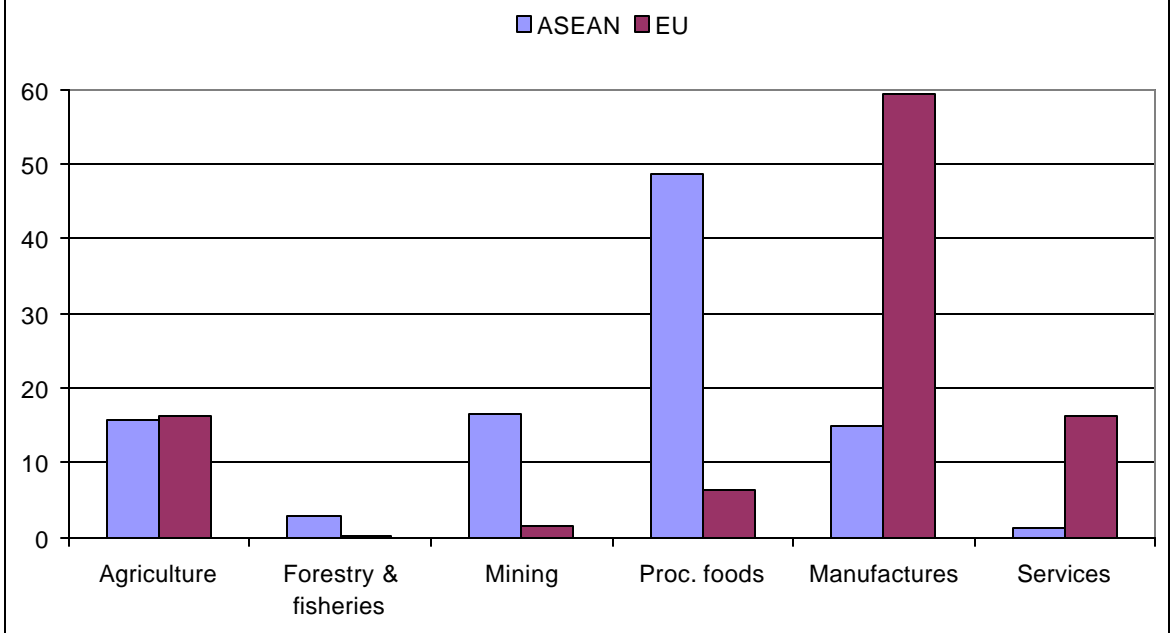


FIGURE 4. Comparison of Vietnam's export structure to ASEAN and the EU (percent)



ports to the EU, on the other hand, consist primarily of manufactured goods (mainly clothing, textiles, footwear and other wearing apparel) and services (transportation and tourism). Primary agricultural exports to each region both make up about 16% of the region-specific export totals, but a closer look at the composition of products (Table A.7 in the Appendix) reveals that agricultural exports to ASEAN countries consist mainly of 'other crops' and pork, whilst primary agricultural exports to the EU are mainly coffee beans and 'other crops'. These different export patterns mask without doubt a combination of explanatory factors such as 'comparative advantage' broadly defined (agricultural versus industrial production), the quality of Vietnamese food products, food safety regulations in the different export markets, and consumer preferences.

5. The agro-industrial complex: an input-output model analysis

The previous section has described the main structural features of the Vietnamese economy from the perspective of the 1997 SAM. Among other things, this overview shows the significant role played by the agricultural sector. The economic significance of this key sector, however, reaches well beyond the immediate impact on income and employment in the sector itself. This is because the agricultural sector generates economic activity in other sectors of the economy through its demand for intermediate goods and services on the one hand, and through its supply of intermediate inputs to the food processing industries on the other. This section demonstrates how the SAM can be used in the context of the classic input-output model to estimate these derived effects. For this purpose, the concept of 'the agro-industrial complex' is introduced.

The agro-industrial complex views the agricultural sector as the key sector, and then defines the complex to include those activities that the agricultural sector generates. The agricultural sector generates economic activity through its demand for pesticides, animal feed, energy and various services as inputs into its own production processes. In terms of the effect of the agricultural sector on the food processing industries it is important to identify those sectors whose production is dependent on the intermediate inputs that can be supplied by the domestic agricultural sector at a given point in time.

In this context, the agro-industrial complex is assumed to include the following food processing industries: meat processing, dairy production, fruit & vegetable processing, sugar refining, coffee, tea and other food processing (the latter is mainly rice processing). The fisheries sector is also included in the agro-industrial complex since this is a relatively large

sector in the Vietnamese economy, and hence so is the seafood processing industry. The other food processing industries (oils and fats processing; cake, candy & chocolate production; alcoholic and non-alcoholic beverage production; cigarette and tobacco production) are assumed to be in a better position in terms of being able to substitute Vietnamese agricultural inputs with imported supplies and are therefore not included in the agro-industrial complex defined here.⁷

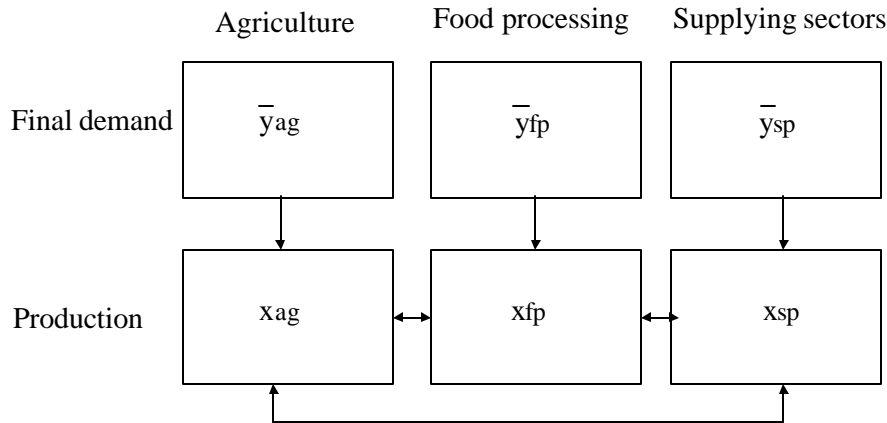
The following describes how the classic input-output model can be used together with the social accounting matrices to estimate the activity-generating effects of the agricultural sector in Vietnam. The point of departure is to split the producing sectors into three categories: (1) the primary agricultural sectors, here including fisheries, (2) the food processing sectors that are dependent on domestic agricultural production, and (3) the remaining sectors, which from the viewpoint of the agricultural sectors can be thought of as the supplying sectors. The traditional input-output model is expressed by the following system of equations:

$$(11) \quad \bar{x} = (I-A)^{-1}y$$

where \bar{x} is a (97 x 1) vector containing the production values for the 97 sectors in the SAM; I is a (97 x 97) identity matrix; A is the coefficient matrix for the 97 sectors' internal supplies (97 x 97); and y is a (97 x 1) vector containing the final demand for the output of each sector. Traditional use of the input-output model assumes that it is the final demand that is the driving factor, which then determines the level of production in the individual sectors. Using the above-mentioned categorization of sectors, this can be illustrated in Figure 5, where a bar over a variable indicates that it is exogenous.

