Theory of Social Accounting

Part 1

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Outline

- An Introduction to Social Accounting Matrices
  - The Circular Flow
  - Overview of Social Accounting Matrices
    - Complete and Consistent
    - Prices in a SAM – an introduction
    - Individual Accounts in a SAM
      - Distributional invariance
- Structure of a SAM
  - SAM accounts
  - Commodities, Margins, Activities, Factors, Institutions, Investment and Savings, Rest of the World
- *Macro-SAM and National Accounts Matrix*
- *The Production Boundary and Price System*
- *Interpreting the Information in a Social Accounting Matrix*
- *Inter-Industry Tables and SAMs*
- *Satellite accounts*

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Introduction

"It is perhaps of interest to realise that the framework of any model concerned with the economy as a whole is always an accounting system. This is true whether we work with highly aggregated models such as that underlying Keynes' General Theory, the input-output model of Leontief or the still more complicated variant with which this series [A Programme for Growth] is concerned."
(Stone, 1962 ,p v).

"Since every economic model has its corresponding accounting framework, and since every such framework can be set out as a SAM, it follows that every economic model has a corresponding SAM."
(Pyatt, 1987, p 330)

"The issue of whether the SAM is deterministic or stochastic is crucial as the SAM provides the underlying data set upon which simple SAM-multiplier analyses and more complex Computable General Equilibrium Models (CGEs) are calibrated. Increasingly, these models are used to explore and simulate the impact of policies and exogenous shocks on the whole socio-economic system. An erroneous or inaccurate SAM invalidates the results obtained from these models"
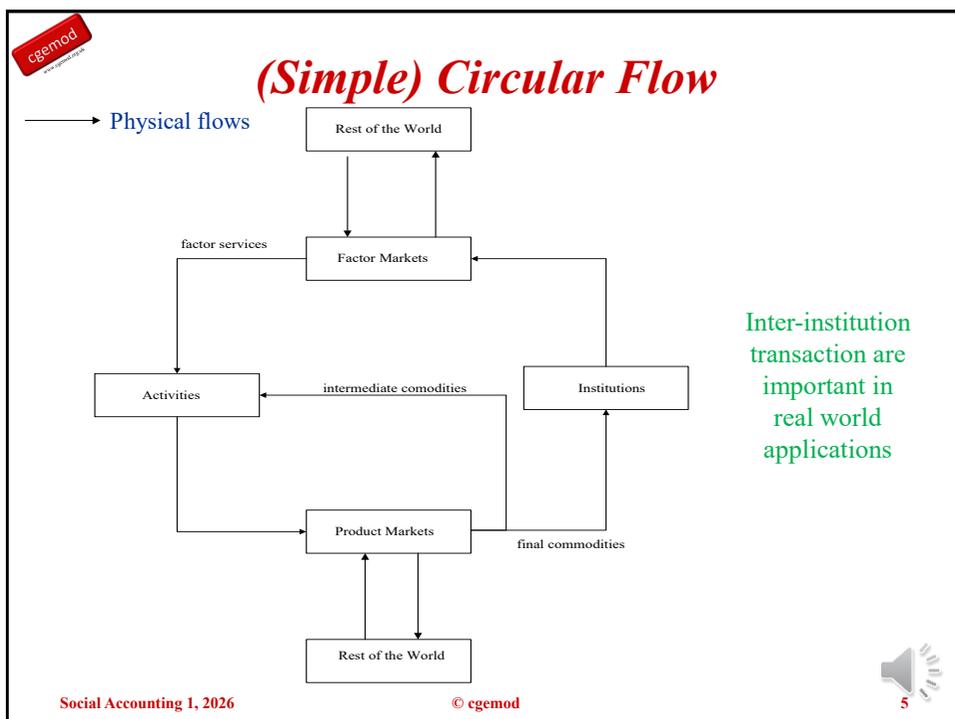*(Thorbecke, 2003, p 186).*

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Introduction

- National accounts and economic models
- A SAM is
  - A single-entry transaction values (TV) matrix
  - A framework within which data can be organised
  - A statistical database for economic models
  - A database for many different economic models
- A SAM is
  - **NOT** an economic model
  - **NOT** Perfect

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(Simple) Circular Flow

Physical flows →

Rest of the World

factor services

Factor Markets

Activities ← intermediate comodities ← Institutions

Product Markets

final commodities

Rest of the World

Inter-institution transaction are important in real world applications

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Important References

- Essential
  - System of National Accounts
  - Handbook on Social Accounting Matrices and Labour Accounts
- Desirable
  - System of Environmental and Economic Accounts
  - System of Environmental-Economic Accounting - Ecosystem Accounting
  - Eurostat Manual of Supply, Use and Input-Output Tables

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Overview of a SAM

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Overview of a SAM

- A square matrix
  - Row and column for each agent
  - Incomes in the rows
  - Expenditures in the columns
- Complete **and** Consistent
  - **Complete**: all transactions
  - **Consistent**: every expenditure has a matching and equal income
- Incomes equal expenditures for ALL agents

$$\sum_i p_{ij}.q_{ij} = \sum_i T_{ij} = \sum_j T_{ij} = \sum_j p_{ij}.q_{ij} \quad \forall i = j$$

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Complete AND Consistent

Consistent:
every expenditure has a matching and equal income

Reconciled Balanced

Complete:
all transactions recorded

How can we know?

