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**Working Paper**

## A pre-prototype 2015 Social Accounting Matrix (SAM) for Myanmar

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WIDER Working Paper 2019/21

## **A Pre-Prototype 2015 Social Accounting Matrix (SAM) for Myanmar**

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**Abstract:** This paper documents the compilation of a Pre-Prototype 2015 Social Accounting Matrix for Myanmar and provides an overview of key economic structural features of this emerging economy in a challenging process of transition. We built this Social Accounting Matrix using National Accounts and Supply and Use Table data as well as Balance of Payment data for the 2014–15 fiscal year together with Government Budget Statistics from the 2017 Statistical Yearbook. It provides a detailed representation of the Myanmar economy and identifies 43 activities and 43 commodities. We disaggregated labour by education attainment level and household income and expenditure by per capita expenditure quintiles for both urban and rural areas and farm and non-farm categories. The Social Accounting Matrix features government, investment, and foreign accounts and is a key database for conducting economy-wide impact assessments to strengthen the evidence underlying policy interventions.

**Keywords:** social accounting matrix, national accounts, supply table, use table, Myanmar

**JEL classification:** C63, E01, E16, P44

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## Table of contents

1	Introduction	1
2	General structure of SAMs	1
3	Constructing the SAM	4
4	Finalizing the SAM	9
5	Employment	9
6	The structure of the Myanmar economy	10
7	Data issues	16
8	Way forward	17
	References	17

## List of acronyms

ADB	Asian Development Bank
CSO	Central Statistical Organization
GDP	Gross Domestic Product
LFS	Labour Force Survey
MLCS	Myanmar Living Conditions Survey (2017)
MoPF	Ministry of Planning and Finance
MPLCS	Myanmar Poverty and Living Conditions Survey (2015)
PD	Planning Department
SAM	Social Accounting Matrix
SUT	Supply and Use Table

## 1 Introduction

This study outlines the construction of a Pre-Prototype 2015 Social Accounting Matrix (SAM) for Myanmar and provides an overview of key economic structural features of this emerging economy in a challenging process of transition. A SAM is a consistent data framework that captures data and information contained in national income accounts and industry and product accounts, as well as the monetary flows between the institutions of the economy. Since the SAM is a square accounting framework, total receipts (row totals) must equal total payments (column totals) for each matching account reported in the SAM. We collected the required data from various sources. It was therefore necessary to make a careful and time-consuming effort to compile the data in a coherent manner and make it consistent. This process was valuable since it helped with identifying inconsistencies among the original statistical sources. For example, there are invariably differences between the incomes and expenditures reported in household surveys and national accounts. SAMs are economy-wide databases used in conjunction with analytical techniques to strengthen the evidence underlying policy formulation processes and decision-making.

We used three main sources of data for the Pre-Prototype 2015 Myanmar SAM developed in this document. First, we used a 2016 report containing 2015 Myanmar National Accounts data, a Supply and Use Table and associated Balance of Payment data (Ministry of Planning and Finance 2016) compiled by the Asian Development Bank (ADB) and the Myanmar Planning Department (PD) of the Ministry of Planning and Finance (hereafter referred as the ‘SUT document’). Second, we obtained the 2015 Government Budget Statistics from the 2017 Statistical Year Book (CSO 2017). Third, we used the 2015 Myanmar Poverty and Living Conditions Survey (MPLCS) (MoPF 2017) for the breakdown of labour and households.

The SAM provides a detailed representation of the Myanmar economy, identifying 43 activities and 43 commodities. It disaggregates labour by education attainment level and household income and expenditures by per capita expenditure quintiles for urban and rural areas and engagement in farming activities. The SAM identifies government, investment, and foreign accounts.

After this introduction, Section 2 reviews the general structure of SAMs. Section 3 describes the data sources used to construct the SAM, while we discuss the finalization of the detailed SAM accounts in Section 4. In Section 5, we describe an attempt to estimate matching employment data while Section 6 briefly describes selected aspects of the Myanmar economic structure through the lens of the SAM. Section 7 reports on key data issues noted during the compilation process, highlighting the need for further work on this SAM, addressed in the concluding Section 8.

## 2 General structure of SAMs

A SAM is an economy-wide accounting framework that usually represents the real economy of a single country<sup>1</sup> reported as a square matrix with each account represented by a row and column. Each cell shows the payment from the account shown in the column heading to the account shown in the row heading—the incomes of an account appear along its row, its expenditures down its column. The underlying principle of double-entry accounting requires that for each account in the

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<sup>1</sup> For general discussions of SAMs and SAM-based modelling, see Pyatt and Round (1985), Pyatt (1988), Arndt et al. (2000), Tarp et al. (2002), and Breisinger et al. (2009).

SAM, total revenue (row total) equals total expenditure (column total). Table 1 shows an aggregate SAM (with written explanations instead of numbers) with reference to Myanmar-specific data.

The SAM makes a distinction between ‘activities’ (the entities that carry out production) and ‘commodities’ (representing markets for goods and non-factor services). SAM flows are valued at producers’ prices in the activity accounts and at market prices (including indirect commodity taxes and transactions costs) in the commodity accounts. The commodities consist of output produced by local activities (which are either exported or sold domestically) and imports.

Payments by activities shown as entries down the columns in the SAM go to commodity accounts (comprising locally produced and imported goods and non-factor services, at market prices) for intermediate demand, and factors of production (value added comprising operating surplus and compensation of employees, land and/or livestock). The commodity accounts make payments (shown again as columns) to domestic activities, the rest of the world, and various tax accounts (for domestic and import taxes). This treatment allows for the data to model imports as perfect or imperfect substitutes vis-à-vis domestic production.

Government consists of a core government account and different tax collection accounts, one for each tax type identified in the data. In the SAM, direct payments between the enterprises, households, government, and the rest of the world reflect transfers as reported in the National Accounts, Government Budget, and Balance of Payment statistics. As mentioned earlier, in the case of Myanmar, we draw on Government Budget Statistics as published in the 2017 Statistical Yearbook (CSO 2017) and Balance of Payment statistics from the SUT document.

The SAM contains a number of factors of production, which earn incomes from their use in the production process, and then pay their incomes to enterprises, households, government, and the rest of the world. Government taxes indirect capital earnings and enterprise profits according to the average corporate tax rates, and the SAM also reflects the repatriation of some profits abroad. The remaining capital earnings, together with labour earnings, appear as payments to households. Households use their incomes to pay taxes, make transfers, save, and consume a combination of domestically produced and imported commodities.