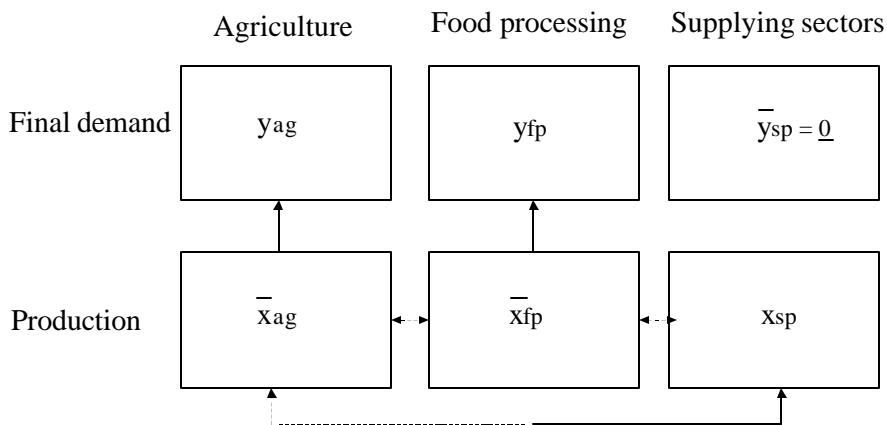
⁷ Clearly, a broader definition of the agro-industrial complex would increase the estimated activity-generating effects of the agricultural sector.

FIGURE 5. Causality in a traditional input-output analysis



In the context of the agro-industrial complex, however, the agricultural sector is seen as the driving factor, and furthermore, production in certain food processing industries is viewed as being completely determined by the level of domestic agricultural production. Hence, in the input-output analysis used here, and following Pedersen (1986), it is assumed that the levels of production in the primary agricultural (and fisheries) sectors as well as in the selected food processing industries are exogenously given as illustrated in Figure 6. The interest here is to determine the isolated effect of \bar{x}_{ag} and \bar{x}_{fp} on x_{sp} , and so we exogenously set the vector of final demands for output from the supplying industries to zero, i.e. $\bar{y}_{sp} = \underline{0}$. Hence, what we are capturing is precisely the level of production needed in the supplying sectors, x_{sp} , to fulfill the demands of the agricultural sectors and the food processing industries (to achieve their production levels \bar{x}_{ag} and \bar{x}_{fp}). After having satisfied own input de

FIGURE 6. Causality in an input-output analysis where agriculture is viewed as the key sector



mands as well as the demands for intermediate inputs by other sectors, there is a ‘residual’ of agricultural and food products that is captured by the final demands y_{ag} and y_{fp} .

In summary, the input-output model is now thought of as follows:

$$(12) \quad x = Ax + y$$

By making the categorization of sectors explicit, the following system of equations illustrates the endogenous variables being solved for in the model, namely x_{sp} , y_{ag} and y_{fp} :

$$(13) \quad \begin{bmatrix} \bar{x}_{ag} \\ \bar{x}_{fp} \\ x_{sp} \end{bmatrix} = \begin{bmatrix} A_{ag,ag} & A_{ag,fp} & A_{ag,sp} \\ A_{fp,ag} & A_{fp,fp} & A_{fp,sp} \\ A_{sp,ag} & A_{sp,fp} & A_{sp,sp} \end{bmatrix} \begin{bmatrix} \bar{x}_{ag} \\ \bar{x}_{fp} \\ x_{sp} \end{bmatrix} + \begin{bmatrix} y_{ag} \\ y_{fp} \\ \underline{0} \end{bmatrix}$$

This alternative way of using the classic input-output model has been applied to the 1997 SAM for Vietnam.⁸ When calculating the derived effects of the individual agricultural sectors, successive computations are performed, where the \bar{x}_{ag} ’s that are not being evaluated are set to zero.

⁸The calculations have been done using SAS software, and the code is available from the author upon request.

The tables in the previous section showed the sectoral structure of production and factor income in the Vietnamese economy. These values measured in Dong are provided in Table 13 along with employment numbers by sector (estimates based on information provided in the World Bank (1999) and GSO (1998) publications).

TABLE 13. Production, factor income and employment in the agricultural and fisheries sectors

	Paddy rice	Rubber	Coffee beans	Sugar cane	Othe crop:	Porl	Poultry	Other livestock	Total ag.	Fisheries
Value of production (mill.Dong)	55,394	2,336	5,549	2,953	37,561	13,797	4,929	4,173	126,691	20,228
Factor income (mill Dong)	31,091	655	2,835	2,475	19,343	7,011	4,114	2,160	69,683	12,080
Employed persons (thous.)	11,953	504	1,197	637	8,105	2,977	1,064	901	27,337	529

As discussed above, however, the importance of the agricultural sector for the Vietnamese economy is not appreciated in its entirety by just regarding the production value, factor income and employment created in the sector alone. The impact on the rest of the economy is substantial and is generated through the sector's demand for intermediate inputs and services, and its supply of intermediate inputs to the food processing industries.

These derived effects are shown for factor income and employment in Tables 14 and 15, respectively. In 1997 factor income earned in the entire primary agricultural sector amounted to 69.7 bill. Dong. Including the factor income generated in the food processing industries and the input supplying sectors that can be attributed to the agricultural sectors' activities, total agricultural factor income in fact adds up to 94.9 bill. Dong (thereby increasing the share of agricultural factor income in the total from 25% to 34%). A substantial part of this additional factor income attributable to the agricultural sector's production activities is generated through the sector's demands for inputs such as agricultural services and trade & transportation services. The factor income generated in these two sectors as a consequence of the agricultural sector's activities equals 1.4 and 11.5 bill. Dong, respectively. In terms of downstream linkages, the agricultural sector as a whole generates income in e.g. the 'other food processing' industry equal to 5.1 bill. Dong. Most of this latter income is generated by the activities resulting from the delivery of paddy rice for further processing.

