SA-TIED
Southern Africa – Towards Inclusive Economic Development

A 2013 social accounting matrix for Zimbabwe

by Rob Davies, Marko Kwaramba, and Dirk van Seventer

SA-TIED Working Paper #25 | November 2018

UNITED NATIONS UNIVERSITY UNU-WIDER
national treasury Department: National Treasury REPUBLIC OF SOUTH AFRICA
INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE IFPRI
planning, monitoring & evaluation Department: Planning, Monitoring and Evaluation REPUBLIC OF SOUTH AFRICA
the dti Department: Trade and Industry REPUBLIC OF SOUTH AFRICA
SARS
TIPS

About the programme

Southern Africa –Towards Inclusive Economic Development (SA-TIED)

SA-TIED is a unique collaboration between local and international research institutes and the government of South Africa. Its primary goal is to improve the interface between research and policy by producing cutting-edge research for inclusive growth and economic transformation in the southern African region. It is hoped that the SA-TIED programme will lead to greater institutional and individual capacities, improve database management and data analysis, and provide research outputs that assist in the formulation of evidence-based economic policy.

The collaboration is between the United Nations University World Institute for Development Economics Research (UNU-WIDER), the National Treasury of South Africa, the International Food Policy Research Institute (IFPRI), the Department of Monitoring, Planning, and Evaluation, the Department of Trade and Industry, South African Revenue Services, Trade and Industrial Policy Strategies, and other universities and institutes. It is funded by the National Treasury of South Africa, the Department of Trade and Industry of South Africa, the Delegation of the European Union to South Africa,IFPRI, and UNU-WIDER through the Institute's contributions from Finland, Sweden, and the United Kingdom to its research programme.

Copyright © UNU-WIDER 2019

Information and requests: publications@wider.unu.edu

The views expressed in this paper are those of the author(s), and do not necessarily reflect the views of the of the SA-TIED programme partners or it's donors.

UNITED NATIONS UNIVERSITY
UNU-WIDER

WIDER Working Paper 2018/139

A 2013 Social Accounting Matrix for Zimbabwe

Rob Davies,[1] Marko Kwaramba,[2] and Dirk van Seventer[3]

November 2018

United Nations University World Institute for Development Economics Research
wider.unu.edu

Abstract: This paper documents the construction of a Social Accounting Matrix (SAM) for Zimbabwe in 2013. The SAM was built using National Accounts data from the Zimbabwe National Statistics Agency (ZIMSTAT), including balance of payment data, government finance data, and highly aggregated industry-level production accounts. Detailed data on industry and service sectors were obtained from ZIMSTAT surveys. For some activities, unpublished but recent supply and use data on disaggregated industries were combined with data from older sources. These sources include a 2011/12 ZIMSTAT household survey, trade data, the Central Government Budget, and output and price data from private farming organizations. The SAM provides a detailed representation of Zimbabwe's economy with 36 activities and 48 commodities. The SAM disaggregates labour into skilled and unskilled labour and separates households into rural and urban households. Despite shortcomings in the underlying data, it is hoped that this initial attempt at constructing a SAM representing the economy of Zimbabwe after land reform will stimulate further work aimed at improving it.

Keywords: Social Accounting Matrix, National Accounts, supply table, use table, Zimbabwe
JEL classification: C63, E01, E16

Acknowledgements: Financial support from the World Bank is acknowledged. We are grateful for support and comments by Johannes Herderschee, and for comments by Hans Lofgren, Calvin Zebaze Djiofack, Sébastien C. Dessus, and Martin Lokanc. Neither they nor the World Bank are responsible for any views presented in the paper or for remaining errors and omissions.

Link to the 2013 Social Accounting Matrix for Zimbabwe

[1] Research Associate, Department of Finance and Management, SOAS, University of London, London, UK, corresponding author: robdavieszim@gmail.com; [2] Economist, Macroeconomic and Fiscal Management Global Practice, World Bank, Washington, DC, USA; [3] Consultant for UNU-WIDER, Helsinki, Finland.

This study has been prepared within the context of the UNU-WIDER 2014–18 work programme.

Copyright © UNU-WIDER 2018

Information and requests: publications@wider.unu.edu

ISSN 1798-7237 ISBN 978-92-9256-581-7

Typescript prepared by Lesley Ellen.

The United Nations University World Institute for Development Economics Research provides economic analysis and policy advice with the aim of promoting sustainable and equitable development. The Institute began operations in 1985 in Helsinki, Finland, as the first research and training centre of the United Nations University. Today it is a unique blend of think tank, research institute, and UN agency—providing a range of services from policy advice to governments as well as freely available original research.

The Institute is funded through income from an endowment fund with additional contributions to its work programme from Finland, Sweden, and the United Kingdom as well as earmarked contributions for specific projects from a variety of donors.

Katajanokanlaituri 6 B, 00160 Helsinki, Finland

The views expressed in this paper are those of the author(s), and do not necessarily reflect the views of the Institute or the United Nations University, nor the programme/project donors.

List of acronyms and abbreviations

ALS	Agriculture and Livestock Survey
CF	communal farming
CFU	Commercial Farmers Union
CGE	computable general equilibrium
CIP	Census of Industrial Production
CL	communal land
COP	consumption of own production
CSO	Central Statistical Office (predecessor to ZIMSTAT)
FTLRP	Fast Track Land Reform Program
GDP	gross domestic product
GFS	Government Financial Statistics
GOS	gross operating surplus
LS	large scale
LSCF	large scale commercial farming
LMAC	Livestock and Meat Advisory Council
NIPA	National Income and Product Accounts
NPISH	Non-Profit Institutions Serving Households
NSA	national statistical agency
PICES	Poverty, Income, Consumption and Expenditure Survey
QES	Quarterly Employment Survey
RA	resettlement area
RAS	Biproportional scaling method
RoW	Rest of the World
SAM	Social Accounting Matrix
SH	small holder
SNA	System of National Accounts
SSCF	small scale commercial farming
SUT	supply–use table
SUTSAM	SAM (with single labour and single household)
TIMB	Tobacco Industry and Marketing Board
ZFU	Zimbabwe Farmers' Union
ZIMSTAT	Zimbabwe National Statistics Agency

1 Introduction

The circular flow of income has long been a conceptual framework for thinking about an economy as a system. In its simplest form, producers supply goods and services to households, who pay for them using incomes received from supplying labour and capital services to producers. In other words, incomes generated in production flow around the economy, returning to producers in the form of demand. This circular flow can be elaborated to represent the economy more realistically by including more detail such as savings and investment, taxes and government spending, imports and exports, transfers, and so forth. However, no matter how much detail of this sort is included, most representations of the circular flow retain the assumption that it is a single, aggregated 'good'—gross domestic product (GDP)—that flows around.

This depiction of the economy has proved to be very useful—even necessary—for understanding and designing macroeconomic policies. However, for many economic problems, an understanding of how the economy acts at a more disaggregated level is required. Policies for economic recovery in Zimbabwe will not be simply about generating growth of GDP or even of GDP per capita, but will hinge crucially on which sectors can be grown, where their outputs will be sold, who benefits from the incomes they generate, and such like. Many important insights into these issues can only be gained by detailed investigations into particular sectors. It is obvious that recovery will require increased output and rising productivity from small holder farmers, but what will and will not facilitate this requires understanding of small holder farmers – how they produce, how they make decisions, and what constrains their expansion, etc. Such understanding necessarily comes from detailed microeconomic studies.

But not all the constraints on small holder farmers are at this microeconomic level. Possibly they can produce more, but there is no market for additional output. Perhaps there are markets for some small-holders' products but not for others, and perhaps they could produce more if more fertilizer were available, but there is no capacity to produce or import more. These wider issues take us from the micro back to the economy-wide level. We need to consider how small holder farmers are located in the circular flow, but in a circular flow that contains detail about what is produced, who produces it, who buys it, how the income generated is distributed, and so on.

Such information can be assembled in a Social Accounting Matrix (SAM). A SAM is a comprehensive and consistent economy-wide data framework, which depicts the circular flow for a country or region over a given period in a detailed way. SAMs are disaggregated into different accounts, which make and receive payments. The detail captured in the disaggregation of these accounts varies depending on the purpose of the SAM and on data availability. SAMs are *comprehensive*: they combine data on every flow or transaction among the accounts they depict, which themselves cover the entire economy. SAMs are also *consistent*: since there are two sides to every transaction, the inflows into an account (or its 'resources') must match its outflows (or its 'uses').

This paper outlines the construction of a Social Accounting Matrix (SAM) for Zimbabwe for 2013. It draws on data published by the Zimbabwe National Statistics Agency (ZIMSTAT). Such data include National Income and Product Accounts (NIPA) (ZIMSTAT 2015), various activity-level surveys, supply–use table (SUT) data, a household survey (PICES) (ZIMSTAT 2013), ZIMSTAT unpublished trade data, and monetary flows between institutions captured in the NIPA. The required data are drawn from various sources and must therefore be compiled and made consistent.

This is a useful exercise since it helps identify inconsistencies between statistical sources as well as gaps in the data. But SAMs are also useful for policy formulation and analysis. They allow users to think about the implications of changes in one part of the economy for other parts. Their consistency requirements lead us to ask important questions that are sometimes overlooked. For example, government might embark on an ambitious road building programme requiring, among other things, tar and engineering services. A normal approach to project design might take these into account in assessing the costs and feasibility of the project. An approach using a SAM framework, however, highlights that tar and engineering services must be supplied from somewhere, raising questions about whether they can be shifted from other uses, produced domestically, or imported. In other words, it places the project firmly in an economy-wide context. Even if SAMs are used in this way relatively informally, they provide a useful framework for policy makers. However, SAMs can also be the basis for economy-wide models. Such models apply explicit rules for the way the SAM adjusts to maintain consistency after one component has been changed. While this paper is concerned with the construction of the Zimbabwean SAM, we will return to the question of models in the final section.

The work presented in this paper should be treated very much as a preliminary attempt to create a SAM for Zimbabwe. As will be clear from the discussion below, lack of data and poor quality of the data that are available has necessitated using judgements and assumptions in key places. Such judgements often must be made in data poor countries, not only when constructing SAMs. The advantage of the SAM framework is that any assumptions made must be consistent with other data. The SAM provides some triangulation of the assumptions, not only because of the internal requirements for the SAM to be consistent, but also from its use in policy analysis and economy-wide modelling.

There have been previous SAMs constructed for Zimbabwe. Marcella Thomas and Romeo Bautista constructed one for 1991 (Thomas & Bautista 1999). This was updated to 1997 in an unpublished report, based on Chitiga et al. (2000). Drawing on these earlier SAMs and other data, a 2011 SAM was constructed for internal use by the World Bank (Davies and van Seventer 2013). The work in this paper uses some of this earlier work.

Section 2 of this paper reviews the general structure of SAMs. Section 3 presents the key features of a SAM for Zimbabwe. Several steps are involved in its construction. The first step is compiling National Accounts and other official data sources into a consistent macro SAM framework. The second step then draws on survey information to disaggregate labour and household accounts. Given the diversity and inaccuracy of survey data sources, the prior SAM is inevitably inconsistent (e.g. there are inequalities between household receipts and payments). Section 4 describes the data sources used to construct the prior SAM, some of the problems with them, and the balancing procedure of SAM accounts. Section 5 offers a snapshot of the Zimbabwe economy through the lens of the constructed SAM. The paper concludes in Section 6 with observations on what might be done in the future. We hope that making this SAM available might stimulate the development of better data for policy in Zimbabwe.

2 General structure of SAMs

A SAM is an economy-wide data framework that usually represents the real economy of a single country.[1] More technically, a SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row. 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 SAM, total revenue (row total) equals total expenditure (column total). Table 1 shows an aggregate SAM (with verbal explanations in place of numbers) with specific reference to data for Zimbabwe.

The SAM distinguishes between 'activities' (the entities that carry out production) and 'commodities' (representing 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 margins) in the commodity accounts. The commodities are activities' outputs, either exported or sold domestically, and imports. In the activity columns, payments are made to commodities (intermediate demand) and factors of production (value added, comprising operating surplus, compensation of employees, and/or mixed income). In the commodity columns, payments are made to domestic activities, the Rest of the World (RoW), and various tax accounts (i.e. domestic and import taxes). This treatment provides the data needed to model imports as perfect or imperfect substitutes vis-à-vis domestic products.

The government is disaggregated into a core government account and different tax collection accounts—one for each tax type identified in the data. This disaggregation is necessary since the economic interpretation of some payments can otherwise be ambiguous. In the SAM, direct payments between enterprises, households, government, and the RoW are reserved for transfers as reported in the National Accounts, government, and balance of payment statistics. In Zimbabwe, we draw on the NIPA for government finance and balance of payment statistics. Payments from the government to factors (for labour services provided by public sector employees) are captured in the government services activity. Government consumption demand represents purchases of outputs from the government services activity, which, in turn, pays labour.