Table 1: The basic structure of a 2015 SAM for Myanmar

	Row number	Activities	Commodities	Factors	Enterprises	Households	Government	Taxes	Investment	Change in stocks	Rest of the world (RoW)	Total
Column serial number		1 (43)*	2 (43)	3 (11)	4 (1)	5 (20)	6 (1)	7 (5)	8 (1)	9 (1)	10 (1)	
Activities	1		Marketed output									Activity income
Commodities	2	Intermediate inputs	Transaction costs			Marketed consumption of households	Marketed consumption of households		Investment	Change in stocks	Exports	Total demand
Factors	3	Value added									Remittances received by Myanmar factors from RoW	Factor earnings
Enterprises	4			Factor income to enterprises			Transfers to enterprises					Enterprises earnings
Households	5			Factor income to households	Indirect capital payments		Transfers to households				Net foreign remittances received	Household income
Government	6				Revenue from state economic enterprises			Revenue from taxes			Net foreign transfers to the government	Government income
Taxes	7	Activity taxes	Sales taxes	Factor taxes	Corporate income taxes	Personal taxes						Revenue from taxes
Savings	8				Enterprises savings	Household savings	Government savings				Foreign savings	Savings
Change in stocks	9								Change in stocks			Change in stocks
Rest of the world	10		Imports	Gross payments to foreign owned factors of production	Enterprise payments to RoW		Government Transfers to the RoW					Foreign exchange outflow
Total		Gross output	Total supply	Factor expenditure	Enterprise expenditure	Household expenditure	Government expenditure	Revenue from taxes	Investment	Change in stock	Foreign exchange inflow	

Source: Authors' compilation.

### 3 Constructing the SAM

The main challenge of building a SAM involves combining data from various sources into an internally coherent SAM framework. For Myanmar, we collected this information from the National Accounts, associated Balance of Payment data and a Supply and Use Table from the SUT document, as well as Government Budget Statistics from the 2017 Statistical Year Book (CSO 2017).

The SUT document's data components consist of Supply and Use Table data, National Accounts, and Balance of Payment data. They are internally consistent (barring some rounding differences). Given total savings, it is possible to derive domestic savings since foreign savings equal the negative of the current account on the Balance of Payment. The breakdown of domestic savings in government and non-government reflects that the budget surplus on the public sector's current account is available in the Government Budget Statistics from the 2017 Statistical Year Book (CSO 2017). The residual non-government domestic savings are broken down into enterprise and household savings. The latter is the balancing item of the household accounts, while enterprise savings make up the balancing item of the savings–investment account.

Put differently, a number of steps are involved in constructing the SAM. The first step in constructing the Myanmar SAM is compiling national accounts and other official data sources into a consistent Macro SAM framework, which we subsequently expand with detailed industries and products using a Supply and Use Table. We name this a SUTSAM. Households and the production factor labour appear in the SUTSAM as single accounts.

The second step in turn draws on survey information to disaggregate the labour and the household accounts. The breakdown of labour and household accounts makes use of the unpublished MPLCS by PD (2016), which we discuss in more detail in the next section.

The Macro SAM shown in Table 2 is an aggregation of the more detailed Micro SAM. The rest of this section explains how each Macro SAM entry is derived and disaggregated, and we discuss in turn each entry in the SAM. The notation for SAM entries is (row, column) and the values are in billions of Kyat (MMK).<sup>2</sup> Product and industry classifications are available in Appendix A and a global set of all accounts in the SAM is included in Appendix B.

- 1 (Commodities, Activities)...MMK99,809 billion  
Intermediate inputs. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities x 43 activities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 2 (Labour, Activities)...MMK17,486 billion  
Wage earnings. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 24 labour types (no-education illiterate/no-education literate/monastery/primary/secondary/tertiary education, and rural/urban and farm/non-farm) x 43 activities. The source of the disaggregation is the 2015 MPLCS and the 2015 Use Table, Table 9, SUT document respectively.
- 3 (Capital, Activities)...MMK58,160 billion

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<sup>2</sup> The Central Statistical Organization (CSO) of the Ministry of Planning and Finance of Myanmar can authorize use of the final disaggregated SAM data upon request.



- Gross operating surplus. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 5 types of capital x 43 activities. We discuss the disaggregation in the following types of capital: agriculture capital, non-agriculture capital, land, livestock, and fishery stock in Section 7d–e.
- 4 (Act Tax, Activities)...MMK1,738 billion  
Taxes on production. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 1 tax type x 43 activities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 5 (Activities, Commodities)...MMK177,192 billion  
Domestics supply. Available from the 2015 Supply Table, Table 8, SUT document. The dimensions of disaggregation are 43 activities x 43 commodities. The source of the disaggregation is the 2015 Supply Table, Table 8, SUT document.
- 6 (Sales Tax, Commodities)...MMK1,965 billion  
Sales taxes. Available from the 2015 Supply Table, Table 8, SUT document. The dimensions of disaggregation are 4 tax types (excise tax, commercial tax, state lottery and transportation tax, and goods and services tax) x 43 commodities. The source of the disaggregation is the 2015 Supply Table, Table 8, SUT document.
- 7 (Imp Tax, Commodities)...MMK372 billion  
Custom Duties. Available from the 2015 Supply Table, Table 8, SUT document. The dimensions of disaggregation are 1 tax type x 43 commodities. The source of the disaggregation is the 2015 Supply Table, Table 8, SUT document.
- 8 (Rest of the world, Commodities)...MMK14,921 billion  
Imports. Available from the 2015 Supply Table, Table 8, SUT document. The dimensions of disaggregation are 1 foreign region type x 43 commodities. The source of the disaggregation is the 2015 Supply Table, Table 8, SUT document.
- 9 (Households, Labour)...MMK17,624 billion  
Household income from wage earnings. Calculated as a residual. The dimensions of disaggregation are 20 household types (5 quintiles, urban/rural and farm/non-farm) x 24 labour types. The source of the disaggregation is the 2015 MPLCS.
- 10 (Rest of the world, Labour)...MMK0 billion  
Wage earnings paid to foreign (non-resident) workers. Available from the SUT document, Table 7. The dimensions of disaggregation are 24 labour types. The disaggregation reflects the shares for total domestic labour. See previous point.
- 11 (Enterprises, Capital)...MMK43,799 billion  
Enterprise income from capital. The dimensions of disaggregation are 1 type of enterprise x 5 types of capital. See Section 7d–e for further detail.
- 12 (Households, Capital)...MMK9,748 billion  
Household income from mixed income source. The dimensions of disaggregation are 20 household types x 5 capital types. See Section 7d–e for further detail.
- 13 (Fact Tax, Capital)...MMK1,488 billion  
Taxes on the use of state properties. Available from the Statistical Yearbook 2017 (Table 17.02, p. 542). The dimensions of disaggregation are 1 tax type x 5 types of capital. The source of the disaggregation reflects detail available in the Statistical Yearbook 2017 (Table 17.02, p. 542).
- 14 (Rest of the world, Capital)...MMK3,183 billion  
Payments to the rest of the world for surpluses generated by ownership of capital. Available from the SUT document, Table 7 (item D.4, property income). The dimensions of disaggregation are 5 types of capital. We allocate the full amount to non-agriculture.
- 15 (Households, Enterprises)...MMK33,813 billion