At the sectoral level, it is seen that one-third of the factor income related to paddy rice, sugar cane, 'other livestock' and fisheries production is generated outside these sectors, whereas for the other sectors less than 25% of the factor income is generated outside the given sector. In other words, for every 1,000 Dong earned in the paddy rice sector, 525

Dong are earned elsewhere in the economy. Similar impacts apply to the sugar cane, ‘other livestock’ and fisheries sectors. The other agricultural sectors have much less of an income generating effect on the rest of the economy. When 1,000 Dong are earned in the poultry sector, for example, only 154 Dong are earned elsewhere in the economy. Finally, it may be noted that taking these derived effects into account increases the relative importance of the paddy rice sector in total factor income due to its relatively strong links to the rest of the economy.

TABLE 14. Factor income in the agro-industrial complex, mill. Dong

	Paddy rice	Rubber	Coffee beans	Sugar cane	Other crops	Pork	Poultry	Other livestock	Total ag.	Fisheries
Primary agriculture	31,091	655	2,835	2,475	19,343	7,011	4,114	2,160	69,683	0
Agricultural services	1,209	1	28	10	134	17	1	8	1,407	0
Forestry & fisheries	102	1	5	6	33	284	7	37	474	12,080
Mining & quarrying	102	2	11	6	42	39	2	6	210	18
Meat processing	0	0	0	0	0	182	257	0	439	0
Dairy production	0	0	0	0	0	0	0	453	453	0
Fruit & veg. prcssing	0	0	0	0	354	0	0	0	354	0
Sugar refineries	0	0	0	725	0	0	0	0	725	0
Coffee processing	0	0	236	0	0	0	0	0	236	0
Tea processing	0	0	0	0	99	0	0	0	99	0
Seafood processing	0	0	0	0	0	0	0	0	0	3,032
Other food prcssing	5,121	0	0	0	2	2	1	3	5,130	15
Other manufacturing	397	10	32	35	144	69	14	38	738	209
Fertilizer, ag. chem.	320	3	32	8	79	15	2	7	466	4
Animal feed	9	0	0	0	1	722	52	62	847	141
Trade & transpt.	7,749	98	379	324	1,829	530	253	331	11,493	2,004
Other services	1,327	29	110	116	320	114	43	99	2,159	969
Total	47,426	799	3,668	3,705	22,379	8,984	4,746	3,204	94,911	18,472

The primary agricultural sector employs over 27 million people in Vietnam. Yet within the concept of the agro-industrial complex, employment attributable to agricultural production activities is greater than this. Taking into account the impact of agricultural production activities on the other sectors adds another 1.3 million employees to the agro-industrial complex (Table 15). This means that for agriculture as a whole, employing one person in the primary agricultural sector gives rise to 0.05 employed person in the rest of the economy. This figure masks inter-sectoral differences of course, with paddy rice and sugar cane again having the strongest – but still not particularly large – impacts on other sectors (0.08 and 0.07, respectively). The situation is very different for the fisheries sector. For each person employed in the fisheries sector, there is 0.45 person employed elsewhere in the economy. In general, these results suggest that the derived employment effects of agricultural production on the rest of the economy are not as large as the derived income effects.

TABLE 15. Employment in the agro-industrial complex

	Paddy rice	Rubber	Coffee beans	Sugar cane	Other crops	Port	Poultry	Other livestock	Total ag.	Fisheries
Prim. agriculture	11,952,555	503,966	1,197,405	637,121	8,104,611	2,976,969	1,063,545	900,472	27,336,644	0
Agric. services	50,012	25	1,158	395	5,509	699	36	335	58,168	17
Forest. & fisheries	2,110	14	100	123	683	5,874	139	761	9,805	530,648
Mining & quarrying	656	12	73	33	235	189	12	32	1,242	100
Meat processing	0	0	0	0	0	4,453	6,308	0	10,761	0
Dairy production	0	0	0	0	0	0	0	10,284	10,284	0
Fruit & veg. proc..	0	0	0	0	8,835	0	0	0	8,835	0
Sugar refineries	0	0	0	19,016	0	0	0	0	19,016	0
Coffee processing	0	0	3,716	0	0	0	0	0	3,716	0
Tea processing	0	0	0	0	3,286	0	0	0	3,286	0
Seafood proc.	0	0	0	0	0	0	0	0	0	51,814
Other food proc.	234,531	1	7	7	29	73	14	113	234,776	324
Other manufact.	41,398	994	2,969	2,651	12,213	6,102	1,384	2,803	70,513	22,942
Fertilizer, ag. chem.	23,344	339	2,826	677	6,040	508	57	237	34,030	161
Animal feed	61	0	1	1	8	4,988	361	431	5,850	973
Trade & transpt.	526,288	6,808	30,517	22,470	128,010	36,053	17,040	22,177	789,363	141,455
Other services	25,400	565	2,613	2,270	6,669	2,104	731	2,853	43,205	18,765
Total	12,856,356	512,724	1,241,385	684,764	8,276,128	3,038,013	1,089,627	940,497	28,639,494	767,199

Comparing these results with similar calculations for a developed country such as Denmark (Jacobsen 1996), it is evident that although the agricultural sector itself accounts for a substantially larger share of both income and employment in the Vietnamese economy, its derived effects are much smaller in relative terms. This is not surprising, of course, because the degree to which primary agricultural products are processed and handled further downstream in the food production chain is much higher in a developed country like Denmark. An exception is the Vietnamese fisheries sector, which generates quite a lot of activity elsewhere in the economy and has an employment generating effect of a magnitude comparable with cash crops in the Danish economy. This is clearly because seafood is a very 'sensitive' product that requires extensive resources devoted to storage, handling and transportation facilities in its marketing.

The results of this simple input-output model application highlight some important aspects of the Vietnamese economy, and they point to a number of challenges facing the future policy formulation process and the choice of overall development strategy for Vietnam. There is no doubt that the agricultural sector still constitutes the backbone of the Vietnamese economy, but it is also clear that in terms of income and employment generation, a further development of the food processing industries will boost this sector's impact on the rest of the economy. One of the greatest challenges facing producers of both primary agricultural and processed food products is the imposition of increasingly stringent food safety regula-

tions in export markets. Substantial efforts are required to enhance the capability of producers in Vietnam to comply with such requirements, and this will entail changes in the prevailing systems of production and marketing as well as adjustments to the domestic food safety regulatory framework.