The SAM contains several factors of production which earn incomes from their use in the production process and pay their incomes to enterprises, households, government, and the RoW. Indirect capital earnings or enterprise profits are taxed according to average corporate tax rates, and some profits may be repatriated abroad. The remaining capital earnings, along with mixed income and labour earnings, are paid to households. Households use their incomes to pay taxes, make transfers, save, and consume domestically produced and imported commodities.

3 Constructing the SAM

A standard problem for SAM construction (but a major reason why SAMs are valuable) is that data are drawn from many sources that are often contradictory. Constructing a SAM entails reconciling these conflicting data to produce a consistent whole, which can reveal gaps in our knowledge or problems with one or other source, which are themselves beneficial outcomes. In fact, the recommendation of the System of National Accounts (SNA) that the National Accounts

[1] For general discussions of SAMs and SAM-based modelling, see Pyatt and Round (1985), Reinert and Roland-Holst (1997), Pyatt (1988), Robinson and Roland-Holst (1988), and Breisinger et al. (2009).

be constructed using a SUT framework is precisely to ensure internal consistency across the entire NIPA.[2]

Building a SAM thus entails two steps. In the first, data from multiple sources are assembled to give as good a depiction of the economy as they allow. Since the data are drawn from disparate and inconsistent sources, this SAM will be unbalanced: the use of resources by each account will generally not match their availability, as we know they must. Borrowing a term from Bayesian statistics, we therefore refer to it as the 'prior SAM': it is not a SAM, since it does not balance. Nonetheless, it is the best estimate of what the final SAM should look like, based solely on available data.

The second step is to apply a statistical balancing algorithm to the prior SAM to force it to balance.

We discuss how we proceeded with each of these steps in the Zimbabwean case below.

3.1 Constructing the prior SAM

The primary data come from a variety of sources: National Accounts, surveys, administrative data and even micro-studies of particular areas. We should emphasize that disagreements between these sources do not necessarily imply one source is right and the others wrong; their data are collected for different purposes using different methodologies, possibly at different times. They provide pictures of the economy taken from different angles. However, for the construction of the SAM, they need to be reconciled.

A standard approach to unreconciled data sources is to use one source to provide a benchmark value for the level for a component and to use more disaggregated sources to provide details on how this level should be distributed across subcomponents.

In Zimbabwe, we took aggregates in the NIPA as benchmarks to ensure consistency with the published National Accounts. Disaggregated data, often from surveys, were used to determine shares of aggregates across subcomponents.

For example, estimates of expenditure by households on specific goods and services were available from the Poverty, Income, Consumption and Expenditure Survey (PICES) (ZIMSTAT 2013). However, total household spending in PICES is not the same as in the NIPA. We therefore estimated spending on goods and services as:

$$\underbrace{EXP^{sam}_{H,C}}_{\substack{\text{Expenditure by household}\\ \text{type H on commodity C}\\ \text{in the SAM}}} = \underbrace{\frac{EXP^{pices}_{H,C}}{\sum_H \sum_C EXP^{pices}_{H,C}}}_{\substack{\text{Share of expenditure by household}\\ \text{type H on commodity C in total}\\ \text{household expenditure in PICES}}} \cdot \underbrace{EXP^{NIPA}}_{\substack{\text{Total Private Consumption}\\ \text{Expenditure in NIPA}}} \quad (1)$$

Similar approaches were taken to disaggregate various components of Zimbabwe's National Accounts.

[2] Throughout this report the general term 'National Income and Production Accounts' (NIPA) refers to the full set of National Accounts. In Zimbabwe, these accounts are found in the National Income Reports (ZIMSTAT 2015i).

Since we used NIPA aggregates as benchmarks, we needed to ensure that these data are themselves consistent. We therefore began by constructing a macro SAM—sometimes called a National Accounting Matrix (NAM)—from NIPA. The result of this step is shown in Table 2, which shows entries in both millions of US dollars and in per cent of GDP at factor cost.

Each account in the macro SAM represents the aggregate of several component accounts in the disaggregated micro SAM. Thus, the activity account in the macro SAM is the aggregate of 36 activity accounts in the micro SAM. At the same time as collating the data for the macro SAM, therefore, we collected data to construct the micro sub-accounts. Appendix A gives a detailed explanation of how each macro SAM entry is derived and disaggregated to arrive at the unbalanced, prior micro SAM.

We have emphasized here the inconsistences between different data sources as the primary reason why the prior SAM is unbalanced. Another reason is that in some instances the data required are not even available. For example, the NIPA estimates national savings. However, it presents savings by households and enterprises as a single figure. We need to differentiate between these categories. We had to apply judgements to address the lack of data on contributions of households and enterprises to national savings. Yet the SAM's requirement that we apply our assumptions consistently across all other flows again points to the enormous value of the SAM in providing a coherent, balanced picture of the whole economy.

Although we expect the prior SAM to be unbalanced, it is normal to look for as much information as possible so that the imbalances are as low as possible. We do not want to give a statistical algorithm too much leeway in deciding how to balance. So, when there are large imbalances, we would normally investigate the reasons further, seeking better information if possible. In the present case, there have been neither the time nor the resources to do this, so we have had to pass larger imbalances than we would like to the balancing algorithm. We therefore emphasize the preliminary nature of our SAM and urge others to work to improve it.

Table 1: Basic structure of a 2013 SAM for Zimbabwe

	Activities	Commodities	Labour	Capital	Mixed income	Enterprises	Households	Government	Net activity taxes	Net product taxes	Import duties	Income taxes	Changes in inventories	Accumulation	Rest of the World	Total
Activities		Output of total domestic economy														Gross output
Commodities	Intermediate consumption	Transactions Margins					Final consumption expenditure by households	Final consumption expenditure government					Change in inventories	Gross fixed capital formation	Exports of goods & services	Total demand
Labour	Compensation of employees														Compensation of Zimbabwe residents received in the RoW	Labour income
Capital	Net operating surplus + Depreciation														Property income paid by the RoW	Capital income
Mixed income	Mixed Income															
Enterprises				Gross operating surplus of corporations												Enterprise earnings
Households			Compensation of residents		Mixed income of households	Misc transfers from enterprises to households		Transfers by government to households							Transfers received by households from the RoW	Household earnings
Government						Property income received by government	Transfers received by government from households		Net other taxes on production in all industries	Net taxes on products less import duties	Import duties	Direct taxes paid by enterprises and households			Transfers received by the government from the RoW	Government receipts
Net activity taxes	Net other taxes on production in all industries															Net other taxes on production in all industries
Net product taxes		Net taxes on products less import duties														Net taxes on products - import duties
Import duties		Import duties														Import duties
Income taxes						Current taxes on income and wealth paid by enterprises	Current taxes on income and wealth of households									Current taxes on income and wealth
Changes in inventories														Change in inventories		Change in inventories + residual item

Accumulation						Gross saving of enterprises	Gross saving of households and NPISHs	Gross saving of government							Current external balance with the RoW (foreign savings)	Savings
Rest of the World		Imports of goods & services	Compensation of non-Zimbabwe employees	Property income transferred to the RoW			Transfers by households to the RoW	Transfers by government to the RoW								Foreign exchange outflows
Total	Gross output	Total supply	Distribution of labour income	Distribution of capital income	Distribution of Mixed income	Enterprise outlays	Household outlays	General government outlays	Net other taxes on production in all industries	Net taxes on products less import duties	Import duties	Direct taxes paid by enterprises and households	Change in inventories	Gross fixed capital formation + change in inventories	Foreign exchange inflow	

Source: Authors' own workings.

Table 2: 2013 Macro SAM for Zimbabwe, US$ millions, per cent of GDP at factor cost

	Activities	Com-modities	Labour	Capital	Mixed income	Enter-prises	House-holds	Govern-ment	Net activity taxes	Net product taxes	Import duties	Income taxes	Accum-ulation	Change in inventories	Rest of the World	Total
Activities		19,333 170.1%														19,333 170.1%
Commodities	7,779 68.5%	1,016 8.9%					12,903 113.5%	2,862 25.2%					1,753 15.4%	5 0.0%	3,972 34.9%	30,291 266.5%
Labour	7,091 62.4%														22 0.2%	7,113 62.6%
Capital	3,443 30.3%														93 0.8%	3,536 31.1%
Mixed income	831 7.3%															831 7.3%
Enterprises				3,064 27.0%												3,064 27.0%
Households			7,048 62.0%		831 7.3%	1,124 9.9%		-163 -1.4%							1,263 11.1%	10,103 88.9%
Government						65 0.6%	274 2.4%		188 1.7%	1,575 13.9%	362 3.2%	1,308 11.5%			126 1.1%	3,898 34.3%
Net activity taxes	188 1.7%															188 1.7%
Net product taxes		1,575 13.9%														1,575 13.9%
Import duties		362 3.2%														362 3.2%
Income taxes						647 5.7%	661 5.8%									1,308 11.5%
Accumulation						1,227 10.8%	-3,756 -33.1%	398 3.5%							3,889 34.2%	1,758 15.5%
Change in inventories													5 0.0%			5 0.0%
Rest of the World		8,005 70.4%	65 0.6%	472 4.2%			20 0.2%	801 7.0%								9,364 82.4%
Total	19,333 170.1%	30,291 266.5%	7,113 62.6%	3,536 31.1%	831 7.3%	3,064 27.0%	10,103 88.9%	3,898 34.3%	188 1.7%	1,575 13.9%	362 3.2%	1,308 11.5%	1,758 15.5%	5 0.0%	9,364 82.4%	

Source: Authors' own calculations.

3.2 Balancing the prior SAM

The balancing procedure involved took place in two stages. First, we constructed a SAM with a detailed breakdown of activities and commodities, but still containing single labour and household accounts. We refer to this as the SUTSAM, as it essentially is based on a SUT. Balancing the SUTSAM ensures that supplies of commodities from domestic activities and imports match their uses as intermediate inputs, final goods bought by households and government, investment, and exports. While the balancing routine can handle differences between these in the prior SAM statistically, our economic understanding of Zimbabwe's economy leads us to treat certain differences prior to balancing. For example, when reported exports of a commodity exceed its domestic production, we can interpret the difference as re-exports. However, this interpretation is not sustainable when the exports exceed domestic supply *plus* imports. In such cases, we manually introduce changes in inventories, in such a way that the sums remain consistent with the macro SAM and the NIPA. This was achieved by adjusting all initial changes in stock up or down by the same rate. We were then able to submit the unbalanced SUTSAM to the balancing routine.

Several routines can be used to ensure final balancing. We used cross-entropy developed in (Robinson et al. 2001). Davies and Thurlow (2013) provide a technical explanation of this routine.. Essentially, this method balances the SAM by changing its numbers in a way that minimizes deviations from the prior SAM (measured by the 'entropy distance'). It allows the SAM builder to control which numbers change and by how much, by placing bounds on the presumed variance around each. These bounds can be very narrow or even zero for numbers that are deemed reliable or that we want to target for some other reason. Numbers about which we are more uncertain can be allowed to change much more.

In the Zimbabwean case, we wanted the final SAM to accord closely with the published National Accounts—despite our doubts about the accuracy of the latter. To be useful in policy debates, a SAM should accord with policy makers' perceptions of an economy, though discussing the validity of statistics forming perceptions is useful. Moreover, policy discussions should be conducted from the same song sheet: questions on the suitability of one policy over another should not be decided based on different data sets. We therefore held all macroeconomic aggregates constant in the balanced SAM. Since the underlying activity and commodity-level data and the supply table and use table data were based on less reliable data sources, we imposed no further constraints, and expected the cross-entropy routine to adjust the unbalanced SUTSAM. An account of the cross-entropy process is given in Davies and Thurlow (2013).

After balancing the SUTSAM, we disaggregated the labour and household accounts. As the SUTSAM was now balanced, this could be set up to result in imbalances for household accounts only. We did this by first disaggregating wages and salaries for each activity by broad skill category. Summing activities resulted in total labour income for each skill category. We then disaggregated household expenditure on each commodity and each of the other outlays across the two household groups (i.e. urban and rural). Summing across all commodities and other types of outlays yielded total household outlays for each household income group. Since total household outlays must equal total household income for each household income group, we used the former as the benchmark for the latter. We drew initial shares of household income by sources (i.e. wages and salaries by skill, capital income, dividends, and various transfers) from a previous SAM. These shares were then applied to the total outlays of each household income group. Finally, the

household accounts were balanced using the biproportional scaling method, also known as RAS, while holding all other non-household related entries of the SUTSAM constant.[3]

The result was a disaggregated micro SAM with detailed labour and household categories consistent with the National Accounts aggregates.