- Calculated as the residual of the enterprise account. The dimensions of disaggregation are 20 household types. See Section 7d–e for further detail.
- 16 (Government, Enterprises)...MMK608 billion  
Government earnings from state economic enterprises and interest receipts. Available from the Statistical Yearbook 2017, Government Budget Statistics (Table 17.02, p. 542).
- 17 (Dir Tax, Enterprises)...MMK205 billion  
Corporate Tax, Myanmar Business Survey (CSO 2016: Table 14).
- 18 (Sav=Inv, Enterprises)...MMK9,742 billion  
Retained earnings by enterprises. Calculated as the balancing item of the savings–investment account.
- 19 (Rest of the world, Enterprises)...MMK498 billion  
Payments by enterprises to the rest of the world. 60 per cent of miscellaneous current transfers (remittances). Available from the SUT document, Table 7 (item D.75). The remaining 40 per cent allocated to households. See 23 below.
- 20 (Commodities, Households)...MMK43,477 billion  
Household expenditure. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities x 20 household types. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document and the 2015 MPLCS.
- 21 (Dir Tax, Households)...MMK2,030 billion  
Individual Income Tax. Taxes on Income and Profit is available from the Statistical Yearbook 2017, Government Budget Statistics, Table 17.02, p. 542. Corporate tax, see 17 above, subtracted. The dimensions of disaggregation are 20 household types. The disaggregation reflects shares from the 2012 Viet Nam SAM (Hoai et al. 2016).
- 22 (Sav=Inv, Households)...MMK19,188 billion  
Household savings. Calculated as the balancing item of the household accounts. Disaggregation reflects household expenditure shares.
- 23 (Rest of the world, Households)...MMK332 billion  
Payments by households to the rest of the world. 40 per cent of miscellaneous current transfers (remittances). Available from the SUT document, Table 7 (item D.75). The remaining 60 per cent allocated to enterprises—see 19 above. The dimensions of disaggregation are 20 household types. The source of the disaggregation is the 2015 MPLCS.
- 24 (Commodities, Government)...MMK5,189 billion  
Government expenditure. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 25 (Enterprises, Government)...MMK736 billion  
Interest Payments. Available from the Statistical Yearbook 2017, Government Budget Statistics (Table 17.01, p. 537).
- 26 (Households, Government)...MMK874 billion  
Social Benefit and State Pension Transfers from Government to Households. Calculated as the balancing item of the government accounts (see Section 7b for more detail) The dimensions of disaggregation are 20 household types. The source of the disaggregation is the 2015 MPLCS.
- 27 (Sav=Inv, Government)...MMK1,919 billion  
Surplus on the *current account* of the government. Available from the Statistical Yearbook 2017, Government Budget Statistics (Table 17.01, p. 37).
- 28 (Rest of the world, Government)...MMK0 (zero) billion

- Payments by government to the rest of the world. Available from the SUT document, Table 7 (item D.74, current international cooperation).
- 29 (Government, Act Tax)...MMK1,738 billion  
Transfer from the Internal Revenue Department to government. See 4 above.
- 30 (Government, Sales Tax)...MMK1,965 billion  
Transfer of from Internal Revenue Department to government. See 6 above.
- 31 (Government, Imp Tax)...MMK372 billion  
Transfer of from Internal Revenue Department to government. See 7 above.
- 32 (Government, Fact Tax)...MMK1,488 billion  
Transfer of from Internal Revenue Department to government. See 17 above.
- 33 (Government, Dir Tax)...MMK2,235 billion  
Transfer of from Internal Revenue Department to government. See 21 above.
- 34 (Commodities, Sav=Inv)...MMK31,390 billion  
Investment demand. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 35 (Change in stocks, Sav=Inv)...MMK1,028 billion  
Total of changes in stocks transferred to the savings = investment account. See 36 below.
- 36 (Commodities, Change in stocks)...MMK1,028 billion  
Change in stocks. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 37 (Commodities, Rest of the world)...MMK13,558 billion  
Exports. Available from the 2015 Use Table, Table 9, SUT document. The dimensions of disaggregation are 43 commodities. The source of the disaggregation is the 2015 Use Table, Table 9, SUT document.
- 38 (Labour, Rest of the world)...MMK138 billion  
Transfer receipts by labour from abroad. Available from the SUT document, Table 7 (item D.1, compensation of employees). The dimensions of disaggregation is 24 labour types. The disaggregation reflects the same shares as for total domestic labour.
- 39 (Capital, Rest of the world)...MMK59 billion  
Transfer receipts by capital from abroad. Available from the SUT document, Table 7 (item D.4, property income).
- 40 (Enterprises, Rest of the world)...MMK330 billion  
Transfer receipts by enterprises from abroad. Available from the SUT document, Table 7 (10 per cent of item D.75, miscellaneous current transfers, remittances).
- 41 (Households, Rest of the world)...MMK2,968 billion  
Transfer receipts by households from abroad. Available from the SUT document, Table 7 (90 per cent of item D.75, miscellaneous current transfers, remittances). The dimensions of disaggregation are 20 household types. The source of the disaggregation is the 2015 MPLCS.
- 42 (Government, Rest of the world)...MMK312 billion  
Transfer receipts by government from abroad. Available from the SUT document, Table 7 (item D.74, current international cooperation).
- 43 (Sav=Inv, Rest of the world)...MMK1,569 billion  
Foreign savings = deficit on the current account of the Balance of Payment. Available from the SUT document, Table 7 (item B.12 current external balance).

Table 2: A 2015 Macro SAM for Myanmar (billions of Kyat, MMKbillion)

	Row #	Activities	Commodities	Labour	Capital	Enterprises	Households	Government	Act tax	Sales tax	Imp tax	Fact tax	Dir tax	Sav=Inv	Change in stocks	Rest of the world	Total
Column #		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Activities	01		177,192														177,192
Commodities	02	99,809					43,477	5,189						31,390	1,028	13,558	194,450
Labour	03	17,486														138	17,624
Capital	04	58,160														59	58,218
Enterprises	05				43,799			736								330	44,865
Households	06			17,624	9,748	33,813		874								2,968	65,027
Government	07					608			1,738	1,965	372	1,488	2,235			312	8,718
Act tax	08	1,738															1,738
Sales tax	09		1,965														1,965
Imp tax	10		372														372
Fact tax	11				1,488												1,488
Dir tax	12					205	2,030										2,235
Sav=Inv	13					9,742	19,188	1,919								1,569	32,418
Change in stocks	14													1,028			1,028
Rest of the world	15		14,921		3,183	498	332										18,934
Total	16	177,192	194,450	17,624	58,218	44,865	65,027	8,718	1,738	1,965	372	1,488	2,235	32,418	1,028	18,934	

Source: Authors' calculations.