6. Concluding remarks

This paper has documented the construction of social accounting matrices for Vietnam for 1996 and 1997. The purpose of building these SAMs has been to obtain core data bases for a CGE model of the Vietnamese economy that will be used to analyze economic issues related in particular to Vietnam's increasing participation in international trade. The SAM construction process has been challenging because it has had to rely on diverse data sources of varying quality, often with conflicting pieces of information. Hence, prudent 'common sense' assumptions have been made along the way, and the main macro economic indicators have been imposed upon the final cross-entropy process used to balance the raw disaggregated micro-SAM. The result is a micro-SAM that seems to be a reasonable reflection of the underlying structure of the Vietnamese economy and therefore applicable in a CGE modeling framework. Furthermore, as an illustration of its applicability, the SAM has been used in this paper in the context of a simple input-output modeling framework to illustrate the income- and employment-generating effects of the agricultural sector in Vietnam.

As with any other data compilation and estimation effort, the level of disaggregation chosen for the Vietnam SAM depends on two factors: first, the purpose of the subsequent analyses using the SAM, and second, the availability of data. Given that the intention is to use the SAM and CGE model for trade-related analyses, much effort has been devoted to disaggregating the rest-of-world account by identifying the sources and destinations of Vietnam's imports and exports by commodity. Furthermore, given the interactions between trade and other domestic policy instruments, the level of detail in the tax accounts will also prove useful. In terms of policy representation there is, nevertheless, still work to be done in terms of representing trade-related policies such as export and import quotas on selected products, the duty draw-back system for exporters, etc. This will be pursued in connection with the development of an agriculture- and trade-focused CGE model for Vietnam based upon these SAMs. There are of course areas in which the SAM could be disaggregated further, providing that reliable data are available. In particular, it may be useful to disentangle marketing margins from the intermediate demand matrix since these are often large in a developing country context. Another area of interest would be to pursue better information so that a disaggregation of the enterprise account into state-owned, private and foreign-invested enterprises could be implemented.

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8. Appendix

NOTE: See Table A.10 below for abbreviations and aggregations used in the Appendix tables.

TABLE A1. Structure of the economy (percent)

	PADDY	RWRUBBER	COFFBEANS	SUGARCANE	OTHCROPS	PORK	POULTRY	OTHLVPLT	PRIM.AGRIC.	IRRIGSRV	OTHAGSRV	FORESTRY	FISHERY	MINING	PRCMEAT	PVAOIL	DAIRY	CKECHOC	PFRTVEG	ALCHOHOL	NALDRNK	REFSUGAR	PRCOFFEE	PRTEA	CIGTBOC	PRSEAFD	OTHFOOD	TOT PRC.FOOD	MANUFACTURING	ELEC.GAS.WTR	CONSTRUCTION	TRADE & TRANSP.	OTHER SERVICES	TOTAL	Value (bill. Dong)
GDP fc	11.1	0.2	1.0	0.9	6.9	2.5	1.9	0.8	24.9	0.2	0.3	1.6	4.3	6.5	0.2	0.1	0.2	0.1	0.1	0.9	0.3	0.3	0.1	0.0	0.5	1.1	1.8	5.6	10.1	2.4	6.6	12.4	25.0	100	279.816
Production	8.3	0.2	0.8	0.4	4.0	2.1	0.7	0.6	17.1	0.2	0.3	1.0	3.0	5.5	0.4	0.3	0.3	0.2	0.3	0.9	0.4	0.7	0.1	0.1	0.7	1.9	8.6	15.0	21.8	2.5	9.1	8.2	16.3	100	658.431
Labor	11.1	0.3	0.7	1.2	7.0	3.7	2.3	1.1	27.4	0.2	0.4	0.5	4.7	2.2	0.2	0.2	0.2	0.1	0.1	0.6	0.2	0.1	0.1	0.0	0.4	1.4	1.8	5.4	10.0	2.9	6.7	13.1	26.4	100	175.051
Capital	0.8	0.0	0.4	0.0	0.6	0.6	0.0	0.3	2.9	0.1	0.2	0.1	1.1	18.3	0.1	0.1	0.2	0.2	0.1	1.9	0.6	0.6	0.1	0.1	0.9	0.8	2.4	8.1	13.8	2.1	8.4	14.8	30.0	100	78.868
Land	42.5	0.6	5.0	1.4	25.6	0.0	0.0	0.0	75.1			13.5	11.4																					100	25.896

TABLE A2. Sectoral cost structure (percent)

	PADDY	RWRUBBER	COFFBEANS	SUGARCANE	OTHCROPS	PORK	POULTRY	OTHLVPLT	IRRIGSRV	OTHAGSRV	FORESTRY	FISHERY	MINING	PRCMEAT	PVAOIL	DAIRY	CKECHOC	PFRTVEG	ALCHOHOL	NALDRNK	REFSUGAR	PRCOFFEE	PRTEA	CIGTBOC	PRSEAFD	OTHFOOD	MANUFACTURING	ELEC.GAS.WTR	CONSTRUCTION	TRADE & TRANSP.	OTHER SERVICES	
LABUNSK	34.5	37.9	23.4	66.5	44.3	44.9	77.6	43.3	5.5	5.8	11.6	41.2	13.2	12.0	15.7	10.9	9.1	10.5	15.6	10.2	3.9	22.2	5.6	13.4	16.1	4.6	9.4	15.5	16.1	24.9	21.8	
LABSMK	2.3	2.5	1.5	4.3	2.9	2.9	5.1	2.8	16.1	16.9	2.5	1.4	4.9	2.4	3.2	2.2	1.9	2.1	3.2	2.1	0.8	4.5	1.1	2.7	3.3	0.9	3.6	11.7	3.6	5.3	16.6	
LABHGSK	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	15.7	16.5	0.1	0.1	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.3	0.1	0.2	0.2	0.1	0.3	0.7	0.2	0.4	8.5	
Capital	1.3	1.7	6.0	1.1	2.0	3.4	0.7	6.1	10.1	10.2	1.3	4.7	31.6	4.5	5.3	8.6	9.6	4.7	28.8	16.0	10.7	5.7	5.5	15.1	5.4	3.4	7.6	10.9	11.1	23.2	18.2	
Land	20.9	12.2	26.2	12.7	25.6						56.3	15.4																				
Total value added	59.0	54.3	57.2	84.8	74.9	51.3	83.5	52.3	47.4	49.4	71.8	62.8	49.9	19.2	24.3	21.8	20.7	17.4	47.9	28.4	15.4	32.7	12.3	31.4	24.9	9.0	20.8	38.9	31.0	53.9	65.1	
Intermediate demand	41.0	45.7	42.8	15.2	25.1	48.7	16.5	47.7	52.6	50.6	28.2	37.2	50.1	80.8	75.7	78.2	79.3	82.6	52.1	71.6	84.6	67.3	87.7	68.6	75.1	91.0	79.2	61.1	69.0	46.1	34.9	
Total costs	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Value (bill. Dong)	54321	1268	5076	2947	26118	13682	4929	4138	1100	1820	6770	19604	36067	2412	1742	2110	1592	2057	5689	2817	4747	730	812	4913	12278	56714	143812	15958	59981	54214	107645	