4 Data sources and issues

We tried to use the latest sources available for all data.

This section goes through some of the main sources and problems with them. Appendix B gives more detailed sources for each entry in the SAM.

As mentioned before, a standard problem in constructing a SAM is that data are drawn from many, often contradictory, sources. Part of the construction process is reconciling these conflicting data to produce a consistent whole. This is an important part of the value of having a SAM.

But in Zimbabwe we also faced inconsistencies *within* published data sources. Before data from a source could be combined and reconciled with data from other sources, we often had to reconcile numbers within the original source. Many inconsistencies were simply errors in addition (e.g. omission of elements in summations), and corrections were obvious. However, sometimes our obvious corrections failed to reconcile internal inconsistencies. In such cases, we had to make judgements about where the errors lay and how to solve them.

Explanations of 'non-obvious' data problems are provided below by specific source.

4.1 National Accounts

The government's latest published National Accounts are *National Accounts 2009–2014 Report, August 2015* (ZIMSTAT 2015i).[4]

---

[3] Using cross entropy here would apply a consistent methodology across the balancing process. However, biproportional scaling is a special case of entropy, and we used it on household income distribution because we do not want the rest of the SAM to adjust. This entailed balancing a small 2x2 matrix for which RAS can more easily be applied than cross entropy. Our approach means that we are not using information from income distribution to inform other aspects of the SAM; we do not adjust production or commodity flows in light of the adjustments needed to incorporate income distribution. We make this assumption because the data are poor.

[4] The Quarterly Digest of Statistics 2016 First Quarter revised some of the figures in the earlier National Accounts Report. It provided extensive notes for the reasons for the revision:

> 'Following the Financial Programming workshop held in Kadoma from April 4 to 8, 2016, it is was (sic) observed that data on compensation of employees provided to ZIMSTAT by the Ministry of Finance and Economic Development excluded compensation of employees of grant aided institutions as well as other items.
>
> The workshop participants observed that if the compensation of employees of grant aided institutions as well as other items are added, the GDP would grow by 12 to 13 percent in some years. Accordingly, new data was provided to ZIMSTAT by the Ministry of Finance and Economic Development and the GDP figures were revised at both current and constant prices. After the revisions, the GDP increased by 13.4 percent and 15.2 percent at current and constant prices, respectively in 2014.'

The National Accounts in Zimbabwe are compiled without using the SNA's recommended SUT framework. Some component parts of the published GDP are constant proportions of GDP over several years, suggesting that disaggregates are constructed by ZIMSTAT from the top down after the high-level aggregate has been derived, rather than the high-level aggregate being derived from the bottom up. Importantly for SAM construction, the ratio of intermediates to value added for most 1 digit industries identified in NIPA is constant from 2009 to 2013. This suggests that the construction process was first to derive the value added and then to use a previously determined ratio to derive the intermediates and gross output. This obviously does not reflect reality and makes these data relatively unusable for our purposes. A different source for the break down between value added, intermediates, and gross output is the Census of Industrial Production, which we discuss below.

As indicated above, besides incorrect additions and other obvious errors, the National Accounts 2009-2014 Report (ZIMSTAT 2015i) contains several inconsistencies that we were unable to reconcile. We cannot review all of these inconsistencies here but highlight one in particular.

Table 2.1a in the NIPA (ZIMSTAT 2015i) provides GDP figures for various sectors, including public administration (essentially the government). The GDP of public administration was US$402 million in 2013. Yet Table 5.1a in the NIPA (ZIMSTAT 2015i) indicates that wages and salaries for general government amounted to US$2,226 million. This latter amount is more than five times the former, even though sectoral GDP is essentially value added, which comprises compensation of employees and gross operating surplus. We understand that such an order of magnitude difference is because a large share of compensation of employees in the Central Government Budget is reallocated to other sectors in the economy (ZIMSTAT 2016a). This might be a reasonable adjustment (and is possibly standard in national income accounting) to understand where labour is used in the economy. However, it makes it difficult to reconcile government accounts with government data represented in the SAM. Moreover, it means we end up with a significant budget surplus.

4.2 Census of Industrial Production

A potentially important source of information for constructing the interindustry components of the SAM is the Census of Industrial Production (CIP) (ZIMSTAT 2015h). This provides disaggregated information on four sectors of the economy: mining, manufacturing, electricity and water, and construction. Zimbabwe has produced CIPs for many years. Annual CIPs were produced from 1964 to 1997, with a gap in production until 2009. From 2009, CIP reports were published for each year until 2013. We worked with the CIP for 2013.

Unfortunately, we faced internal inconsistencies and errors in published reports, which required some effort and judgement on our part to initially create a consistent data set. To address some problems, we had to refer to the 2012 CIP to check our understanding.

Further, the numbers in the CIP are not consistent with data from other sources. For example, the value of minerals sold, which should bear some relation to reported revenue of the mining sector, differs considerably.

4(cont.) We initially used these revised estimates for our basic benchmark, since they gave the latest data. However, that version of the QDS was removed from the ZIMSTAT website and we reverted to the original *National Accounts 2009-2014 Report*.

In addition, some CIP data appeared not to have been incorporated into—or reconciled with—the NIPA. For example, Table 3 shows the shares of intermediates in gross output for each of the four main sectors.

Table 3: Intermediates as a percentage of gross output: CIP vs. NIPA data, 2013

	CIP	NIPA
Mining	39%	37%
Manufacturing	52%	25%
Electricity and water	52%	30%
Construction	63%	24%

Sources: Authors' calculations based on ZIMSTAT (2015h: Table 1, 2015i: Tables 7.3a and 7.3b)).

The gross output of sectors is reported in two tables in the CIP:

- Table 1: Principal indicators—gross output, intermediate consumption, and value added classified by industrial group; and

- Table 5: Revenues, net inventories, and gross output classified by industrial group.

However, these two values do not match in 2013, and although they match in 2012, the total of Table 5 is not the sum of the components. In both cases the error is caused by the omission of net change in inventories.

The NIPA provides an aggregate amount for compensation of employees—but this is not broken down by sector. The CIP does break down employment, wages and salaries, and employer contributions for the four sectors it covers and their subsectors. We cross checked these figures and made some adjustments when the implied wage rates appeared improbable.

4.3 Prices, Incomes, Consumption and Expenditure Survey

The PICES 2011/12, which was published in 2013 (ZIMSTAT 2013), provides the latest household survey data for Zimbabwe. The main issue complicating the construction of the SAM was that the PICES was (understandably) carried out using old enumeration areas, which were sampled according to land use types. We discuss this in more detail later.

We believe that it would be useful if the government made available anonymized raw data from the PICES, which would permit a more nuanced approach to household production and expenditure.

4.4 Agriculture and Livestock Surveys

ZIMSTAT published separate Agricultural and Livestock Surveys (ALS) covering 2015 (see ZIMSTAT 2015b, 2015c, 2015d, 2015e, 2015f, 2015g), which surveyed large scale commercial farms, A1 farms, A2 farms, communal farms, small scale commercial farms (SSCFs), and old resettlement schemes. These surveys have similar formats and cover similar topics. The reports published by ZIMSTAT include some data from earlier surveys in 2012.

We combined the data from these surveys, using data from the 2015 surveys when there was a difference with data in the 2012 surveys. In this paper, we refer to the combined data as if it were from a single survey: the Agriculture and Livestock Survey (ALS).

The ALS provide some data that are potentially useful in building a SAM. There are employment and wage data, some input data, and some output data. Unfortunately, the output data are entirely in quantities, not values. This deficiency makes it impossible to determine total output and its distribution across the land types from the ALS, necessitating sourcing prices from elsewhere.

4.5 Survey of Services

The Survey of Services 2013 Report was released in 2016 (ZIMSTAT 2016b). This survey provides, for the first time, details on the service sector in Zimbabwe, complementing the CIP for mining manufacturing, electricity and water, and construction. This survey proved to be a useful source of information.

4.6 Estimates of expenditure (Blue Book)

We used the 2014 Blue Book to source information about government transfers. The only transfers recorded in NIPA are labelled 'Transfers—other levels of government' (see ZIMSTAT 2015i: Table 7.9d). However, we know other transfers are made to institutions not included in this definition. The Blue Book includes payments to other government agencies as transfers. For example, the Zimbabwe Revenue Authority receives a transfer. This allocation should seemingly not be regarded as a transfer— although neither the SNA nor Government Financial Statistics (GFS) manuals provide clear guidance. Moreover, we had to make judgements on what constitutes transfers, and recommend that more time and work is directed at identifying and classifying transfers.

4.7 Balance of payments

The Reserve Bank of Zimbabwe (RBZ) provided data on the balance of payments, which we used to disaggregate flows in NIPA.

4.8 Splitting value added into gross operating surplus and wages

We used Table 2.1a in NIPA(ZIMSTAT 2015i), which provides value added by 1 digit sector, to split the value added for each sector in the disaggregated SAM into wages, gross operating surplus (GOS), and mixed income. Table 2.5a of the NIPA (ZIMSTAT 2015i) provides compensation of employees for the whole economy, but the NIPA does not provide a breakdown by sector.

Table 4: GDP and earnings from Quarterly Employment Survey, 2013, US$ millions unless otherwise indicated

	GDP[1]	Annual earnings[2]	Earnings share in GDP (%)
Agriculture, hunting and fishing and forestry	1,364	454	33.3
Mining and quarrying	1,187	355	29.9
Manufacturing	1,457	746	51.2
Electricity and water	492	292	59.4
Construction	399	193	48.3
Finance and insurance and real estate	1,413	597	42.3
Distribution, hotels, and restaurants	1,909	553	29.0
Transport and communication	1,374	338	24.6
Public administration	402	858	213.5
Education	879	963	109.5
Health	123	402	326.8
Domestic services	43	109	254.1
Other services	400	756	189.1
Totals	11,442	6,616	57.8
Memo item: Compensation of Employees[3]		7,091	

Sources: Authors' calculations based on [1]ZimStat (2015i: Table 2.1a); [2]ZIMSTAT (2015i: Table 7.7b); [3]ZIMSTAT (2015i: Table 2.5a).

The National Income Reports show annual earnings according to Zimbabwe's Quarterly Employment Survey (QES).[5] We expected earnings from the QES to be lower than compensation of employees, since earnings typically do not include employers' contributions. This was true in 2013, when total earnings were US$6,616 million, while compensation of employees was US$7,091 million—an acceptable difference. Yet QES earnings in several sectors are ***higher*** than value added, which is not right (see Table 4). We judge that this unacceptable result arises mostly from errors in calculating sector GDPs. But, as we want to retain the published GDP as our benchmark, we had to make changes to the amounts for compensation of employees.

ZIMSTAT published two Labour Force Surveys covering 2011 and 2014 (ZIMSTAT 2012, 2015a). Though the surveys collected data on employment by 1 digit sector and occupational categories, the published reports do not show how these sectors and occupational categories relate. Furthermore, the published reports provide only one table with wage data, which is needed to split value added, but the data in this table cover the whole economy rather than sectors. We thus were unable to use these surveys.

Some wage data are available from other surveys, including the ALS, the CIP, and the Survey of Services. The latter two also provide data that allow computation of value added. We assembled data from these sources to the 1 digit level and estimated the share of compensation of employees in value added for each sector, which we applied to lower-level industry detail when required.

[5] See ZimStat (2015i: Table 7.7b).

4.9 Agricultural data

Agricultural data presented several problems. We therefore discuss these problems and the steps we took to mitigate them below.

Zimbabwe's dualism

Agriculture in Zimbabwe has historically been highly dualistic, driven by a discriminatory settler colonial system, which designated separate areas for white and black farmers. The different land tenure systems imposed on these areas, the unequal land distribution, and a host of policies favouring white farmers led to two distinct farming systems. On the one hand, there were large scale commercial farming (LSCF) areas based on private land tenure, with large farm sizes, generally in good farming areas, using modern farming methods to produce products for the market. On the other, there were communal lands (CL), based on traditional and communal land tenure, relatively over-crowded, generally in poor farming areas, and largely engaged in subsistence agriculture.

This dichotomy largely remains today, though the balance between commercial and subsistence farming has been changing, so the gap is probably not as large as it once was. For most policy and welfare issues it is therefore useful to continue distinguishing between different farming systems. However, the available data for doing this are rather poor.

Prior to independence these areas were not only separate, but each was somewhat homogenous. The legislated land allocation meant that the farming systems were coterminous with the legislated areas. Agricultural data were collected based on these land use types—as was done by the statistical agency (initially the CSO, now ZIMSTAT)—and could be interpreted as representing the two parts of the dual system.