## 4 Finalizing the SAM

Finalizing the SAM takes place in two stages. First, we construct a detailed SAM that contains aggregate entries for the factors of production capital and labour and for households. Up to this point, the SAM is labelled here as the SUTSAM. As mentioned at the start of the previous section, the core data of this SUTSAM comes from the SUT document's Supply and Use Table. The SUT document also provides National Accounts and the Balance of Payment statistics. In addition, we added Government Budget Statistics from CSO's 2017 Statistical Yearbook. To complete the SUTSAM, we eliminated minor rounding errors in the SUT by means of manual adjustments.

In a second stage, we disaggregate the SUTSAM across factors and households using 2014/15 Household Survey data from the 2015 MPLCS (MoPF 2017). For wage earnings across labour types, the mapping of activities from the MPLCS to the SAM is available in Appendix C.

Next, we integrate household income and expenditure survey data and tax payments with the SUTSAM. All sources of household income and household expenditure were initially, and where possible, disaggregated across household types using the 2014/15 Household Survey data from the MPLCS. Some household expenditures are not included in the MPLCS. We use proxies from some other expenditures as shown in Appendix D. Payment of taxes and savings by individuals in households are not available in the MPLCS. We use distributions from the 2012 Viet Nam SAM (Hoai et al. 2016) for the former, while we distributed total savings across the households according to total household outlays.

The MPLCS does not record non-wage receipts by households except for social transfers from the government and those received from the rest of the world. We distributed other non-wage household income derived from capital and from enterprises across households using matching information from a 2012 Vietnam SAM (Hoai et al. 2016). We compared the resulting total income with the total outlays of each household and bi-proportional scaling of the income distribution submatrix of the SAM to balance the household accounts such that imbalances disappear while holding all other non-household-related entries of the SUTSAM constant.

## 5 Employment

We used the MPLCS to extract wage earnings. We can use the same source to estimate employment by activity and education attainment, but some additional complications are noted. A worker may have multiple jobs and it is possible to use weights based on the earnings shares of a job in a worker's total income. However, in that way we match only the non-zero incomes with non-zero counts of workers and avoid employment where there are no earnings. Yet, there may be jobs with zero income reported. That is not a problem if there is at least one job with non-zero income. Accordingly, if a worker has two jobs, but one of them has zero income reported, then the job with non-zero income gets a weight of one, as it is 100 per cent of the worker's total wage earnings. However, there are also some cases where all jobs reported zero income. If a worker has three jobs with zero income reported, they all get a zero weight. In that case, the worker do not count and total employment will be under-reported. Therefore, we scaled the results to total employment (count of workers with zero and non-zero earnings) for each labour category.

In a second step, the distribution of employment estimates across the labour types for the 13 activities of the MPLCS are applied to the 43 SAM activities using the same shares as wage earnings using the mappings shown in Appendix C.

Finally, we scaled the employment estimates bi-proportionally to be consistent with the following benchmarks:

- Total employment according to the 2017 Statistical Year Book
- 2015 Labour Force Survey (LFS, Department of Labour, 2016, p45) reports estimates of employment shares for a limited number of broad industries
- Employment shares for urban and rural areas based on employment to population ratios from the 2015 LFS (Department of Labour, 2016. P35) and unpublished population estimates from population projections by the Department of Population.

## **6 The structure of the Myanmar economy**

While SAMs are typically put together to serve as the underlying data framework of an economy-wide model, they can also be used as a descriptive tool to derive observations about the structure of an economy. In this section, we examine selected aspects of the Myanmar economy through the lens of the Pre-Prototype 2015 SAM. These observations are by no means exhaustive. They are a precursor for further work in this area. In this section, we consider industry value added, trade, household expenditure, and income distribution in turn.

In Table 3, we show the contribution by each of the 43 activities identified in the SAM to gross domestic product (GDP) at factor costs (i.e. excluding activity taxes). Note that aggregation has an impact on the shares, hence the high share of wholesale and retail trade. The same applies to the second (other crops) to the fourth (other manufacturing) entry in the table. Unsurprisingly, those activities feature highly in this ranking.

At the same time, specific activities such as paddy and fisheries also rank in the top ten. Agriculture is therefore an important activity in the Myanmar economy, as can be seen in the second tableau of the table showing 1-digit industry shares. Here, agriculture is second to private services only, while manufacturing comes a distant third. Back in the first tableau, it is clear that food processing contributes most to manufacturing, followed by an aggregation of unspecified other manufacturing activities.

Table 3: Contribution to GDP at factor costs according to a 2015 SAM for Myanmar

	Share in total VA@fct cst
1 Wholesale and retail trade	17.0%
2 Other crops	9.4%
3 Food, beverage and tobacco products	8.0%
4 Other manufacturing products	7.8%
5 Construction	6.9%
6 Fuel minerals	6.6%
7 Land transport	4.6%
8 Fisheries	4.5%
9 Paddy	4.4%
10 Livestock	3.5%
11 Public admin. and defence; compulsory social security	3.2%
12 Restaurants	3.2%
13 Other services	2.9%
14 Owner occupied dwellings	2.3%
15 Fruits	1.6%
16 Water transport	1.6%
17 Wearing apparel & textiles	1.2%
18 Electricity, gas and steam	1.2%
19 Other mining including support services	1.0%
20 Banking	1.0%
21 Maintenance & repair of motor vehicles	1.0%
22 Warehousing and support activities for transportation	0.9%
23 Vegetables	0.9%
24 Forestry and logging	0.8%
25 Health	0.6%
26 Other administrative and support services	0.6%
27 Education	0.5%
28 Non-metallic mineral products	0.5%
29 Professional, scientific and technical activities	0.3%
30 Domestic services	0.3%
31 Hotels	0.3%
32 Real estate	0.3%
33 Printing and reproduction of recorded media	0.3%
34 Water supply, sewerage	0.2%
35 Air transport	0.2%
36 Coke and refined petroleum products	0.2%
37 Computer programming, consultancy and information service activities	0.1%
38 Publishing, motion pictures, video, TV and radio	0.1%
39 Insurance and other financial auxiliary services	0.1%
40 Travel agencies	0.0%
41 Postal and courier	0.0%
42 Sale of motor vehicles	0.0%
43 Telecommunication	-0.3%
Total	100.0%
1 Agriculture	25.1%
2 Mining	7.6%
3 Manufacturing	18.0%
4 Utilities	1.4%
5 Construction	6.9%
6 Private Services	36.5%
7 Public Services	4.4%
Total	100.0%

Source: 2015 Myanmar SAM and authors' calculations.