TABLE A.3. Household shares (percent)

	HHRAGS	HHRNAS	HHRWAG	HHUAGS	HHUNAS	HHUWAG	TOTAL	Value (bill. Dong)
Income	52	9	10	9	13	12	100	239,002
Consumption	53	9	10	9	12	11	100	225,224
Savings	36	6	6	8	22	21	100	9,411

TABLE A.4. Trade patterns by commodity (percent)

	PADDY	RWRUBBER	COFFBEANS	SUGARCANE	OTHCROPS	PORK	POULTRY	OTHLVLT	PRIMAGRIC.	IRRIGSRV	OTHAGSRV	FORESTRY	FISHERY	MINING	PRCMEAT	PVAOIL	DAIRY	CKECHOC	PFRTVEG	ALCOHOL	NALDRNK	REFSUGAR	PRCOFFEE	PRTEA	CIGTBCC	PRSEAFD	OTHFOOD	TOT PRC-FOOD	MANUFACTURING	ELEC,GAS,WTR	CONSTRUCTION	TRADE, TRANSP.	OTHER SERVICES	TOTAL	Value (bill. Dong)
Exports	0.7	1.5	3.9	0.0	7.3	0.8	0.2	0.3	14.6	0.0	0.0	0.2	2.7	18.2	0.2	0.3	0.1	0.1	0.7	0.4	0.2	0.6	0.2	0.2	0.0	7.0	11.2	21.3	30.9	0.0	0.0	0.4	11.8	100.0	135,236
Imports	0.2	0.5	0.0	0.0	6.3	0.0	0.0	0.0	7.1	0.0	0.0	0.4	0.0	0.2	1.5	0.3	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.3	1.6	4.6	67.7	8.7	0.0	3.2	8.2	100.0	160,990	

TABLE A.5. Trade patterns by region (percent)

	ASEAN	JAPAN	TAIWAN	CHINA	HONGKONG	KOREA	OTHER ASIA	EU	EASTERN EUROPE	AUSTRALIA & NZEAL	USA	CANADA	LATIN AMERICA	REST OF WORLD	TOTAL	Value (bill. Dong)
Exports	21.1	21.7	4.7	4.4	3.0	2.0	0.9	21.4	3.1	4.8	8.1	1.1	1.4	2.2	100	135,236
Imports	20.4	1.9	0.1	13.9	0.3	0.2	2.3	17.0	8.9	0.3	3.3	0.2	1.4	29.9	100	160,990

TABLE A.6. Vietnam's commodity-specific exports by destination (percent)

	ASEAN	JAPAN	TAIWAN	CHINA	HONG KONG	KOREA	OTHERASIA	EU	EASTERN EUROPE	AUSTR. & NZEAL	USA	CANADA	LATINAMERICA	REST OF WORLD	TOTAL	Value (bill. Dong)
PADDY	0.0	0.0	0.0	0.7	0.0	0.0	77.9	0.0	21.4	0.0	0.0	0.0	0.0	0.0	100.0	1010
RWRUBBER	16.2	3.4	15.8	22.8	2.3	2.7	0.4	24.1	3.6	0.6	2.3	0.6	2.4	2.6	100.0	2054
COFFBEANS	4.2	4.9	0.0	0.2	0.0	3.7	0.0	50.1	7.9	3.3	23.1	1.8	0.0	0.7	100.0	5228
SUGARCANE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
OTHCROPS	28.2	3.2	9.4	3.5	5.5	4.1	1.9	15.7	3.4	6.3	10.5	2.4	0.8	5.2	100.0	9856
PORK	82.1	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1028
POULTRY	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	230
OTHLVPLT	30.0	4.3	1.0	1.7	21.7	0.0	0.0	15.6	0.0	0.1	22.8	2.3	0.4	0.1	100.0	394
PRIM.AGRIC.	22.8	3.3	6.3	5.2	3.4	3.3	5.0	23.8	5.3	4.1	12.0	1.8	0.7	3.0	100.0	19801
IRRIGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
OTHAGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
FORESTRY	3.8	13.8	47.0	13.7	3.6	1.5	10.3	3.6	0.5	1.5	0.6	0.2	0.0	0.1	100.0	205
FISHERY	22.4	32.5	5.6	1.1	28.7	0.4	0.1	0.9	0.1	1.0	6.3	0.1	0.0	0.8	100.0	3656
MINING	19.1	40.5	0.3	14.6	0.0	1.2	0.0	1.8	2.1	17.6	2.3	0.0	0.3	0.2	100.0	24598
PRCMEAT	2.8	4.1	0.0	0.2	74.2	0.0	0.0	0.1	18.5	0.1	0.0	0.0	0.0	0.0	100.0	216
PVAOIL	4.7	5.1	0.7	88.7	0.3	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	100.0	384
DAIRY	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	79
CKECHOC	5.0	14.6	13.3	0.4	11.3	1.4	0.1	27.0	0.8	3.6	12.3	10.1	0.0	0.2	100.0	169
PFRTVEG	6.1	22.1	27.0	0.5	2.5	3.2	0.0	14.6	6.6	1.7	8.9	0.8	4.4	1.5	100.0	1001
ALCHOHOL	15.7	39.6	0.0	0.0	30.6	0.0	0.0	2.1	1.1	1.6	9.0	0.4	0.0	0.0	100.0	556
NALDRNK	20.3	0.0	21.8	0.0	28.2	0.0	0.0	7.2	3.4	3.1	12.8	2.7	0.0	0.5	100.0	210
REFSUGAR	5.4	13.0	0.0	0.2	0.0	0.0	0.0	33.7	0.2	0.4	46.9	0.0	0.0	0.3	100.0	874
PRCOFFEE	20.2	0.0	0.1	0.0	0.4	0.6	0.0	5.7	10.9	7.1	47.8	7.3	0.0	0.0	100.0	268
PRTEA	1.2	0.3	0.8	0.1	0.3	0.0	0.0	7.5	1.5	0.7	2.2	0.5	0.0	84.8	100.0	313
CIGTBCC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100.0	2
PRSEAFD	6.7	51.9	0.4	0.4	6.9	1.7	0.0	12.3	0.1	2.6	13.9	1.4	0.0	1.6	100.0	9518
OTHFOOD	84.6	0.8	1.3	0.1	0.4	0.1	0.1	0.9	8.4	0.1	0.4	0.1	2.1	0.6	100.0	15174
TOT PRC.FOOD	48.3	19.7	2.0	1.4	4.0	0.7	0.1	6.4	5.0	1.1	7.4	0.7	1.3	1.9	100.0	28763
MANUFACTURING	10.1	22.5	9.7	1.0	2.4	3.0	0.1	41.3	1.4	1.9	2.0	1.4	1.1	2.1	100.0	41753
ELEC.GAS,WTR	12.5	0.0	0.0	87.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	5
CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
TRADE, TRANSP.	2.1	16.2	1.1	3.2	1.0	2.0	1.0	28.7	3.1	1.0	28.4	2.0	5.1	5.1	100.0	544
OTHR SERVICES	2.1	15.0	1.0	3.1	1.0	2.1	1.0	28.6	3.5	1.0	29.2	2.1	5.2	5.2	100.0	15911
TOTAL	21.1	21.7	4.7	4.4	3.0	2.0	0.9	21.4	3.1	4.8	8.1	1.1	1.4	2.2	100.0	135236