This match between geographical designation and technological homogeneity began to break down after independence, primarily as regards the LSCF areas. Some of this land was redistributed to small scale farmers. The statistical agency did modify its survey enumeration areas to reflect this change, collecting and reporting data for resettlement areas (RAs) separately from LSCF. However, the Fast Track Land Reform Programme (FTLRP) further disrupted the relative homogeneity of the former LSCFs. After 2000, the former LSCF became a mix of remaining LSCFs, new A2 farms (commercial, but typically with smaller land holdings than the previously commercial farms), and A1 (typically small scale peasant farms).

ZIMSTAT has only recently been able to modify its survey frame to keep pace with these changes. PICES was collected and reported based on the old classification.[6] The ALS does distinguish between LSCF, A2, and A1, but the internal inconsistencies and lack of value data mentioned earlier make these hard to use. Table 5 presents a concordance between the old and new schemes and some approximate numbers.

Splitting output

Facing such data problems, we have taken a stylized approach to agriculture in the SAM.

[6] 'Since the 2002 Master frame was used during sampling, it is not possible to separate agricultural output for A1 farms and A2 farms from former large scale commercial farms' (ZIMSTAT 2013: 86).

We distinguish between two systems, large scale (LS) and small holder (SH). The former comprises LSCF and A2 farms, and the latter the other designations: A1 farms, small scale commercial farms (SSCFs), old resettlement areas, and communal lands.[7] The distinction between LS and SH lies not simply in their sizes, but their outputs and the production technologies they use. As producers, SH are less integrated with the rest of the economy than LS. This is reflected in two key dimensions:

- SH producers consume a higher share and market a smaller share of their output than do LS; and

- SH producers use proportionately fewer purchased inputs than do LS.

PICES has some data that allow us to see these patterns, albeit based on the old classification scheme (see Table 5). The LSCF in PICES is the old administrative designation. Under the new designation this is split into A2, A1, and LSCF. Since PICES was conducted in 2011/12, what is specified as LSCF presumably already comprised a mix of the three new designations. Thus, the 34 per cent consumption of own produce is presumably a weighted average of A1 (which will be close to CL) and A2/LSCF which would be even lower. Ideally, we should make this adjustment. However, although the 2015 ALS do separate the three new components of the former LSCF, it is not in a form that permits us to disaggregate. Data are given in tonnes rather than values that are needed for disaggregation.

Table 5: Characteristics of farm types, per cent of gross output

	CL	RA	SSCF	LSCF
Use of output				
Consumption of own produce	70	52	49	34
Marketed output	30	48	51	66
Composition of inputs				
Purchased inputs	14	24	32	47
Value added	86	76	68	53

Source: Authors' calculations based on ZIMSTAT (2013: Table 5.1).

In addition, we found it unclear how the PICES, which is a household survey, accounted for farms owned by corporations. We presume that output data in the PICES Table 5.1 (ZIMSTAT 2013) did not include such farms, though the data might have included household production on such farms. We thus found it difficult to identify outputs, value added, and inputs of corporate farming. We recognize that large corporations are involved in forestry, sugar, tea, poultry, and other products, but separating their contribution to production versus processing others' production was problematic. For example, two companies dominate Zimbabwe's sugar industry, but purchase cane from out-growers.

According to the PICES (ZIMSTAT 2013), gross output in 2011/12 was US$1.2 billion. According to the NIPA, the average gross output of agriculture, forestry, and fishing over 2011 and 2012 was US$2.7 billion (ZIMSTAT 2015i: Table 7.3a). Similarly, the PICES indicated total value added of US$921 million,[8] while the GDP of agriculture, forestry, and fishing GDP was US$1,370 million. Surveys tend to give lower figures than National Accounts, but some of this difference could be due to the PICES not covering corporations.

[7] 'Old resettlement areas' refer to the land redistributed in the 1980s; 'small scale commercial farming' refers to a small pre-Independence group of black 'master' farmers permitted to own land.

[8] Table 5.1 in PICES (ZimStat 2013) excludes 'Own Account Capital Formation' from value added; we have added it back

Table 6 presents alternative ways of dealing with this difference. On the one hand, we could assume PICES data represent all agriculture (column A in Table 6). On the other hand, we could take the difference between the NIPA and PICES as representing all missing corporates and add them to LS numbers from PICES (column B in Table 6). Or, assuming the difference is due to omission of corporates and 'normal' under-reporting of surveys, we could allocate some proportion of the difference to LS. However, we faced difficulties accurately determining this proportion. To derive the results in column C in Table 6, we compared figures for private consumption expenditure in PICES, which do not suffer from omission of corporates, with those in NIPA, and adjusted the difference by this proportion (84 per cent).

The methods in columns A and B of Table 6 could be interpreted as providing some bounds on estimates: method A assumes there is no omission of corporate farming and B assumes the whole difference is corporate farming.

Recall that we have undertaken this exercise to get some idea of the structure of agriculture across our two types. Firstly, we are interested in the aggregated technology of the types. The addition of the difference affects only LS. PICES suggests that intermediates are 47.2 per cent of gross output and 52.8 per cent of value added. Adding the difference with intermediates reported in NIPA takes the ratio up to over 70 per cent.

We also considered the shares of each farming type in gross output, intermediates, and VA. PICES suggests that 14.8 per cent of gross output comes from LS and 79.8 per cent from SH. The addition of the difference changes these figures to 64.5 per cent and 33.2 per cent, respectively. Similar changes occur in the contributions to value added and the use of intermediates (see Table 6).

We believe that these modifications move the data in the right direction. Nonetheless, it is probable that LS contributions to gross output, value added, and intermediates are higher than suggested by PICES. It is also likely that intermediates are a higher proportion of LS costs than suggested by PICES— although the change there may be less dramatic. But we have no sensible way to derive robust estimates.

We try to ensure that LS and SH in the SAM conform to these stylized differences. We assume that there is no consumption of own production (COP) in the LS.

To make appropriate adjustments to the SAM, we need to know the gross outputs of the LS and SH. The NIPA provide data for a single agricultural sector. Although it purports to provide data on value added, intermediate purchases, and gross output, investigation of those data suggests that the latter two are essentially constructed numbers. Intermediates are 52.0 per cent of gross output from 2009 to 2013. It appears that the National Accountant has made an estimate of the value added and then applied this fixed ratio across the years to derive the latter two.

However, we use these numbers, despite our misgivings about their reliability, to maintain consistency with the published NIPA.

We have four agricultural sectors in the disaggregated SAM: large scale farming, small scale farming, forestry, and fishing. We first split out farming (comprising both LS and SH together), forestry, and fishing, drawing on previous but unpublished SAMs.

The ALS provides some data which might permit estimation of gross output. We also supplemented these data with data from various agricultural organizations: the Tobacco Industry and Marketing Board (TIMB), Commercial Farmers Union (CFU), Zimbabwe Farmers' Union (ZFU), and Livestock and Meat Advisory Council (LMAC).

We took the following steps to break down value added into compensation of employees and GOS in agriculture:

1. Split agriculture value added from NIPA (ZIMSTAT 2015i: Table 7.3a) into farming (90.9 per cent), forestry (9.0 per cent), and fishing (0.1 per cent), using ratios from an unpublished 2011 SAM (Davies and van Seventer 2013);

2. Split the farming value added calculated in Step 1 into LS (17 per cent) and SH (83 per cent) using shares estimated from PICES (ZIMSTAT 2013: Table 5.1);

3. Took the initial estimate of the wage bill for LS and SH from the ALS;

4. Assumed wage bills for forestry and for fishing are the same shares of value added as in LS; and

5. Derived gross operating surplus + mixed income for each type as a residual.

Splitting gross output was more complicated. The product composition of marketed output differs, with industrial crops being a significantly higher proportion of LS than SH output.

1. We obtained data on quantities produced for a range of crops and livestock from the crop forecasts. We supplemented these with data from various sources;

2. We split the quantity of each product into LS and SH using proportions derived from the ALS;

3. We collected prices for each of these products from newspapers and various reports;

4. We combined these prices with the quantity splits derived in Step 2 to estimate shares of LS and SH in the value of gross output for farming; and

5. We applied these to our estimate of farming gross output from the NIPA figures.

One of the changes in the economy under the land reform is that there appears to be much more competition between LS and SH in domestic product markets than previously. However, this could be a statistical artefact arising from the enumeration problems referred to above.

Ideally, farm production should be valued at farm gate prices, excluding transport and other costs of getting it to market. The prices we collected were prices paid by the purchasers, and thus over-valued the value of farm output. However, since we used the values to derive proportions, rather than levels, the implicit assumption is that, on average, purchaser prices for crops are the same, relative to each other, as are farm gate prices. This is wrong, but we have no way of knowing the extent of the error.

Table 6: Various estimates of the structure of agriculture

	Values (US$ '000)			Ratios to gross output			Relative shares		
	A	B	C	A	B	C	A	B	C
Gross output	**1,194,193**	**2,868,349**	**2,405,289**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
Large scale	176,658	1,850,814	1,387,754	100.0	100.0	100.0	14.8	64.5	57.7
Small holder	952,433	952,433	952,433	100.0	100.0	100.0	79.8	33.2	39.6
Urban	65,102	65,102	65,102	100.0	100.0	100.0	5.5	2.3	2.7
Intermediates	**272,773**	**1,491,542**	**1,250,751**	**22.8**	**52.0**	**52.0**	**100.0**	**100.0**	**100.0**
Large scale	83,334	1,302,103	1,061,312	47.2	70.4	76.5	30.6	87.3	84.9
Small holder	159,910	159,910	159,910	16.8	16.8	16.8	58.6	10.7	12.8
Urban	29,529	29,529	29,529	45.4	45.4	45.4	10.8	2.0	2.4
Value added	**921,420**	**1,376,807**	**1,154,538**	**77.2**	**48.0**	**48.0**	**100.0**	**100.0**	**100.0**
Large scale	93,324	548,711	326,442	52.8	29.6	23.5	10.1	39.9	28.3
Small holder	792,523	792,523	792,523	83.2	83.2	83.2	86.0	57.6	68.6
Urban	35,573	35,573	35,573	54.6	54.6	54.6	3.9	2.6	3.1

Note: A: Pure PICES; B: PICES + Unadj Diff; C: PICES + Adj Diff.

Source: Authors' calculations based on ZIMSTAT (2013: Table 5.1, 205i: Tables 7.3a-c and 3.1a).

Consumption of own production

Finally, we discuss the treatment of consumption of own production (COP). As noted above, COP represents a significant share of agricultural output in Zimbabwe. The PICES report that nationally households consumed 58 per cent of their output (ZIMSTAT 2013: 87). In principle, COP should be included in the SAM and statistics on Zimbabwe's economy, but available COP data at our disposal did not allow us to proceed as desired.

We believe that COP is already incorporated in NIPA. The NIPA's sectoral gross outputs, value added and intermediates, and private consumption expenditure all include COP. If COP is to be shown separately in the SAM, these other numbers need to be adjusted accordingly.

A standard way of incorporating COP explicitly into a SAM is to show COP as direct flows from activities to households. We initially followed this route when constructing this SAM. However, we found that doing so required reducing not only the *level* of private consumption expenditure (as given in NIPA), but also the expenditure on each affected commodity. There is insufficient information available in published sources to identify which commodities should be reduced and by how much (and for which household type). Our attempts to let the cross-entropy balancing algorithm do this for us resulted in large and arbitrary changes in unrelated parts of the SAM. We therefore decided not to show COP separately in this version of the SAM. Nonetheless, we emphasize that COP is in the SAM—simply not identified explicitly. We recommend incorporating COP explicitly into the SAM when better data are available.

5 Snapshot of Zimbabwe's economy through the lens of the 2013 SAM

In this section, we review broad structural features of the Zimbabwean economy through the lens of the 2013 SAM we have constructed. The analysis is not comprehensive but serves to check the plausibility of the SAM data and reveal shortcomings. The summary tables presented here are given in more detail in Appendix C.

We begin with the structure of production. Table 7 reports various aspects of the structure of production, with more detail being given in Appendix C. In the first tableau, we see how the

various contributions to gross outputs are distributed across sectors. *Services* dominate all components, producing 49.6 per cent of gross output, and contributing 58.1 per cent of mixed income, which reflects self-employed professionals and actors in the informal sector delivering services where value added cannot be split between wages and GOS. Small holder farming is an important source for unskilled labour incomes. Surprisingly, the agriculture, forestry, and fishing sector does not generate mixed income, which is unusual in countries with subsistence agriculture. This absence accords with National Accounts data but may be erroneous.