Gross domestic product or value added represents payments to the factors of production capital and labour. Capital, according to the SUT document, also includes payments for mixed income, i.e. where the distinction between capital and labour is difficult to make. Tables 4 and 5 investigate what the shares are of labour and capital in GDP for the various activities identified in the Myanmar SAM. We report the top ten activities with the highest shares of labour in Table 4.

Table 3: Wage earnings share in GDP for selected industries according to 2015 SAM for Myanmar

	Share in activity VA Labour
1 Wearing apparel & textiles	83.7%
2 Water transport	63.3%
3 Other administrative and support services	60.8%
4 Public admin. and defence; compulsory social security	59.8%
5 Postal and courier	53.2%
6 Education	48.2%
7 Travel agencies	43.0%
8 Printing and reproduction of recorded media	42.9%
9 Publishing, motion pictures, video, TV and radio	39.5%
10 Other manufacturing products	36.5%
1 Agriculture	17.9%
2 Mining	3.9%
3 Manufacturing	28.3%
4 Utilities	5.5%
5 Construction	29.9%
6 Private Services	23.9%
7 Public Services	53.8%
8 Total	23.1%

Source: 2015 Myanmar SAM and authors' calculations.

The textile and clothing industry leads the way in terms of labour share in value added, followed by a number of services industries, including the public sector. However, even for the relatively high-ranking activity of travel agencies, printing, and publishing, where capital outlay is expected to be modest, the wage share is already well below 50 per cent. This suggests that there may be a significant number of owner-operated production units operating in these activities, where mixed income may be an important source of income.

The second tableau of Table 4 highlights the relatively low share of wage earnings by employed labour in GDP. The last row reports that the economy-wide average is not more than just over 23 per cent. This suggests that the mixed income or own-account earnings, which is accounted for by the production factor capital, could be an important albeit somewhat hidden component of GDP. The matching shares of capital/mixed income are available in Table 5.

Table 4: Gross operating surplus share in GDP for selected industries according to 2015 SAM for Myanmar

	Share in activity VA Labour
1 Telecommunication	367.9%
2 Owner occupied dwellings	100.0%
3 Domestic services	100.0%
4 Fisheries	100.0%
5 Fuel minerals	99.0%
6 Coke and refined petroleum products	97.9%
7 Electricity, gas and steam	96.5%
8 Livestock	91.7%
9 Real estate	91.6%
10 Insurance and other financial auxiliary services	89.8%
1 Agriculture	82.1%
2 Mining	96.1%
3 Manufacturing	71.7%
4 Utilities	94.5%
5 Construction	70.1%
6 Private Services	76.1%
7 Public Services	46.2%
Total	76.9%

Source: 2015 Myanmar SAM and authors' calculations.

The case of telecommunication is interesting. The Use Table reports negative gross operating surplus for the industry that is larger in absolute terms than the wage earnings it pays. Hence, value



added for the industry is negative and the share of negative gross operating surplus in negative value added then technically becomes larger than 100 per cent. We believe the reason for the negative gross operating surplus relates to high establishment investment in new segments of mobile and broadband industries so the implied losses could be of a temporary nature. A very high share is also associated with fisheries, which may be due to mainly owner-operated production units. More in line with expectations, fuel minerals, coke and refined petroleum products producers, and electricity, gas and steam are highly capital intensive, while owner occupied dwellings, domestic services, livestock, and real estate services may also have a significant degree of owner operation.

Next, we turn our attention to commodities, starting with household expenditure patterns. In Table 6, we show patterns for all households, rural households, and urban households in the respective tableaus. Expenditure of food and beverage constitutes the highest share, on average, but it is higher for rural compared to urban households. In urban areas, owner occupied dwellings, usually referring to imputed own accommodation rents is the second highest, while, as expected, it does not feature in the top ten of rural households, nor for that matter does expenditure on banking and health services. However, the opposite is the case for a number of agricultural products such as vegetables and forestry products.

Table 5: Household expenditure shares

	% of expenditure by All Households
1Food, beverage and tobacco products	55.2%
2Other crops	7.1%
3Fisheries	6.0%
4Owner occupied dwellings	5.4%
5Other manufacturing products	4.5%
6Restaurants	3.1%
7Livestock	2.7%
8Banking	1.6%
9Forestry and logging	1.6%
10Vegetables	1.5%
	% of expenditure by Rural Households
1Food, beverage and tobacco products	59.6%
2Other crops	8.9%
3Fisheries	6.3%
4Other manufacturing products	4.4%
5Restaurants	2.8%
6Livestock	2.8%
7Forestry and logging	1.9%
8Vegetables	1.7%
9Wearing apparel & textiles	1.3%
10Coke and refined petroleum products	1.2%
	% of expenditure by Urban Households
1Food, beverage and tobacco products	48.1%
2Owner occupied dwellings	12.8%
3Fisheries	5.6%
4Other manufacturing products	4.7%
5Other crops	4.1%
6Banking	3.9%
7Restaurants	3.6%
8Livestock	2.5%
9Coke and refined petroleum products	1.7%
10Health	1.3%

Source: 2015 Myanmar SAM and authors' calculations.

In Table 7, we show detail of commodity imports. Other manufacturing products account for more than half of total imports followed by refined petroleum and food products.

Table 6: Share in total imports and imports as a share of total supply

	% of total imports
1Other manufacturing products	54.4%
2Coke and refined petroleum products	16.9%
3Food, beverage and tobacco products	8.5%
4Water transport	7.0%
5Wearing apparel & textiles	3.2%
6Non-metallic mineral products	2.8%
7Insurance and other financial auxiliary services	2.3%
8Other administrative and support services	1.0%
9Computer programming, consultancy and information service activities	0.9%
10Other crops	0.7%
	Import % of total supply
1Insurance and other financial auxiliary services	87.1%
2Coke and refined petroleum products	69.0%
3Computer programming, consultancy and information service activities	56.6%
4Travel agencies	44.5%
5Water transport	34.8%
6Postal and courier	23.8%
7Professional, scientific and technical activities	20.9%
8Other manufacturing products	16.4%
9Other administrative and support services	14.0%
10Non-metallic mineral products	13.2%

Source: 2015 Myanmar SAM and authors' calculations.