TABLE A.7. Vietnam's destination-specific exports by commodity (percent)

	ASEAN	JAPAN	TAIWAN	CHINA	HONGKONG	KOREA	OTHER ASIA	EU	EASTERN EUROPE	AUSTR. & NZEAL	USA	CANADA	LATIN AMER-ICA	REST OF WORLD	TOTAL
PADDY	0.0	0.0	0.0	0.1	0.0	0.0	63.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.7
RWRUBBER	1.2	0.2	5.1	7.8	1.1	2.0	0.7	1.7	1.8	0.2	0.4	0.9	2.6	1.8	1.5
COFFBEANS	0.8	0.9	0.0	0.2	0.0	7.0	0.1	9.0	10.0	2.7	11.0	6.2	0.0	1.3	3.9
SUGARCANE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHCROPS	9.8	1.1	14.4	5.7	13.3	14.6	15.0	5.3	8.1	9.6	9.5	15.7	4.4	17.4	7.3
PORK	3.0	0.0	0.0	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
POULTRY	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
OTHLVPLT	0.4	0.1	0.1	0.1	2.1	0.0	0.0	0.2	0.0	0.0	0.8	0.6	0.1	0.0	0.3
PRIM.AGRIC.	15.9	2.2	19.5	17.0	16.6	23.6	78.9	16.3	25.0	12.5	21.8	23.4	7.1	20.5	14.6
IRRIGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHAGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FORESTRY	0.0	0.1	1.5	0.5	0.2	0.1	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
FISHERY	2.9	4.0	3.2	0.7	26.0	0.5	0.3	0.1	0.1	0.6	2.1	0.2	0.1	1.0	2.7
MINING	16.5	33.9	1.2	59.5	0.0	10.6	0.0	1.5	12.2	67.2	5.3	0.0	4.3	1.5	18.2
PRCMEAT	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.2
PVAOIL	0.1	0.1	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
DAIRY	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
CKECHOC	0.0	0.1	0.4	0.0	0.5	0.1	0.0	0.2	0.0	0.1	0.2	1.1	0.0	0.0	0.1
PFRTVEG	0.2	0.8	4.2	0.1	0.6	1.2	0.0	0.5	1.6	0.3	0.8	0.6	2.3	0.5	0.7
ALCOHOL	0.3	0.7	0.0	0.0	4.2	0.0	0.0	0.0	0.1	0.1	0.5	0.1	0.0	0.0	0.4
NALDRNK	0.1	0.0	0.7	0.0	1.5	0.0	0.0	0.1	0.2	0.1	0.2	0.4	0.0	0.0	0.2
REFSUGAR	0.2	0.4	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	3.8	0.0	0.0	0.1	0.6
PRCOFFEE	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.7	0.3	1.2	1.3	0.0	0.0	0.2
PRTEA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	9.0	0.2
CIGTBCC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRSEAFD	2.2	16.8	0.6	0.7	16.3	5.7	0.3	4.0	0.1	3.9	12.1	9.1	0.1	5.3	7.0
OTHFOOD	45.1	0.4	3.0	0.2	1.3	0.4	1.5	0.5	30.6	0.2	0.6	1.2	16.6	3.3	11.2
TOT PRC.FOOD	48.7	19.3	8.9	6.7	28.5	7.4	1.8	6.4	34.6	5.1	19.4	14.0	19.0	18.4	21.3
MANUFACTURING	14.8	32.0	63.1	7.2	24.6	45.5	3.8	59.4	14.4	12.0	7.5	39.8	24.8	29.7	30.9
ELEC,GAS,WTR	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRADE, TRANSP.	0.0	0.3	0.1	0.3	0.1	0.4	0.4	0.5	0.4	0.1	1.4	0.7	1.5	0.9	0.4
OTHR SERVICES	1.2	8.1	2.6	8.1	4.1	11.8	13.1	15.7	13.2	2.5	42.5	21.9	43.2	28.0	11.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Value (bill. Dong)	28498	29371	6414	6017	4045	2769	1250	28994	4166	6445	10927	1502	1901	2937	135236

TABLE A. 8. Vietnam's commodity-specific imports by source (percent)