The use of intermediate inputs gives some indication of the strength of sectors' backward linkages, though linkages might be to imported rather than domestically produced inputs. Small holder farms purchase only 2.4 per cent of intermediates in the economy, highlighting these farms' weak backward connections to the rest of the economy. The data also suggest weak backward linkages in the government and other industrial sectors.

The middle panel of Table 7 shows the structure of production within sectors. Value added represents 59.4 per cent of gross output across the whole economy but varies widely across sectors. For example, value added in other industrial sectors (i.e. electricity, water, and construction) comprises 83 per cent of gross output, but only 50.1 per cent in manufacturing. The other industrial sectors require high capital and skilled labour inputs, but produce outputs largely non-traded, thus their high share of value added might reflect lack of competition in such sectors. Within the agriculture, forestry, and fishing sector, the value added of large scale farming accounts for 26.6 per cent of gross output, and the value added of small holder farming 81.9 per cent. Details on variations within sectors are in Appendix Table C2.

The bottom panel of Table 7 shows how value added is distributed within sectors. Across the whole economy, skilled and unskilled labour make up 62.4 per cent of value added and capital (as GOS) 30.3 per cent. Zimbabwe's functional distribution of income is not noticeably out of line with global norms. However, the combined share of labour noted above is considerably higher than reported in National Accounts in the 1990s, when it averaged about 42 per cent of GDP at factor cost (CSO 2002). This could be due to changes in the treatment of mixed income.

In agriculture, forestry, and fishing, 38.5 per cent of value added were wages to unskilled workers compared with 5.6 per cent in mining. Variation was seen across but also within sectors. Within agriculture, forestry, and fishing, unskilled labour accounted for 8.9 per cent of value added in large scale farming and 53.3 per cent in small holder farming. The relatively high share of capital income in agriculture, forestry, and fishing may be because some income classified as mixed income was attributed to GOS. This seems to be the case after examining the distribution within agricultural subsectors. The relative earnings of skilled labour and unskilled labour are not surprising. What is surprising is that capital makes up a higher share of value added in small holder farming (46.7 per cent) than large scale farming (31.0 per cent). This trend is almost certainly because some returns to labour are embodied in surpluses generated by farm activities and are recorded as GOS. We preferred to show this under mixed income, but this was not possible due to lack of data. This also explains the lack of incomes in skilled labour in small holder farms.

Besides, in agriculture, forestry, and fishing, the SAM has subsectors in mining and manufacturing. Details on variations in subsectors are in Appendix Table C3.

Table 7: 2013 SAM: Structure of production

	Intermediates	Value added	Skilled labour	Unskilled labour	Gross operating surplus	Mixed income	Gross output
a) Contributions of gross output across sectors (per cent)							
Agriculture, forestry & fishing	15.8	11.4	4.5	33.7	15.8	0.0	13.2
Large scale farms	12.7	3.2	3.8	2.2	3.2	0.0	7.1
Small holder farms	2.4	7.5	0.0	30.7	11.5	0.0	5.4
Mining	4.4	11.7	12.2	5.0	13.2	14.4	8.7
Manufacturing	18.9	13.0	12.6	7.8	14.8	17.4	15.4
Other industrial sectors	3.1	10.5	11.8	7.3	9.7	10.0	7.5
Services	53.8	46.8	47.7	42.7	44.5	58.1	49.6
Government	4.0	6.6	11.2	3.4	2.0	0.0	5.5
Economy-wide	100.0	100.0	100.0	100.0	100.0	100.0	100.0
b) Structure of gross output within sectors (per cent)							
Agriculture, forestry & fishing	48.7	51.3	10.1	19.7	21.5	0.0	100.0
Large scale farms	73.4	26.6	16.0	2.4	8.2	0.0	100.0
Small holder farms	18.1	81.9	0.0	43.7	38.3	0.0	100.0
Mining	20.3	79.7	40.8	4.4	27.3	7.2	100.0
Manufacturing	49.9	50.1	23.9	3.9	17.3	4.9	100.0
Other industrial sectors	17.0	83.0	46.3	7.5	23.3	5.8	100.0
Services	44.0	56.0	28.2	6.6	16.1	5.1	100.0
Government	29.3	70.7	59.6	4.8	6.4	0.0	100.0
Economy-wide	40.6	59.4	29.3	7.7	18.0	4.3	100.0
c) Structure of value added within sectors (per cent)							
Agriculture, forestry & fishing		100.0	19.6	38.5	41.9	0.0	
Large scale farms		100.0	60.1	8.9	31.0	0.0	
Small holder farms		100.0	0.0	53.3	46.7	0.0	
Mining		100.0	51.2	5.6	34.2	9.0	
Manufacturing		100.0	47.8	7.8	34.5	9.8	
Other industrial sectors		100.0	55.9	9.0	28.1	7.0	
Services		100.0	50.3	11.9	28.8	9.1	
Government		100.0	84.3	6.7	9.0	0.0	
Economy-wide		100.0	49.4	13.0	30.3	7.3	

Source: Authors' own calculations.

Table 8 shows the structure of commodity flows in Zimbabwe. Services dominate and make up 61.8 per cent of domestic sales—defined as sales of domestically produced goods to the domestic market—followed by manufactured products as a distant second. The dominance of services is not uncommon, as services include trade and transport services. In South Africa, services account for about 68 per cent of domestic sales.

The data on exports and imports accords with what is already known: Zimbabwe exports predominately agricultural and mining products, and imports mainly manufactured goods. Zimbabwe's export dependence is high in agriculture and mining, and its import penetration is high in manufacturing. The import penetration of agriculture (15 per cent) is largely because of imports of maize and other grains, which will vary according to the agricultural season. About a quarter of Zimbabwe's manufacturing products are exported. Appendix Table C4 provides the details.

Table 8: 2013 SAM: Structure of commodity flows by market and sources, per cent

	Domestic sales	Exports	Imports	Export dependence	Import penetration
Agricultural products	9.2	33.2	2.7	47.1	15.0
Mining products	3.0	37.7	0.1	75.6	2.2
Manufactured products	16.3	18.8	85.0	22.0	75.5
Other industrial products	9.8	0.2	0.9	0.6	5.2
Services	61.8	10.1	11.3	3.8	9.8
National	100.0	100.0	100.0	19.7	37.2

Note: 'Export dependence' is the share of domestic production at market prices that is exported. 'Import penetration' is the share of sales in the domestic market that is imported.

Source: Authors' own calculations.

Table 9 illustrates household consumption patterns. Manufactured products account for more than half of consumption of rural and urban households. Rural households consume higher shares of agricultural products than urban households, but the opposite is true for services and other industrial products. Note that many food items are classified as manufactured products.

Urban households account for 64.4 per cent of national consumption. Rural households account for three-quarters of consumption spending on agricultural products, while urban households account for most consumption spending on manufactured products and other industrial products. In part this reflects the fact that food consumption in rural areas is often of own production, whereas in urban areas it is of processed foods supplied from the manufacturing sector.

Table 9: 2013 SAM: Household consumption patterns, per cent

	Shares of products in household consumption			Shares of households in product consumption		
	Rural	Urban	Total	Rural	Urban	Total
Agricultural products	10.2	1.6	4.7	77.4	22.6	100.0
Mining products	0.0	0.0	0.0	73.0	27.0	100.0
Manufactured products	56.1	50.3	52.4	38.2	61.8	100.0
Other industrial products	1.9	7.9	5.7	11.6	88.4	100.0
Services	31.8	40.1	37.2	30.5	69.5	100.0
National	100.0	100.0	100.0	35.6	64.4	100.0

Source: Authors' own calculations.

Table 10 illustrates the outlays of households in Zimbabwe. The striking feature is that household consumption is considerably higher than total income—balanced by high negative savings among rural and urban households. We are not surprised if the poor performance of Zimbabwe's economy leads households to live beyond their means, but it is hard to explain **how** households manage to do so. Are households drawing on past savings? This seems unlikely. Perhaps they are selling or depreciating capital assets, particularly cattle. Moreover, such actions of households seem unable to account for the degree of negative savings, and suggest an area warranting further investigation.

Table 10: 2013 SAM: Outlays of household incomes, per cent

	Rural	Urban	National
Total consumption	136.2	123.5	127.7
Transfers to government	0.0	4.1	2.7
Income tax	6.8	6.4	6.5
Savings	-42.9	-34.3	-37.2
Transfers abroad	0.0	0.3	0.2
Total outlay	100.0	100.0	100.0

Source: Authors' own calculations.

Many Zimbabwean households are sustained by inflows of 'diaspora dollars'—remittances from abroad. Table 11, which offers a breakdown of sources of household incomes, features these remittances from abroad, which are included in the SAM. We estimate that such transfers from the RoW accounted for 12.5 per cent of household incomes in 2013. Since the SAM balances incomes and outlays, such remittances have already been considered when deriving the high negative savings figures. The puzzle in this area thus remains.

Table 11: 2013 SAM: Sources of household incomes, per cent

	Skilled labour	Unskilled labour	Mixed income	Investment income	Government transfers	Transfers from RoW	Total income
Rural	37.9	23.5	23.1	6.7	-3.7	12.5	100.0
Urban	63.8	10.2	0.7	13.4	-0.6	12.5	100.0
National	55.1	14.6	8.2	11.1	-1.6	12.5	100.0

Source: Authors' own calculations.

6 Summary and recommendations

This report documented the construction of a Social Accounting Matrix (SAM) for Zimbabwe in 2013. The SAM provides a snapshot of the economy and how it fits together, and highlights gaps in data, suggesting areas where further data work is required. Constructing a SAM does not generate new data but brings existing data from multiple sources into a consistent framework.

Many economic policy issues in Zimbabwe must be examined in an economy-wide framework, as changes in one part of the economy have repercussions on other parts. This will be particularly true after Zimbabwe re-engages with the international community to build and strengthen its economy. Policy makers will need to grow linkages between different parts of the economy, so that growth in different sectors is mutually reinforcing. But achieving this will require an understanding of how different parts of the economy interact with each other. As noted in this paper, a SAM provides a useful and consistent framework for such an economy-wide analysis.

One of the main uses of SAMs is to provide data to construct computable general equilibrium (CGE) models, and we hope that the SAM in this paper will be used to formulate such models. When preparing this paper, we ran a preliminary model primarily to test data, which will be reported in a different document. We make a few comments on the use of SAM, expecting that it might be used for policy modelling.

We have emphasized throughout this paper problems with data, and the extent to which we made assumptions and judgements about such data to complete the SAM. Some may have

understandable scepticism about using the SAM for analysis, pointing to the 'garbage in, garbage out' adage. However, we hold that this SAM will be useful and acceptable for several reasons.

First, the utility of a SAM is primarily its depiction of the *structure* or relationships of the economy—not absolute levels. For example, a SAM may reflect the performance of an economy even if the level of GDP is hopelessly wrong, provided the SAM captures well the relative contributions of sectors to GDP. We assert that several important structural features of Zimbabwe's economy are adequately represented in this SAM.

Second, a key goal of CGE models is to explore the mechanisms by which a shock may generate particular results. In reference to this goal, it is the story behind the numbers that matters most. We believe that the story told by the numbers in this paper is broadly on target.

Third, we strongly believe that framing policy questions in an explicit economy-wide framework, with open data and an open model structure, can make useful contributions to debates around those policies.

Finally, we point out that our construction of a SAM has highlighted problems with data—not created them. We built the SAM based on existing GDP, trade, budget, and other data that institutions already use in policy analysis. For example, the Ministry of Finance uses such data to help frame the budget, the RBZ to develop monetary policy statements, and other institutions to discuss and set goals for Zimbabwe's economy.

Nonetheless, Zimbabwean policy modellers should be cautious in applying the SAM to develop policies outside the context of the current economic crisis. The data in the SAM captures an economy in crisis, and the SAM has features contingent on that crisis. Policy makers are advised to not use the data in the SAM to determine structural parameters for modelling the economy beyond the crisis. The best example of a variable linked to the crisis may be negative household savings, which is probably empirically correct, but represents an area where the SAM model is calibrated on unusual data.

Other features of the SAM raise similar questions. The SAM suggests that linkages among industries are rather weak, which we believe reasonably portrays this facet of Zimbabwe's economy. In the past two decades, linkages have been undermined among industries. But calibrating the model to these linkages carries them forward into projections and policy analysis. For instance, weakened linkages imply that increases in demand for outputs will have relatively lower multiplier effects on the rest of the economy. Similarly, a projected increase in productivity in a sector might have a lesser benefit on industries downstream.

These kinds of issues raise questions about the appropriate way to model an economy transitioning from a crisis. Policies for such economies should support standard demand or supply interventions, but also pay attention to how to shift underlying structures and features from those contingent on the crisis to ones based on 'normality'.