Some services, such as insurance and other financial auxiliary services and computer programming, consultancy and information service activities, and others are also in the top ten of the first tableau.

Others such as travel agencies, water transport, postal and courier, professional, scientific and technical activities, and other administrative and support services do not account for a large share of total imports. However, import penetration—measured here by the share of these imports in total supply of these services and shown in the second tableau—is relatively high for all mentioned. In view of this, one could argue that the Myanmar economy is under-served by local providers.

In Table 8, data are available for exports in the same way as in Table 7 for imports. The first tableau shows the top ten shares in total exports and the second tableau shows the export–output ratio. Interestingly, fuel minerals accounts for the highest share of exports, while refined petroleum products accounts for one of the highest import shares and import penetration ratios (see Table 7). A similar picture emerges for other manufacturing products and to a lesser degree for insurance and other financial auxiliary services, wearing apparel and textiles, and food, beverage and tobacco products. This could be the result of high aggregation, where many different types of commodities and services are lumped together and the presence of ‘intra-industry’ trade is more likely. Nevertheless, one could also argue that this suggests that there may be opportunities for local value addition. Note also that tourism related services such as restaurants, air transport, professional, scientific and technical activities, hotels, and travel agencies display a high export share of their total output. With the gradual opening up of the country to foreign visitors, these industries are likely to gain more prominence in total exports.

Table 7: Share in total exports and exports as a share of total demand

	% of total exports
1Fuel minerals	39.6%
2Restaurants	13.0%
3Other manufacturing products	11.6%
4Wearing apparel & textiles	8.2%
5Other crops	7.3%
6Fisheries	4.9%
7Food, beverage and tobacco products	3.9%
8Non-metallic mineral products	2.1%
9Insurance and other financial auxiliary services	2.0%
10Water transport	1.5%
	Export % of total demand
1Insurance and other financial auxiliary services	69.8%
2Fuel minerals	55.3%
3Publishing, motion pictures, video, TV and radio	43.8%
4Restaurants	39.5%
5Air transport	28.3%
6Professional, scientific and technical activities	26.9%
7Hotels	25.4%
8Travel agencies	23.4%
9Postal and courier	22.7%
10Other administrative and support services	16.2%

Source: 2015 Myanmar SAM and authors' calculations.

Finally, we turn to the distribution of income. The sources of income for households are included in Table 9. Across the top of the table, we aggregate up to low and high income for a combination of rural/urban and farm/non-farm households. In the table, low income accounts for the first four quintiles of the SAM and high income represents the fifth quintile. The data originate from the MPLCS (MoPF 2017). Sources of income are included as row headings. Low skilled labour represents all labour except workers with tertiary education (diplomas and degrees). We divide gross operating surplus that can be associated with capital stock between agriculture and non-agriculture. We transfer the former directly to households as mixed income. We assume that non-agriculture capital transfers in full to enterprises. Hence, row 4 is empty. Enterprises then distribute that income to households as shown in row 8. Other forms of gross operating surplus transfers are associated with fish stock, land and livestock. More detail about the underlying data is available in Section 7d–e.

Table 8: Income distribution

		Rural farm low inc HH	Rural farm high inc HH	Rural non-farm low inc HH	Rural non-farm high inc HH	Urban farm low inc HH	Urban farm high inc HH	Urban non-farm low inc HH	Urban non-farm high inc HH	Average
1	Low skilled labour	10.4%	5.8%	39.4%	9.4%	8.7%	15.9%	60.3%	15.1%	18.9%
2	High skilled labour	0.4%	0.8%	1.5%	0.9%	1.3%	5.4%	11.6%	13.6%	6.0%
3	Agr capital	14.0%	15.7%			13.5%	15.8%			4.4%
4	Non-agr capital									
5	Fish stock	6.8%	19.9%			0.7%				3.9%
6	Land	47.6%	32.5%			45.8%	31.5%			11.0%
7	Livestock	9.7%	9.8%			6.4%	6.9%			2.8%
8	Enterprises	9.7%	13.7%	38.7%	84.3%	21.8%	22.5%	25.1%	69.5%	47.7%
9	Govt transfers	0.4%	0.3%	4.3%	0.8%	0.9%	0.2%	1.3%	0.7%	1.2%
10	RoW transfers	1.0%	1.5%	16.0%	4.6%	0.9%	1.8%	1.8%	1.1%	4.2%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: 2015 Myanmar SAM and authors' calculations.

Across all households, the share of income derived from enterprises dominates, at almost 50 per cent, followed by labour at just over half that share. Most household labour earnings derive from low skilled labour. Households who are involved in farming activities, however, derive a substantial share of their income from transfers related to land, fish, and livestock and less from enterprises. Farm-based households also get a lower share of their income from labour. What they derive from agricultural capital is similar in rural areas compared to households from urban areas. Urban and non-farm households appear to receive a larger share of their income from government transfers. Rural non-farm households' share in income received from abroad is the highest, followed by urban households involved mainly in non-farm activities.

## 7 Data issues

While the SAM construction described above is a constructive first step, given the data sources at hand, we highlight a number of data issues and assumptions. They include the following points.

- The breakdown of secondary income received from and transferred to the rest of the world between enterprises and households is not available from the Balance of Payment data. We therefore needed to make assumptions as described in the text.
- While this is not normally our first choice, government's current income and expenditure is squared by taking the current account deficit as given by the Government Budget Statistics' difference between its current receipts and expenditures and by making government transfers to households for pensions and other social benefits (including cash transfers to students, among others) the residual.
- The shares of land in gross operating surplus generated in production of crops, livestock and fish stock is not readily available for Myanmar. We use shares that are more or less in line with those of Viet Nam (Hoai et al. 2016).
- We allocate the returns on non-agricultural capital in full to enterprises, and we allocate the transfers associated with agricultural capital, land, livestock, and fish stock in full to households. This follows the approach used in the construction of a 2012 Vietnam SAM (Hoai et al. 2016).
- We use the 2015 MPLCS to disaggregate wage earnings, household income distribution, and household expenditure. Three limitations to using this survey should be observed:
  - The survey only allows for the identification of 12 main activities. The mapping to the 43 activities in the SAM is available in Appendix C.

- In the household expenditure data, some expenditures are not covered. We use proxies from other expenditures as shown in Appendix D.
- There is no distribution pattern for non-wage income from sources other than government and foreign transfers. At this stage, we use matching shares from a 2012 Vietnam SAM (Hoai et al. 2016).