	ASEAN	JAPAN	TAIWAN	CHINA	HONG KONG	KOREA	OTHER ASIA	EU	EASTERN EUROPE	AUSTR. & NZEAL	USA	CANADA	LATIN AMERICA	REST OF WORLD	TOTAL	Value (bill. Dong)
PADDY	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	246
RWR UBBER	48.8	0.0	0.0	4.5	0.0	0.0	0.0	0.0	46.1	0.0	0.0	0.0	0.0	0.6	100.0	824
COFFBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
SUGARCANE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
OTHCROPS	11.9	0.0	0.0	30.3	0.0	0.0	7.4	6.0	21.3	1.3	0.0	0.0	0.7	21.3	100.0	10,159
PORK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.5	12.5	0.0	0.0	0.0	0.0	0.0	100.0	72
POULTRY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
OTHLVPLT	5.0	0.0	0.0	20.0	0.0	0.0	5.9	34.9	6.5	0.0	0.0	0.0	2.4	25.3	100.0	13
PRIM.AGRIC.	14.2	0.0	0.0	29.7	0.0	0.0	6.6	6.0	22.6	1.1	0.0	0.0	0.6	19.2	100.0	11,313
IRRIGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
OTHAGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
FORESTRY	14.6	0.0	0.0	18.0	0.4	0.0	0.1	21.6	17.8	0.0	0.0	0.0	1.2	26.3	100.0	692
FISHERY	3.1	0.0	0.0	5.2	0.0	0.0	3.5	14.5	23.1	0.0	0.0	0.0	3.5	47.1	100.0	24
MINING	41.5	0.0	0.0	31.0	0.0	0.0	0.0	3.0	2.0	0.0	0.0	0.0	6.5	16.0	100.0	368
PRCMEAT	50.9	0.0	0.0	9.1	0.0	4.6	0.3	0.4	0.1	0.0	0.0	0.0	0.0	34.5	100.0	305
PVAOIL	58.6	0.0	0.0	12.3	0.0	0.0	6.4	0.5	16.9	3.7	0.0	0.0	0.6	1.0	100.0	2,401
DAIRY	6.0	0.0	0.0	0.0	0.0	0.0	24.4	9.4	27.4	0.0	0.0	0.0	18.4	14.3	100.0	470
CKECHOC	33.8	0.0	0.0	3.7	0.0	0.0	4.1	6.9	4.3	0.4	0.0	0.0	1.2	45.7	100.0	117
PFRTVEG	26.3	0.0	0.0	12.2	0.0	1.5	12.6	8.8	0.0	0.0	0.0	0.0	4.7	33.9	100.0	148
ALCOHOL	11.1	0.0	0.0	3.3	0.1	0.0	35.8	29.2	0.9	0.0	0.0	0.0	3.3	16.3	100.0	78
NALDRNK	12.5	0.0	0.0	0.7	0.0	0.0	0.0	8.3	70.7	0.0	0.0	0.0	0.5	7.2	100.0	8
REFSUGAR	28.9	0.0	0.0	0.0	0.0	0.0	0.3	0.6	47.3	0.0	0.0	0.0	0.0	23.0	100.0	73
PRCOFFEE	89.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0	0.0	0.0	100.0	62
PRTEA	84.9	0.0	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	0.0	0.0	0.0	10.4	100.0	15
CIGTBCC	86.5	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	0.0	12.3	100.0	818
PRSEAFD	66.1	0.0	0.0	1.4	0.0	0.0	2.5	0.6	19.7	0.0	0.0	0.0	0.6	9.2	100.0	492
OTHFOOD	15.6	0.0	0.0	6.0	5.9	0.0	20.1	19.5	4.1	0.0	0.0	0.0	0.3	28.5	100.0	2,579
TOT PRC.FOOD	42.3	0.0	0.0	6.7	2.0	0.2	11.0	8.3	10.6	1.2	0.0	0.0	1.6	16.1	100.0	7,566
MANUFACTRNG	24.2	0.0	0.0	11.5	0.1	0.0	1.2	17.8	6.7	0.1	0.0	0.0	0.9	37.4	100.0	108,685
ELEC.GAS,WTR	8.0	0.2	0.0	37.5	0.0	0.0	4.2	6.9	21.3	0.0	0.1	0.0	0.4	21.5	100.0	14,118
CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
TRADE, TRNSP.	2.1	14.8	1.0	3.8	1.0	1.3	1.9	25.8	4.0	1.0	28.1	2.9	6.4	5.9	100.0	5,102
OTHR SERVICES	1.0	16.8	0.6	2.3	0.4	2.1	1.0	32.7	2.3	1.5	29.2	1.7	4.2	4.1	100.0	13,122
TOTAL	20.4	1.9	0.1	13.9	0.3	0.2	2.3	17.0	8.9	0.3	3.3	0.2	1.4	29.9	100.0	160,990

TABLE A.9. Vietnam's source-specific imports by commodity (percent)

	ASEAN	JAPAN	TAIWAN	CHINA	HONGKONG	KOREA	OTHER ASIA	EU	EASTERN EUROPE	AUSTR. & NZEAL	USA	CANADA	LATIN AMER-ICA	REST OF WORLD	TOTAL
PADDY	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
RWRUBBER	1.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.5
COFFBEANS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SUGARCANE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHCROPS	3.7	0.0	0.0	13.7	0.0	0.0	20.1	2.2	15.1	23.7	0.0	0.0	3.2	4.5	6.3
PORK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
POULTRY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHLVPLT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRIM.AGRIC.	4.9	0.0	0.0	15.0	0.0	0.0	20.2	2.5	17.8	23.7	0.0	0.0	3.2	4.5	7.0
IRRIGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OTHAGSRV	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FORESTRY	0.3	0.0	0.0	0.6	0.7	0.0	0.0	0.5	0.9	0.0	0.0	0.0	0.4	0.4	0.4
FISHERY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MINING	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1.1	0.1	0.2
PRCMEAT	0.5	0.0	0.0	0.1	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
PVAOIL	4.3	0.0	0.0	1.3	0.0	0.0	4.1	0.0	2.8	16.4	0.0	0.0	0.6	0.1	1.5
DAIRY	0.1	0.0	0.0	0.0	0.0	0.0	3.1	0.2	0.9	0.0	0.0	0.0	4.0	0.1	0.3
CKECHOC	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1
PFRTVEG	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.1	0.1
ALCOHOL	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
NALDRNK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
REFSUGAR	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
PRCOFFEE	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PRTEA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CIGTBCC	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5
PRSEAFD	1.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.7	0.0	0.0	0.0	0.1	0.1	0.3
OTHFOOD	1.2	0.0	0.0	0.7	36.6	0.0	13.9	1.8	0.7	0.0	0.0	0.0	0.4	1.5	1.6
TOT PRC.FOOD	9.8	0.0	0.0	2.3	36.6	4.0	22.4	2.3	5.6	16.5	0.0	0.0	5.6	2.5	4.7
MANUFACTURING	80.3	0.0	0.0	55.8	36.4	0.1	35.1	70.6	51.1	13.1	0.0	8.6	47.3	84.4	67.5
ELEC,GAS,WTR	3.4	0.8	0.0	23.6	0.7	0.3	16.1	3.5	21.0	0.0	0.2	0.0	2.3	6.3	8.8
CONSTRUCTION	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TRADE, TRANSP.	0.3	25.2	39.7	0.9	12.8	18.3	2.6	4.8	1.4	9.9	27.1	37.0	15.0	0.6	3.2
OTHR SERVICES	0.4	74.0	60.3	1.4	12.9	77.3	3.7	15.7	2.1	36.8	72.6	54.4	25.1	1.1	8.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Value (bill. Dong)	32,765	2,986	135	22,387	417	355	3,718	27,371	14,329	542	5,283	400	2,174	48,129	160,990