We have emphasized problems that arise from poor data. These problems suggest areas for further work. We conclude by offering our assessment of areas where further work could yield high returns:

1. The apparent inconsistencies in the National Accounts

   We highlighted many areas where we think the published National Accounts could be improved. High on our list of priorities for clarification are:

   a. the conflict between the data on public sector wages in the government production accounts and in the GDP; and

   b. the relationships between value added, intermediates, and gross output across sectors.

2. The agricultural sector, and particularly the split between large scale and small holder farming

   We question whether the conventional split between large scale and small scale farming continues to make much sense—either from a policy or an analytical point of view. Do the previous administrative categories still reflect clear technological and behavioural differences? This debate requires data beyond that used for SAMs and should take place among agricultural experts. It is a debate that we think is overdue.

3. The sectoral distribution of wages, and their split between skilled and unskilled workers

   Though various sources cover wages and employment on a sectoral basis, we indicated serious inconsistencies between them, and that such sources are often insufficiently detailed.

4. The distribution of factor incomes and transfers between households

   A central contribution of SAMs is that they close the circular flow by showing how incomes generated in production are distributed to households. Income distribution is a key policy issue in Zimbabwe. We constructed our SAM to show the distribution of income between rural and urban households, because that is what the published data permitted us to do. This is a useful distinction, but it would be more useful to also understand how incomes are distributed between rich and poor.

5. Savings by different institutions

   Any future growth in Zimbabwe will require investment which requires savings. However, the data on savings in Zimbabwe, both domestic and foreign, are very weak. Serious evidence-based policy requires much better information.

In some cases, the data to make these improvements exist, but are not publicly available. Many surveys carried out by ZIMSTAT have the requisite raw data, but published data are not in the right form. Making raw data available to researchers raises questions about confidentiality, but many national statistical agencies (NSAs) have protocols for confidentiality. Publishing data would lead to more and better use of the data and raise its value enormously. The public could also provide feedback to publishing agencies, leading to improvements in the quality of data. It would be a major step forward if ZIMSTAT were to move in this direction.

Nonetheless, ZIMSTAT appears to have the best access to necessary data and, from that perspective, is best placed to undertake the work we attempted here. When SAMs were first developed in the 1970s, NSAs were sceptical about the rigour and reliability of SAMs and were understandably unwilling to put their 'seal of approval' on them. It fell largely to non-official researchers to develop the concepts and construct SAMs. This has largely changed: today, more and more NSAs compile official SAMs, or at least provide the building blocks enabling others to complete them. ZIMSTAT should take steps in this direction.

However, ZIMSTAT is under-resourced, and unlikely to be able to compile an official SAM for Zimbabwe in the near future. We believe that much of the necessary work will, in the foreseeable future, be undertaken by non-official researchers. We offer the present SAM, with all its noted deficiencies, as a basis for moving forward. We welcome criticisms of this work, and encourage others to take steps to improve the SAM.

References

Breisinger, C., C.M. Thomas, and J. Thurlow (2009). *Social Accounting Matrices and Multiplier Analysis: An Introduction with Exercises*. Washington, DC: International Food Policy Research Institute. Available at: http://www.ifpri.org/sites/default/files/publications/sp5.pdf (accessed on 5 November 2015).

Chitiga, M., R. Davies, and R. Mabugu (2000). *A 1995 Social Accounting Matrix (SAM) for Zimbabwe*. Harare: SIDA Office in Harare, Zimbabwe.

CSO (Central Statistical Office (2002). *National Accounts 1985–2000*. Harare: Government of Zimbabwe.

Davies, R., and J. Thurlow (2013). *A 2009 Social Accounting Matrix (SAM) for South Africa*. Washington, DC: International Food Policy Research Institute.

Davies, R., and D. van Seventer (2013). *Notes on the Construction of a Preliminary 2011 MicroSAM for Zimbabwe and CGE Results of a Tariff Increase*. World Bank. unpublished.

Ministry of Finance and Economic Development (2012). *Budget Estimates for the Year Ending December 31, 2013*. Harare: Government of Zimbabwe.

Pyatt, G. (1988). 'A SAM Approach to Modelling'. *Journal of Policy Modelling*, 10(3): 327–52.

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

Reinert, K.A., and D.W. Roland-Holst (1997). 'Social Accounting Matrices'. In J.F. Francois and K.A. Reinert (eds), *Applied Methods for Trade Policy Analysis: A Handbook*. New York, NY: Cambridge University Press.

Robinson, S., and D.W. Roland-Holst (1988). 'Macroeconomic Structure and Computable General Equilibrium Models'. *Journal of Policy Modelling*, 10(3): 353–75.

Robinson, S., A. Cattaneo, and M. El-Said (2001). 'Updating and Estimating a Social Accounting Matrix Using Cross Entropy Methods'. *Economic Systems Research*, 13(1): 47–64.

Thomas, M., and R.M. Bautista (1999). *A 1991 Social Accounting Matrix (SAM) for Zimbabwe*. Washington, DC: International Food Policy Research Institute.

ZIMSTAT (2012). *2011 Labour Force Survey*. Harare: Government of Zimbabwe.

ZIMSTAT (2013). *Poverty Income Consumption and Expenditure Survey 2011/12 Report*. Harare: Government of Zimbabwe.

ZIMSTAT (2015a). *2014 Labour Force Survey*. Harare: Government of Zimbabwe.

ZIMSTAT (2015b). *Agriculture and Livestock Survey in A1 Farms*. Harare: Government of Zimbabwe.

ZIMSTAT (2015c). *Agriculture and Livestock Survey in A2 Farms*. Harare: Government of Zimbabwe.

ZIMSTAT (2015d). *Agriculture and Livestock Survey in Communal Lands*. Harare: Government of Zimbabwe.

ZIMSTAT (2015e). *Agriculture and Livestock Survey in Old Resttlement Schemes.* Harare: Government of Zimbabwe.

ZIMSTAT (2015f). *Agriculture and Livestock Survey in Small Scale Commercial Farms.* Harare: Government of Zimbabwe.

ZIMSTAT (2015g). *Agriculture and Livestock Survey of Large Scale Commercial Farms.* Harare: Government of Zimbabwe.

ZIMSTAT (2015h). *Census of Industrial Production (CIP) 2013 Report.* Harare: Government of Zimbabwe.

ZIMSTAT (2015i). *National Income 2009–2014 Report.* Harare: Government of Zimbabwe. Available at: http://www.ZIMSTAT.co.zw/sites/default/files/img/publications/Accounts/National_%20Accounts_2009_2015.pdf (accessed on 5 November 2015).

ZIMSTAT (2016a). Personal Communication, 31 October.

ZIMSTAT (2016b). *Survey of Services 2013 Report.* Harare: Government of Zimbabwe.

Appendix A: Activities and commodities in the 2013 SAM for Zimbabwe

		Activities			Activities
1	alagr	Large scale farming	19	anmmp	Manufacture of non-metallic mineral products n.e.c.
2	asagr	Small holder farming	20	airon	Manufacture of iron & steel and non-ferrous metal products
3	afore	Forestry	21	ametp	Manufacture of structural metal products
4	afish	Fishing	22	amach	Manufacture of machinery and non-electrical equipment
5	amcoa	Mining & agglomeration of hard coal	23	aequi	Manufacture of electric motors, telecom equipment & medical appliances
6	amnfm	Mining of non-ferrous metal ores, except uranium and thorium ores	24	atreq	Manufacture of transport equipment
7	amoth	Mining and quarrying n.e.c.	25	aothm	Manufacture of furniture & other products n.e.c.
8	afood	Manufacture of food	26	aelwa	Electricity & water
9	atobm	Manufacture of tobacco products	27	acnst	Construction
10	atext	Manufacture of textiles	28	afins	Finance and Insurance
11	aclth	Manufacture of wearing apparel	29	abuss	Real estate
12	aleat	Manufacture of leather products and footwear	30	atrac	Distribution, hotels, and restaurants
13	awood	Manufacture of wood products	31	atrns	Transport and communication
14	apapp	Manufacture of paper & paper products	32	apuba	Public administration
15	aprin	Publishing & printing	33	aeduc	Education
16	achem	Manufacture of chemical products	34	aheal	Health
17	arupl	Manufacture of rubber & plastic products	35	adoms	Domestic services
18	aglas	Manufacture of glass and glass products	36	aoths	Other services
		Commodities			Commodities
1	ctoba	Tobacco	25	cpapp	Paper & paper products
2	cmaiz	Maize	26	cprin	Publishing & printing
3	cothg	Other grains	27	cchem	Chemical products
4	csuga	Sugar	28	crupl	Rubber & plastic products
5	ccott	Cotton	29	cglas	Glass and glass products
6	coicr	Other industrial crops	30	cnmmp	Non-metallic mineral products n.e.c.
7	chort	Horticulture and vegetables	31	ciron	Iron & steel and non-ferrous metal products
8	ccttl	Cattle	32	cmetp	Structural metal products
9	cpoul	Poultry	33	cmach	Machinery
10	coliv	Other livestock	34	cequi	Electric motors, telecom equipment & medical applicances
11	cdair	Dairy	35	ctreq	Transport equipment
12	cfore	Forestry products	36	cothm	Furniture & other products n.e.c.
13	cfish	Fishing products	37	celec	Electricity
14	cmcoa	Coal	38	cwate	Water
15	cmdia	Diamonds	39	ccnst	Construction
		Commodities (cont.)			Commodities (cont.)
16	cmgol	Gold	40	cfins	Finance and insurance services

17	cmpgm	PGM	41	cbuss	Real Estate
18	cmoth	Other minerals	42	ctrac	Distribution, hotels, and Restaurants
19	cfood	Food products	43	ctrns	Transport and communication
20	ctobm	Tobacco products	44	cpuba	Public administration
21	ctext	Textile products	45	ceduc	Education
22	cclth	Wearing Apparel	46	cheal	Health
23	cleat	Leather products and Footwear	47	cdoms	Domestic Services
24	cwood	Wood Products	48	coths	Other Services

Source: Authors' own workings.

Appendix B: Detailed sources for the SAM

This appendix explains how each macro SAM entry is derived and disaggregated to arrive at the prior micro SAM. Each entry in the SAM is discussed below. The notation for SAM entries is (row, column), and the values are in billions of 2013 US dollars. The final disaggregated SAM is quite large and is included in the accompanying Excel workbook.

Table B1: Detailed sources for SAM

i	(Commodities, Activities)…US$7,826 million
	Intermediate consumption is obtained from NIPA where it is available as the sum of 1 digit activities. The disaggregation into a use matrix of 36 activities using 48 commodities (see Appendix A. for details) is partly available from 2011 unpublished use accounts (for mining, manufacturing, electricity and water, and construction) and partly from an unpublished 1997 SAM (agriculture and services), based on Chitiga et al. (2000) and Davies and van Seventer (2013). Lower-level control totals for activities' total intermediate inputs are derived from the CIP (covering mining, manufacturing, utilities, and construction, ZIMSTAT 2013), while services are available from the NIPA. Agriculture's breakdown of total intermediate inputs into 4 components is discussed in the section on agricultural data below. Total sales of intermediates (including imports) for each of the 48 commodities can then be derived from the use table. Some manual adjustment to the initial use table data was required to allow for specific intermediate transactions that were not identified in the original underlying sources (such as those for local processing of tobacco manufacturing). Final adjustment by balancing method.
ii	(Labour, Activities)…US$7,091 million
	Compensation of employees is available from NIPA and disaggregated across industries using the CIP and the Survey of Services (ZIMSTAT 2016b). Agriculture's breakdown of wages and salaries into 4 components is discussed in the section on agricultural data below. Disaggregation across unskilled and skilled is based on the 1991 SAM (Thomas and Bautista 1999).
iii	(Capital, Activities)…US$3,443 million
	Net operating surplus + depreciation is derived from NIPA as the economy-wide total for GOS. Initially, we add mixed income (see below). Then, at the industry level, the sum of GOS and mixed income is derived as the difference between value added and compensation of employees. Value added at the industry level is available for all 1 digit industries from NIPA. Further disaggregation of value added down to 36 industries is based on the CIP, while agriculture's breakdown into 4 components is discussed in the section on agricultural data below. Mixed income (see below) is subsequently broken down based on ratios from an unpublished 1997 SAM.
iv	(Mixed income, Activities)…US$831 million
	Mixed income is available from NIPA as an economy-wide total, and derived at the detail industry level as per above, i.e. using ratios from an unpublished 1997 SAM.
v	(Activity tax, Activities)…US$185 million
	Net other taxes on production in all industries is available from NIPA as an economy-wide total and is derived at the detail industry level using tax rates from an unpublished 1997 SAM. Final adjustment by balancing method.
vi	(Activities, Commodities)…US$18,698 million