## 8 Way forward

We conclude by stressing that, the SAM construction described in this study is a first useful step, given the data sources at hand. Going forward, more work on improving the SAM for Myanmar is the key task. In particular, the new 2016/17 MLCS is expected to offer better coverage of the structure of wage earnings across labour types, household expenditure, and other outlays across household groups and on the structure of income distribution. Modelling application with the SAM described in this document may reveal further gaps in our knowledge.

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## Appendix A: Classifications of industries and products

Product/Industry	Product* (CPC 2.0)	Industry (ISIC 4)
1 Paddy	113	112
2 Vegetables	012 (except 01231, 0124), 015, 01801, 01803	113
3 Fruits	013, 0145 to 0149	0121 - 0126
4 Other crops	01 (all others not in 1,2,3 above), 8611	011-017 (all others), 0161, 0163, 0164, part of 015
5 Livestock	02, 34654, 3911, 86121	014, 0162, 017, part of 015
6 Forestry and logging	03, 8613, 8614,	2
7 Fisheries	04, 8615	3
8 Fuel minerals (energy)	11 (except 11020, 11040),12	05, 06
9 Other mining including support services to mining	13 to 16, 862	07,08,09
10 Manufacture of food, beverage and tobacco products	21 to 25 (except 2411), 881	42714
11 Manufacture of wearing apparel & textiles	26 to 28 (except 2831), 8821, 8822,	13-14
12 Manufacture of printing and reproduction of recorded media	322 to 3269, 328, 8912,	18
13 Manufacture of coke and refined petroleum products	11020, 11040, 33 (except 336), 3371, 8841,	19
14 Manufacture of non-metallic mineral products	3456, 37, 38704, 46932, 8853	23
15 Other manufacturing	2411 2 831 2 9 to 31, 321, 32512, 327, 336, 3371, 34 (except 3372, 3456, 34654), 35, 36,38 (except 3621, 3894, 3895, 38962, 38963), 39 (except 3911), 38 to 49 (except 38704, 46932, 476, 478), 8711, 8712, 87149, 87152, 87154, 87156, 87159, 873 (except 87332), 8823, 883, 8842, 8843, 8851, 8852, 886 to 889, 892, 893	15-17 2 0-22 2 4-33
16 Electricity, gas and steam	17, 3372, 691, 6922, 8631, 8632, 8634	35
17 Water supply, sewerage	18, 3621, 6921, 6923, 8633, 8635, 894, 941 to 944, 949,	36-39
18 Construction	5, 87157	41-43
19 Sale of motor vehicles	61-62 (sale of motor vehicles only)	451
20 Maintenance & repair of MV	8714, 62281 (except sale of motor vehicles), 66282	452
21 Wholesale and retail trade	61-62 (all other goods)	46-47
22 Land transport	6411, 64131, 64132, 6421, 6422, 651, 6601,	49
23 Water transport	6412, 64133, 6423, 652, 6602,	50
24 Air transport	64134, 6424, 6425, 653, 6603	51
25 Warehousing and support activities for transportation	67	52
26 Postal and courier	68, 32690 (part), 38962	53
27 Telecommunication	841, 842,	55
28 Hotels	631, 632	56
29 Restaurants	633, 634	58-60
30 Publishing, motion pictures, video, TV and radio	322 to 324, 32511, 3252, 3253, 3254, 3262, 3263, 3895, 476, 478, 7331, 7332, 83143, 8363, 843, 846, 8911, 961	61
31 Computer programming, consultancy and information service activities	8313, 83141, 83142, 8315, 8316, 844, 85991, 87332,	62-63
32 Banking	32610 (part), 711, 712, 717	64
33 Insurance and other financial auxiliary services	713 to 716	65 and 66
34 Real estate	72	68
35 Owner occupied dwellings		
36 Professional, scientific and technical activities	3255, 3894, 81, 82, 8311, 8312, 8319, 832 to 835, 8361, 8362, 837 to 839, 85999	69 to 75
37 Other administrative and support services	731, 732, 7333 to 7339, 851 to 854, 8591 to 8597, 945	77-78, 80-82
38 Travel agencies	8551 to 8556	79
39 Public admn. and defence; compulsory social security	91	84
40 Education	92	85
41 Health	93	86-88
42 Domestic services	98	98
43 Other services	38961, 38963, 845, 8713, 87151, 87153, 87155, 872, 95, 962 to 979, 99	90-97, 99

Note: \* Characteristics of products of corresponding industries.

Source: SUT document,.

## Appendix B: Global set for a 2015 SAM for Myanmar

Labels	Codes	Codes
Paddy	a_paddy	c_paddy
Vegetables	a_veggy	c_veggy
Fruits	a_fruit	c_fruit
Other crops	a_ocrop	c_ocrop
Livestock	a_livst	c_livst
Forestry and logging	a_fores	c_fores
Fisheries	a_fishy	c_fishy
Fuel minerals	a_fuelm	c_fuelm
Other mining including support services	a_othmn	c_othmn
Food, beverage and tobacco products	a_fobvt	c_fobvt
Wearing apparel & textiles	a_txclf	c_txclf
Printing and reproduction of recorded media	a_print	c_print
Coke and refined petroleum products	a_petr	c_petr
Non-metallic mineral products	a_nonme	c_nonme
Other manufacturing products	a_omanf	c_omanf
Electricity, gas and steam	a_elctr	c_elctr
Water supply, sewerage	a_water	c_water
Construction	a_cnstr	c_cnstr
Sale of motor vehicles	a_mvtrd	c_mvtrd
Maintenance & repair of motor vehicles	a_mvrep	c_mvrep
Wholesale and retail trade	a_trade	c_trade
Land transport	a_ltrnp	c_ltrnp
Water transport	a_wtrnp	c_wtrnp
Air transport	a_atrnp	c_atrnp
Warehousing and support activities for transportation	a_strnp	c_strnp
Postal and courier	a_postc	c_postc
Telecommunication	a_telco	c_telco
Hotels	a_hotel	c_hotel
Restaurants	a_resta	c_resta
Publishing, motion pictures, video, TV and radio	a_pbltv	c_pbltv
Computer programming, consultancy and information service activities	a_itsrv	c_itsrv
Banking	a_fnsrv	c_fnsrv
Insurance and other financial auxiliary services	a_insur	c_insur
Real estate	a_reale	c_reale
Owner occupied dwellings	a_ownoc	c_ownoc
Professional, scientific and technical activities	a_prsrv	c_prsrv
Other administrative and support services	a_oamin	c_oamin
Travel agencies	a_travl	c_travl
Public admn. and defence; compulsory social security	a_padmn	c_padmn
Education	a_educa	c_educa
Health	a_healt	c_healt
Domestic services	a_domsv	c_domsv
Other services	a_othsv	c_othsv
Margin on MVs	m_mtveh	
Trade margin	m_trade	
Transport margin: Land	m_ltrnp	
Transport margin: Water	m_wtrnp	
Transport margin: Air	m_atrnp	
Transport margin: Services	m_strnp	
rural_noeduc_illiterate_farm	rfm_nil	
rural_noeduc_literate_farm	rfm_nli	
rural_monastery_farm	rfm_mon	
rural_primary_farm	rfm_pri	
rural_secondary_farm	rfm_sec	
rural_tertiary_farm	rfm_ter	
rural_noeduc_illiterate_nonfarm	rnf_nil	
rural_noeduc_literate_nonfarm	rnf_nli	
rural_monastery_nonfarm	rnf_mon	
rural_primary_nonfarm	rnf_pri	
rural_secondary_nonfarm	rnf_sec	
rural_tertiary_nonfarm	rnf_ter	
urban_noeduc_illiterate_farm	ufm_nil	
urban_noeduc_literate_farm	ufm_nli	
urban_monastery_farm	ufm_mon	
urban_primary_farm	ufm_pri	
urban_secondary_farm	ufm_sec	
urban_tertiary_farm	ufm_ter	
urban_noeduc_illiterate_nonfarm	unf_nil	
urban_noeduc_literate_nonfarm	unf_nli	
urban_monastery_nonfarm	unf_mon	
urban_primary_nonfarm	unf_pri	
urban_secondary_nonfarm	unf_sec	