TABLE A. 10. Abbreviations and aggregations used in the Appendix tables

Sectors	<p>PADDY RWRUBBER COFFBEANS SUGARCANE OTHCROPS PORK POULTRY OTHLVPLT</p> <p>PRIM. AGRIC.</p> <p>IRRI GSRV OTHAGSRV</p> <p>FORESTRY FISHERY</p> <p>MINING</p> <p>PRCMEAT PVAOIL DAIRY CKECHOC PFRTVEG ALCOHOL NALDRNK REFSUGAR PRCOFFEE PRTEA CIGTBCC PRSEAFD OTHFOOD</p> <p>TOT PRC. FOOD</p>	<p>Paddy Raw rubber Coffee beans Sugarcane Other crops nec Pig Poultry Other livestock and poultry nec</p> <p>TOTAL PRIM. AGRICULTURE</p> <p>Irrigation services Other agricultural services</p> <p>Forestry Fishery</p> <p>Coal, uranium, thorium, metallic ore, stone, other non-metallic minerals, crude oils, nat.gas(exc.exploration)</p> <p>Proc., preserved meat and by -prods Proc. veg. & animal oils and fats Milk, butter and other dairy prods. Cakes,jams,candy,cocoa,choc.prods Proc. & pres. fruits and vegetables Alcohol, beer and liquors Non-alcoholic water & soft drinks Sugar, refined Coffee, processed Tea, processed Cigarettes and other tobacco prods. Processed seafood and by -products Other food manufactures nec</p> <p>TOTAL PROCESSED FOODS</p>	MANUFACTURING	<p>Glass and glass products Ceramics and by-products Paper,pulp,paper prods.& byprod. Processed wood & wood products Cement Bricks, tiles Concrete, mortar, cement prods. Other building materials Basic organic chemicals Basic inorganic chemicals Fertilizer Pesticides & veterinary medicine Health medicine Processed rubber and by -products Soap, detergent, perf., toiletries Plastic, incl. semi-plastic prods. Other plastic products Paint, ink, varnish, painting mat. Other chemical products Health instruments and apparatus Precise and optics equipment Motor veh., motor bikes, bikes Home appliances & spare parts General purpose machinery Special purpose machinery Other transport means nec Elec. machinery and equipment Mach.&equip. broadcastng.TV,IT Non-ferrous metals and products Ferrous metals & prods ex.mach. Fibers, thread & cloth weaving Ready-made clothes, sheets Carpets Weaving, textile embroidery Products of leather tanneries Leather goods Animal feeds</p>	<p>MANUFACTURING (continued)</p> <p>ELEC.GAS,WTR</p> <p>CONSTRUCTION</p> <p>TRADE & TRANSPORT</p> <p>OTHER SERVICES</p>	<p>... Printing activities ex. publishing Prods of other indust. activities Newspapers, periodicals, books Other physical goods nec</p> <p>Gasoline Lubricants Electricity Gas Water</p> <p>Construction</p> <p>Trade Land transportation services Railway transportation services Water transport services Air transport services</p> <p>Repairs of small transport means Hotels and restaurants Tourism Banking, credit, treasury, lotto Insurance & retirement subsidy Science and technology Real est., business, consultancy State management, defence, soc. sec. Education and training Health care, social relief Culture and sport Party organization, trade unions Personal & community services Household services</p>
Labor	<p>LABUNSK LABSMK LABHGSK</p>	<p>Unskilled labor Semi-skilled labor Highly skilled labor</p>				
Households	<p>HHRAGS HHRNAS HHRWAG HHUAGS HHUNAS HHUWAG</p>	<p>Rural agricultural self-employed households Rural non-agricultural self-employed households Rural wage-earning households Urban agricultural self-employed households Urban non-agricultural self-employed households Urban wage-earning households</p>				

Countries	ASEAN	Brunei Cambodia Indonesia Laos Malaysia Myanmar Philippines Singapore Thailand	EASTERN EUROPE	Albania Bulgaria Belarus Czech Republic Estonia Croatia Hungary Kazakstan Lithuania Latvia Moldova Macedna Poland Romania Russia Slovakia Slovenia Yugoslavia	LATIN AMERICA	Argentina Bolivia Brazil Chile Colombia Costa Rica Ecuador Grenada Mexico Nicaragua Peru Paraguay El Salvador Uruguay Venezuela
	JAPAN	Japan				
	TAIWAN	Taiwan				
	CHINA	China				
	HONGKONG	Hong Kong			REST OF WORLD	Switzerland / Lichtenstein
	KOREA	Korea	AUSTR. & NZEAL	Australia New Zealand		Cyprus Turkey Iceland Norway Israel
	OTHER	ASIA India Bangladesh Macau Pakistan	USA	USA		Algeria Egypt Kenya Morocco
	EU	Austria Belgium / Luxembourg Germany Denmark Spain Frnace Finland United Kingdom Greece Ireland Italy Netherlands Portugal Sweden	CANADA	Canada		Madagascar Malta Mauritius Nigeria Tunisia South African Customs Union Zimbabwe Kuwait Oman Saudi Arabia St Lucia Trinidad Barbados Greenland St Kittsnev

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