	Output of total domestic economy at the economy-wide level is the sum of the previous 5 cells in the macro SAM. Disaggregation into a supply matrix of 36 activities making 48 commodities is partly based on 2011 unpublished supply accounts (for mining, manufacturing, electricity and water, and construction) and partly on an unpublished 1997 SAM (agriculture and services), based on Chitiga et al. (2000). An adjustment is made to give higher weights to tobacco being supplied by small scale farming at the expense of other commodities it supplies and at the expense of large scale farming. These new supply coefficients are derived from the Agriculture and Livestock Survey (ZIMSTAT 2015b, 2015c, 2015d, 2015e, 2015f, 2015g), volume data, and informally obtained price data. COP is subtracted using a combination of fixed shares and own judgement. Only small scale agriculture produces for own consumption. Final adjustment by balancing method.
vii	(Commodities, Commodities)…US$2,037 million
	Transactions margins are derived from margins rates that are initially taken from the 1997 SAM but appeared to be very high with 25 per cent rates not uncommon. We set all margins initially to 6 per cent, but in the balanced SAM the rates vary across commodities. The distribution of the margins to the relevant services (trade, transport, financial services) is based on the 2009 SAM for South Africa (Davies and Thurlow 2013). Final adjustment by balancing method.
viii	(Sales Tax, Commodities)…US$2,262 million
	Net taxes on products less import duties as an economy-wide total are derived from total net taxes on product (including import duties) as reported in the NIPA. Tax rates for SAM commodities are taken from an unpublished 1997 SAM for Zimbabwe. Final adjustment by balancing method.
ix	(Import Tax, Commodities)…US$357 million
	Import duties summed to the total at the economy-wide level is taken from the Ministry of Finance and Economic Development (2012). Import duty (collection) rates for each SAM commodity are taken from an unpublished 1997 SAM for Zimbabwe.
x	(RoW, Commodities)…US$8,005 million
	Imports of goods & services are taken from unpublished ZIMSTAT trade data and scaled across commodities to match the total for imports as reported in the NIPA.
xi	(Households, Labour)…US$7,084 million
	Compensation of residents is derived as a residual from *ii* above after accounting for payments to and from the RoW. Distribution across labour skill and household category is initially based on the 1997 SAM. Final adjustment by balancing method.
xii	(RoW, Labour)…US$033 million
	Compensation of non-Zimbabwe employees is taken from the balance of payment accounts in the NIPA and entirely allocated to skilled labour. Final adjustment by balancing method.
xiii	(Enterprises, Capital)…US$3,077 million
	GOS of corporations is transferred to the enterprise account and is derived as a residual from *iii* above after accounting for payments to and from the RoW. Final adjustment by balancing method.
xiv	(RoW, Capital)…US$479 million
	Property income transferred to the RoW is taken from the balance of payment accounts in the NIPA and is made up of property and enterpreneurial income paid by corporate and quasi-corporate enterprises. Final adjustment by balancing method.

xv	(Households, Mixed income)…US$831 million
	Mixed income of households is taken from *iv* above and transferred to households
xvi	(Households, Enterprises)…US$2,002 million
	Miscellaneous transfers from enterprises to households includes dividend payments received by households. It is derived as a residual from *xiii* above after accounting for enterprise property income transfers to the government (see *xvii* below), enterprise direct taxes (see xviii below) and enterprise savings (see see *xix* below). Final adjustment by balancing method.
xvii	(Government, Enterprises)…US$041 million
	Property income received by government is derived from the government statistics in the NIPA. Final adjustment by balancing method.
xviii	(Direct tax, Enterprises)…US$414 million
	Current taxes on income and wealth paid by enterprises is taken from the government statistics of the NIPA. Final adjustment by balancing method.
xix	(Savings=Investment, Enterprises)…US$619 million
	Gross saving by enterprises is derived from total savings of the private sector as recorded by the NIPA, less savings by households as derived in *xxiii* below. Final adjustment by balancing method.
xx	(Activities, Households)…US$678 million
	COP is derived from PICES (ZIMSTAT 2013). Mapping to activities is based on main commodity supplied. Some own judgement is applied. Only rural households consume own production. Final adjustment by balancing method.
xxi	(Commodities, Households)…US$12,903 million
	Final consumption expenditure by households is available in the NIPA as an economy-wide total. Disaggregation across commodities and urban/rural households is based on the PICES (ZIMSTAT 2013).
xxii	(Government, Households)…US$274 million
	Transfers received by government from households is taken from the government finance tables in the NIPA and include admin fees, charges, non-industrial & incidental sales, fines and penalties, contribution-gov. employees' pension fund and other non-tax revenue.
xxiii	(Direct tax, Households)…US$1,274 million
	Current taxes on income and wealth of households is available from the government finance tables in the NIPA. Final adjustment by balancing method.
xxiv	(Savings=Investment, Households)…US$-2,583 million
	Gross saving by households and NPISHs is derived by scaling-up household income and expenditure components from PICES to wages and salaries and household expenditure from the NIPA and taking the difference between total derived household income and expenditure. Final adjustment by balancing method.
xxv	(RoW, Households)…US$000 million
	Transfers by households to the RoW is taken from the balance of payment accounts of the NIPA and comprises other primary income and current transfers paid to the rest of the world. Final adjustment by balancing method.
xxvi	(Commodities, Government)…US$2,862 million

	Final consumption expenditure government is available from the NIPA and further broken down into health, education, and public administration based Ministry of Finance and Economic Development (2012) data.
xxvii	(Households, Government)…US$995 million
	Transfers by government to households are taken from the scaled-up PICES data (for discussion see *xxiii* above). Final adjustment by balancing method.
xxviii	(Savings=Investment, Government)…US$367 million
	Gross saving by government is the sum of savings by central and local government and is available from the savings account in the NIPA. Final adjustment by balancing method.
xxix	(RoW, Government)…US$720 million
	Transfers by government to the RoW is taken from the balance of payment accounts in the NIPA and consists of property and enterpreneurial income paid by government. Final adjustment by balancing method.
xxx	(Government, Activity Tax)…US$185 million
	Net other taxes on production in all industries is discussed in *v* above.
xxxi	(Government, Sales Tax)…US$2,262 million
	Net taxes on products less import duties is discussed in *viii* above.
xxxii	(Government, Import Tax)…US$357million
	Import duties is discussed in *ix* above.
xxxiii	(Government, Direct Tax)…US$1,689 million
	Direct taxes paid by enterprises and households is discussed in *xviii* and *xxii* above.
xxxiv	(Commodities, Change in stocks)…US$005 million
	Change in inventories is available from the NIPA. The breakdown into commodities is initially based on shares from a 1997 SAM and subsequently adjusted to facilitate the balancing procedure, discussed in the next section.
xxxv	(Commodities, Savings=Investment)…US$1,753 million
	Gross fixed capital formation is available from the NIPA, including a breakdown into the broad commodities: construction, transport equipment, and machinery. The latter is distributed equally among machinery and electric motors, telecom equipment, and medical appliances.
xxxvi	(Change in stocks, Savings=Investment)…US$005 million
	Change in inventories: see *xxxiii* above.
xxxvii	(Commodities, RoW)…US$3,972 million
	Exports of goods and services are taken from unpublished ZIMSTAT trade data and scaled across commodities to match the total for imports as reported in the NIPA.
xxxviii	(Labour, RoW)…US$026 million
	Compensation of Zimbabwe residents received in the RoW is taken from the balance of payment accounts in the NIPA and entirely allocated to skilled labour. Final adjustment by balancing method.
xxxix	(Capital, RoW)…US$113 million

	Property income paid by the RoW is taken from the balance of payment accounts in the NIPA and is made up of property and enterpreneurial income received by corporate and quasi-corporate enterprises. Final adjustment by balancing method.
xl	(Households, RoW)…US$1,635 million
	Transfers received by households from the RoW is taken from the balance of payment accounts of the NIPA and comprise other primary income and current transfers received from the rest of the world. Final adjustment by balancing method.
xli	(Government, RoW)…US$137 million
	Transfers received by the government from the RoW is taken from the balance of payment accounts in the NIPA and consists of property and enterpreneurial income received by government. Final adjustment by balancing method.
xlii	(Savings=Investment, RoW)…US$3,355 million
	Current account balance (foreign savings) is taken from the NIPA. Final adjustment by balancing method.

Source: Authors' illustration.

Appendix C: Detailed structural tables derived from the 2013 SAM

We presented a brief snapshot of the economy through the lens of our constructed SAM in Section 5. In this Appendix, we present more detailed tables derived from the SAM. We hope that these will provide the basis for discussing how well our SAM represents Zimbabwe in 2013, thereby contributing to improvements to our preliminary efforts.

Table C1: 2013 SAM: Detailed components of gross output across sectors, per cent

	Inter-mediates	Wages	Gross operating surplus	Mixed income	GDP at factor cost	Activity taxes	GDP in basic prices
Large scale farming	12.73	3.50	3.23	-	3.16	8.01	7.06
Small holder farming	2.41	6.39	11.53	-	7.48	5.30	5.42
Forestry	0.69	0.72	1.01	-	0.76	0.94	0.73
Fishing	0.00	0.01	0.01	-	0.01	0.01	0.01
Mining & agglomeration of hard coal	1.78	4.01	5.11	5.78	4.47	5.13	3.40
Mining of non-ferrous metal ores, except uranium and thorium ores	2.24	6.15	7.48	7.87	6.68	7.38	4.90
Mining and quarrying n.e.c.	0.34	0.51	0.65	0.76	0.57	0.81	0.48
Manufacture of food	8.23	2.26	2.69	2.93	2.44	-1.58	4.73
Manufacture of tobacco products	2.13	2.59	3.00	3.18	2.76	-1.55	2.46
Manufacture of textiles	0.11	0.27	0.34	0.39	0.30	0.33	0.22
Manufacture of wearing apparel	0.08	0.19	0.23	0.27	0.21	0.26	0.16
Manufacture of leather products and footwear	0.05	0.22	0.26	0.30	0.24	0.28	0.16
Manufacture of wood products	0.14	0.59	0.99	1.39	0.77	1.24	0.52
Manufacture of paper & paper products	0.75	0.32	0.50	0.67	0.40	0.80	0.54
Publishing & printing	0.15	0.26	0.34	0.41	0.29	0.39	0.23
Manufacture of chemical products	1.05	1.41	1.84	2.22	1.60	4.30	1.40
Manufacture of rubber & plastic products	0.12	0.48	0.64	0.78	0.55	1.57	0.39
Manufacture of glass and glass products	0.00	0.08	0.10	0.13	0.09	0.10	0.05
Manufacture of non-metallic mineral products n.e.c.	0.23	0.44	0.63	0.83	0.52	0.87	0.41
Manufacture of iron & steel and non-ferrous metal Products	0.08	0.41	0.52	0.62	0.46	0.60	0.31
Manufacture of structural metal products	0.47	0.56	0.76	0.95	0.65	0.86	0.58
Manufacture of machinery and non-electrical Equipment	3.22	0.54	0.73	0.92	0.63	0.94	1.67
Manufacture of electric motors, telecom equipment & medical appliances	0.23	0.12	0.15	0.18	0.13	0.30	0.17
Manufacture of transport equipment	0.60	0.26	0.33	0.40	0.29	0.38	0.42
Manufacture of furniture & other products n.e.c.	1.29	0.60	0.76	0.88	0.67	0.88	0.92
Electricity & water	1.60	5.11	5.93	6.10	5.43	5.51	3.89
Construction	1.53	5.77	3.77	3.92	5.03	10.18	3.67
Finance and insurance	11.72	0.72	5.37	11.07	2.89	5.19	6.46
Real estate	3.50	5.33	6.80	8.14	5.98	2.74	4.95
Distribution, hotels, and restaurants	5.06	5.98	13.69	16.71	9.10	9.45	7.48
Transport and communication	29.24	3.42	10.63	14.78	6.44	18.00	15.73
Public administration	3.98	9.59	1.95	-	6.57	2.45	5.49
Education	3.13	20.98	4.84	3.95	14.85	5.50	10.04
Health	1.11	2.09	0.59	0.68	1.53	1.04	1.36
Domestic services	-	0.77	-	-	0.48	-	0.28
Other services	0.01	7.35	2.57	2.79	5.57	1.37	3.29
National economy	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: Authors' own calculations.