urban_tertiary_nonfarm	unf_ter
Capital agriculture	f_capag
Capital non-agriculture	f_capna
Land	f_landd
Livestock	f_livst
Fishstock	f_fsstk
Enterprises	i_entpr
rural_farm_quintile1	rfa_q1
rural_farm_quintile2	rfa_q2
rural_farm_quintile3	rfa_q3
rural_farm_quintile4	rfa_q4
rural_farm_quintile5	rfa_q5
rural_nonfarm_quintile1	rnf_q1
rural_nonfarm_quintile2	rnf_q2
rural_nonfarm_quintile3	rnf_q3
rural_nonfarm_quintile4	rnf_q4
rural_nonfarm_quintile5	rnf_q5
urban_farm_quintile1	ufa_q1
urban_farm_quintile2	ufa_q2
urban_farm_quintile3	ufa_q3
urban_farm_quintile4	ufa_q4
urban_farm_quintile5	ufa_q5
urban_nonfarm_quintile1	unf_q1
urban_nonfarm_quintile2	unf_q2
urban_nonfarm_quintile3	unf_q3
urban_nonfarm_quintile4	unf_q4
urban_nonfarm_quintile5	unf_q5
Government	i_gvnmnt
Act tax	t_activ
Excise tax	t_excis
Commercial tax	t_commc
State lottery and trpt tax	t_lotty
Custom duties	t_imprt
Subsidies on products	t_subsy
Fact tax	t_factr
Dir tax	t_direct
Savings	sav=inv
Change in stocks	chstcks
Rest of the world	i_roftw

Source: Authors' own aggregation.

## Appendix C: Mapping of activities from MPLCS to SAM

SAM_Labels	SAM_Codes	MPLCS_Labels
Paddy	a_paddy	Agriculture, forestry, fishing
Vegetables	a_veggy	Agriculture, forestry, fishing
Fruits	a_fruit	Agriculture, forestry, fishing
Other crops	a_ocrop	Agriculture, forestry, fishing
Livestock	a_livst	Agriculture, forestry, fishing
Forestry and logging	a_fores	Agriculture, forestry, fishing
Fisheries	a_fishy	Agriculture, forestry, fishing
Fuel minerals	a_fuelm	Mining and quarrying
Other mining including support services	a_othmn	Mining and quarrying
Food, beverage and tobacco products	a_fobvt	Manufacturing
Wearing apparel & textiles	a_txclf	Manufacturing
Printing and reproduction of recorded media	a_print	Manufacturing
Coke and refined petroleum products	a_petr	Manufacturing
Non-metallic mineral products	a_nonme	Manufacturing
Other manufacturing products	a_omanf	Manufacturing
Electricity, gas and steam	a_elctr	Electricity, gas, water supply, waste management
Water supply, sewerage	a_water	Electricity, gas, water supply, waste management
Construction	a_cnstr	Construction
Sale of motor vehicles	a_mvtrd	Wholesale and retail trade
Maintenance & repair of motor vehicles	a_mvrep	Wholesale and retail trade
Wholesale and retail trade	a_trade	Wholesale and retail trade
Land transport	a_ltrnp	Transportation and storage
Water transport	a_wtrnp	Transportation and storage
Air transport	a_atrnp	Transportation and storage
Warehousing and support activities for transportation	a_strnp	Transportation and storage
Postal and courier	a_postc	Hospitality, communication, finance, real estate
Telecommunication	a_telco	Hospitality, communication, finance, real estate
Hotels	a_hotel	Hospitality, communication, finance, real estate
Restaurants	a_resta	Hospitality, communication, finance, real estate
Publishing, motion pictures, video, TV and radio	a_pbltv	Professional/sci. Activities
Computer programming, consultancy and information service activities	a_itsrv	Professional/sci. Activities
Banking	a_fnsrv	Hospitality, communication, finance, real estate
Insurance and other financial auxiliary services	a_insuv	Hospitality, communication, finance, real estate
Real estate	a_reale	Hospitality, communication, finance, real estate
Owner occupied dwellings	a_ownoc	Hospitality, communication, finance, real estate
Professional, scientific and technical activities	a_prsrv	Professional/sci. Activities
Other administrative and support services	a_oamin	Administrative, public admin
Travel agencies	a_travl	Transportation and storage
Public admn. and defence; compulsory social security	a_padmn	Administrative, public admin
Education	a_educa	Educ., health, social work
Health	a_healt	Educ., health, social work
Domestic services	a_domsv	Other (specify)
Other services	a_othsv	Other (specify)

Source: Authors' own mapping.

## Appendix D: Proxies for missing MPLCS expenditure data

Expenditure items	Proxy
Forestry and logging	Average of agriculture
Fuel minerals	Average of agriculture
Other mining including support services	Average of agriculture
Printing and reproduction of recorded media	Telecommunication
Non-metallic mineral products	Construction
Water transport	Land transport
Air transport	Land transport
Warehousing and support activities for transportation	Land transport
Postal and courier	Land transport
Banking	Insurance and other financial auxiliary services
Insurance and other financial auxiliary services	Insurance and other financial auxiliary services
Other administrative and support services	Other services
Travel agencies	Other services
Public admn. and defence; compulsory social security	Other services
Domestic services	Other services

Source: Authors' own mapping.