Table C2: 2013 SAM: Detailed structure of gross output within sectors, per cent

	Inter-mediates	Value added	of which			Activity taxes	Gross output
			Wages	Gross operating surplus	Mixed income		
Large scale farming	72.6	26.3	18.2	8.2	-	1.1	100.0
Small holder farming	17.9	81.2	43.2	37.9	-	1.0	100.0
Forestry	37.9	60.9	36.3	24.6	-	1.3	100.0
Fishing	31.5	67.0	39.7	27.3	-	1.4	100.0
Mining & agglomeration of hard coal	21.1	77.4	43.3	26.8	7.3	1.5	100.0
Mining of non-ferrous metal ores, except uranium and thorium ores	18.4	80.1	46.0	27.2	6.9	1.5	100.0
Mining and quarrying n.e.c.	28.5	69.9	39.1	24.0	6.8	1.6	100.0
Manufacture of food	70.0	30.3	17.5	10.1	2.7	-0.3	100.0
Manufacture of tobacco products	34.8	65.8	38.6	21.7	5.6	-0.6	100.0
Manufacture of textiles	19.9	78.6	44.3	26.8	7.5	1.4	100.0
Manufacture of wearing apparel	20.8	77.6	43.6	26.5	7.5	1.6	100.0
Manufacture of leather products and footwear	12.2	86.1	49.1	29.0	8.0	1.7	100.0
Manufacture of wood products	11.0	86.7	41.3	33.9	11.4	2.3	100.0
Manufacture of paper & paper products	55.4	43.2	21.6	16.2	5.3	1.4	100.0
Publishing & printing	25.1	73.3	40.4	25.4	7.4	1.6	100.0
Manufacture of chemical products	30.1	66.9	36.8	23.4	6.8	3.0	100.0
Manufacture of rubber & plastic products	12.9	83.2	45.6	29.0	8.6	3.9	100.0
Manufacture of glass and glass products	1.6	96.7	53.0	33.6	10.0	1.8	100.0
Manufacture of non-metallic mineral products n.e.c.	22.5	75.4	39.2	27.5	8.7	2.1	100.0
Manufacture of iron & steel and non-ferrous metal products	10.7	87.4	48.9	30.0	8.6	1.9	100.0
Manufacture of structural metal products	32.7	65.8	35.4	23.3	7.1	1.5	100.0
Manufacture of machinery and non-electrical equipment	77.4	22.0	11.9	7.8	2.4	0.5	100.0
Manufacture of electric motors, telecom equipment & medical applicances	53.3	45.0	25.1	15.5	4.5	1.7	100.0
Manufacture of transport equipment	58.2	41.0	22.8	14.1	4.1	0.9	100.0
Manufacture of furniture & other products n.e.c.	56.4	42.7	23.9	14.6	4.1	0.9	100.0
Electricity & water	16.6	82.1	48.2	27.2	6.7	1.4	100.0
Construction	16.8	80.5	57.6	18.3	4.6	2.7	100.0
Finance and insurance	73.0	26.3	4.1	14.8	7.4	0.8	100.0
Real estate	28.4	71.0	39.5	24.5	7.1	0.5	100.0
Distribution, hotels, and restaurants	27.2	71.6	29.3	32.6	9.6	1.2	100.0
Transport and communication	74.8	24.1	8.0	12.0	4.0	1.1	100.0
Public administration	29.2	70.4	64.0	6.3	-	0.4	100.0
Education	12.5	86.9	76.7	8.6	1.7	0.5	100.0
Health	32.9	66.4	56.4	7.8	2.1	0.7	100.0
Domestic services	-	100.0	100.0	-	-	-	100.0
Other services	0.1	99.5	82.0	13.9	3.6	0.4	100.0
National economy	**40.2**	**58.8**	**36.7**	**17.8**	**4.3**	**1.0**	**100.0**

Source: Authors' own calculations.

Table C3: 2013 SAM: Detailed distribution of value added within sectors, per cent

	Skilled labour	Unskilled labour	Gross operating surplus	Mixed income	Value added
Large scale farming	60.1	8.9	31.0	0.0	100.0
Small holder farming	0.0	53.3	46.7	0.0	100.0
Forestry	44.1	15.5	40.4	0.0	100.0
Fishing	44.9	14.4	40.7	0.0	100.0
Mining & agglomeration of hard coal	50.4	5.5	34.6	9.4	100.0
Mining of non-ferrous metal ores, except uranium and thorium ores	51.8	5.6	33.9	8.6	100.0
Mining and quarrying n.e.c.	50.5	5.5	34.3	9.7	100.0
Manufacture of food	51.5	6.3	33.4	8.8	100.0
Manufacture of tobacco products	52.3	6.3	33.0	8.4	100.0
Manufacture of textiles	35.9	20.4	34.1	9.6	100.0
Manufacture of wearing apparel	35.9	20.4	34.1	9.6	100.0
Manufacture of leather products and footwear	36.4	20.7	33.7	9.3	100.0
Manufacture of wood products	44.0	3.6	39.1	13.2	100.0
Manufacture of paper & paper products	46.3	3.8	37.6	12.3	100.0
Publishing & printing	34.9	20.2	34.7	10.2	100.0
Manufacture of chemical products	48.6	6.4	34.9	10.1	100.0
Manufacture of rubber & plastic products	34.7	20.1	34.9	10.3	100.0
Manufacture of glass and glass products	34.7	20.1	34.8	10.3	100.0
Manufacture of non-metallic mineral products n.e.c.	48.1	3.9	36.5	11.5	100.0
Manufacture of iron & steel and non-ferrous metal products	51.6	4.2	34.3	9.8	100.0
Manufacture of structural metal products	49.7	4.1	35.5	10.8	100.0
Manufacture of machinery and non-electrical equipment	49.8	4.1	35.4	10.7	100.0
Manufacture of electric motors, telecom equipment & medical appliances	35.3	20.4	34.4	9.9	100.0
Manufacture of transport equipment	35.2	20.4	34.5	9.9	100.0
Manufacture of furniture & other products n.e.c.	51.8	4.3	34.2	9.7	100.0
Electricity & water	52.7	6.0	33.1	8.2	100.0
Construction	59.3	12.3	22.7	5.7	100.0
Finance and insurance	11.0	4.6	56.4	28.0	100.0
Real estate	39.3	16.3	34.4	10.0	100.0
Distribution, hotels, and restaurants	30.1	10.9	45.6	13.4	100.0
Transport and communication	24.4	8.8	50.0	16.8	100.0
Public administration	84.3	6.7	9.0	0.0	100.0
Education	81.6	6.5	9.9	1.9	100.0
Health	78.7	6.3	11.7	3.2	100.0
Domestic services	0.0	100.0	0.0	0.0	100.0
Other services	58.3	24.1	14.0	3.7	100.0
National	**49.4**	**13.0**	**30.3**	**7.3**	**100.0**

Source: Authors' own calculations.

Table C4: 2013 SAM: Detailed structure of commodity by market and source, per cent

	Composition of:			Export dependence	Import penetration
	Domestic sales	Exports	Imports		
Tobacco	0.9	27.9	0.4	88.4	22.4
Maize	1.7	0.0	1.2	0.6	29.2
Other grains	0.3	0.0	0.5	0.8	49.2
Sugar	0.6	2.4	0.0	50.0	0.0
Cotton	0.1	1.7	0.1	78.4	22.9
Other industrial crops	0.6	0.9	0.1	26.9	8.6
Horticulture and vegetables	0.8	0.2	0.3	4.7	17.3
Cattle	1.3	0.0	0.0	0.0	2.3
Poultry	1.5	0.1	0.0	1.0	0.7
Other livestock	0.1	0.0	0.0	0.2	1.9
Dairy	0.3	0.0	0.1	0.8	8.8
Forestry products	0.9	0.0	0.0	0.3	0.0
Fishing products	0.0	0.0	0.0	6.5	31.7
Coal	0.4	0.7	0.0	33.8	6.4
Diamonds	0.6	10.2	0.0	79.4	0.0
Gold	1.1	15.4	0.0	77.6	0.0
PGM	0.2	4.2	0.0	87.1	0.1
Other minerals	0.7	7.2	0.1	70.2	5.6
Food products	8.2	2.2	16.6	6.2	54.6
Tobacco products	0.5	0.6	0.0	23.3	2.9
Textile products	0.0	0.8	1.2	81.9	94.2
Wearing apparel	0.4	0.2	1.7	9.5	73.5
Leather products and footwear	0.2	0.3	0.5	23.1	56.2
Wood products	0.6	0.9	0.3	27.2	20.7
Paper & paper products	0.5	0.4	0.1	18.8	10.0
Publishing & printing	0.7	0.0	0.3	0.2	23.0
Chemical products	1.6	0.6	32.6	9.0	92.4
Rubber & plastic products	0.6	0.5	1.3	15.5	56.4
Glass and glass products	0.0	0.0	0.2	8.5	65.4
Non-metallic mineral products n.e.c.	0.4	0.8	0.5	34.4	41.2
Iron & steel and non-ferrous metal products	0.0	8.4	2.6	100.0	100.0
Structural metal products	1.2	0.5	0.4	9.6	18.0
Machinery	1.4	0.5	0.9	8.4	27.1
Electric motors, telecom equipment & medical applicances	0.1	0.3	8.2	51.4	98.8
Transport equipment	0.1	0.8	15.1	74.2	99.2
Furniture & other products n.e.c.	0.0	1.0	2.5	100.0	100.0
Electricity	2.7	0.2	0.9	2.1	16.6
Water	3.0	0.0	0.0	0.0	0.0
Construction	4.1	0.0	0.0	0.0	0.0
Finance and insurance services	7.5	0.0	0.0	0.0	0.0
Real estate	5.7	0.0	0.0	0.0	0.0
Distribution, hotels, and restaurants	8.0	6.3	2.7	16.2	16.6
Transport and communication	16.8	3.7	8.6	5.2	23.3
Public administration	6.5	0.0	0.0	0.0	0.0
Education	11.8	0.0	0.0	0.0	0.0
Health	1.6	0.0	0.0	0.0	0.0
Domestic services	0.3	0.0	0.0	0.0	0.0
Other services	3.5	0.0	0.0	0.0	0.0
National	**100.0**	**100.0**	**100.0**	**19.7**	**37.2**

Source: Authors' own calculations.

Table C5: 2013 SAM: Detailed structure of household outlays, per cent

	Rural	Urban	Total
In per cent of consumption expenditure			
Tobacco	0.0	0.0	0.0
Maize	6.4	0.0	2.3
Other grains	0.2	0.0	0.1
Sugar	0.0	0.0	0.0
Cotton	0.0	0.0	0.0
Other industrial crops	0.0	0.0	0.0
Horticulture and vegetables	1.6	1.2	1.4
Cattle	0.0	0.0	0.0
Poultry	0.0	0.0	0.0
Other livestock	0.0	0.0	0.0
Dairy	0.0	0.0	0.0
Forestry products	2.1	0.4	1.0
Fishing products	0.0	0.0	0.0
Coal	0.0	0.0	0.0
Diamonds	0.0	0.0	0.0
Gold	0.0	0.0	0.0
PGM	0.0	0.0	0.0
Other minerals	0.0	0.0	0.0
Food products	25.9	20.9	22.7
Tobacco products	0.8	0.7	0.7
Textile products	0.8	0.6	0.7
Wearing apparel	1.8	1.4	1.6
Leather products and footwear	0.8	0.5	0.6
Wood products	0.0	0.0	0.0
Paper & paper products	0.0	0.0	0.0
Publishing & printing	0.7	0.6	0.6
Chemical products	14.9	14.1	14.4
Rubber & plastic products	0.5	0.3	0.3
Glass and glass products	0.1	0.1	0.1
Non-metallic mineral products n.e.c.	0.0	0.0	0.0
Iron & steel and non-ferrous metal products	0.0	0.0	0.0
Structural metal products	1.5	0.7	1.0
Machinery	0.0	0.0	0.0
Electric motors, telecom equipment & medical appliances	3.9	5.8	5.1
Transport equipment	2.0	1.3	1.5
Furniture & other products n.e.c.	2.6	3.3	3.1
Electricity	1.5	4.1	3.2
Water	0.2	3.5	2.3
Construction	0.2	0.2	0.2
Finance and insurance services	3.2	4.8	4.2
Real estate	10.7	9.5	9.9
Distribution, hotels, and restaurants	0.1	0.5	0.4
Transport and communication	13.7	19.3	17.3
Public administration	0.0	0.2	0.1
Education	1.7	2.4	2.2
Health	0.8	0.7	0.7
Domestic services	0.3	0.5	0.4
Other services	1.3	2.2	1.9
Total expenditure	100.0	100.0	100.0
In per cent of total outlays			
Total expenditure	136.2	123.5	127.7
Transfers to government	0.0	4.1	2.7
Income tax	6.8	6.4	6.5
Savings	-42.9	-34.3	-37.2
Transfers abroad	0.0	0.3	0.2
Total outlays	100.0	100.0	100.0

Source: Authors' own calculations.