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Complete AND Consistent

If **Complete and Consistent**
Incomes equal expenditures for ALL agents

If **Incomplete and** Consistent
Incomes equal expenditures for ALL agents
BUT some transactions are biased

If Complete **and Inconsistent**
Incomes NOT equal expenditures for ALL agents

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Complete & Consistent

- A SAM must **always** be Complete and Consistent
- Incomes equal expenditures for ALL agents

$$\sum_i p_{ij}.q_{ij} = \sum_i T_{ij} = \sum_j T_{ij} = \sum_j p_{ij}.q_{ij} \quad \forall i = j$$

BUT can each transaction have a unique price?

NO

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LOOP

- Law of One Price (LOOP)
  - price for any transaction in a row is the same irrespective of the purchasing agent/account
  - quantities in any row are homogenous (undifferentiated)

$$T_{ij} = \sum_j p_i q_{ij} = p_i Q_i \qquad \text{and} \qquad \sum_j q_{ij} = Q_i$$

LOOP is critical to understanding the price system in a SAM.

The price system embedded in a SAM defines the price system that applies in any model calibrated with that SAM

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Structure of a SAM

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Structure of a SAM

- SEVEN groups of accounts
  - Commodity (or product) accounts
  - Margin accounts
  - Activity (or production/industry) accounts
  - Factor accounts
  - Institutional accounts
    - Households
    - Enterprises
    - Government
  - Capital accounts (Investment-saving)
  - Rest of the World accounts

Order does not matter EXCEPT for easy access to the information

Structure of a SAM is flexible, so some can be difficult to interpret

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Structure of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Commodity Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
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Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Margin Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Activity Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Factor Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Household Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
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Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Enterprise Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
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Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Government Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
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Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Capital Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
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Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Trade Accounts of a SAM

	Commodities	Margins	Activities	Factors	Households	Enterprises	Government	Investment	Rest of World	Account Total
Commodities	0	Margins	(Combined) USE Matrix	0	Household Consumption		Government Expenditure	Investment Expenditure	Exports of Goods & Services	Commodity Demand
Margins	Margins	0	0	0	0	0	0	0	0	Margin Demand
Activities	Production	0	0	0	0	0	0	0		Production
Factors	0	0	Remuneration of Factors	0	0	0	0	0	Factor Income from RoW	Incomes to Factors
Households	0	0	0	Distribution of Factor Incomes	Inter Household Transfers	Distribution of Income	Transfers to Households	0	Remittances from RoW	Household Income
Enterprises	0	0	0	Distribution of Factor Incomes			Transfers to Enterprises	0	Enterprise Income from RoW	Enterprise Income
Government	Commodity Taxes	0	Production Taxes	Factor Taxes	H'hold Income Tax & Other payments to Government	Ent'prise Income Tax & Distribution of Income		0	Transfers from RoW	Government Income
Savings	0	0		Depreciation	Household Savings	Enterprise Savings	Government Savings	Stock Changes	Capital Account Balance	Savings
Rest of World	Imports of Goods & Services	0	0	Factor Payments to RoW	Remittances to RoW	Enterprise Payments to RoW	Current transfers to RoW	0	0	Imports of G&S from and transfers to RoW
Totals	Commodity Supply	Margin Supply	Cost of Production	Expenditure on Factors	Household Expenditure	Enterprise Expenditure	Government Expenditure	Investment Expenditure	Exports of G&S and transfers from RoW	

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Individual Accounts in a SAM

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Individual Accounts

- The choice of accounts in each subgroup is important and depends on the focus
  - Taxes
  - Trade partners
  - Enterprises
  - Commodities\activities
  - Factors
  - Representative Household Groups
  - …..

  But the choices are not independent

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Factors and Activities

- Functional distribution of income
  - Agriculture – land
  - Mining – natural resources
  - Capital
    - 'Fixed'
    - Variable
  - Labour
    - Skills – unskilled, semi-skilled, skilled
    - Education – primary, secondary, tertiary

Problem (?): use of (ILO) occupational categories

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Households (RHGs)

- Expenditure
  - Preferences and utility functions
    - female vv male
    - pensioner vv young adults
    - rural vv urban
    - Religion
    - education
- Income
  - Endowments
    - Capital
    - Land
    - Labour

Choices should cover both dimensions

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Income distribution

- Distributional invariance (Pyatt & Round, 2012)
  - the importance of the interactions between the numbers of
    - Factors [*f*]
    - RHG [*h*]
    - activities\commodities [*g*]

'**Rule of thumb**'

$$\min\left([f],[g]\right) \geq [h]$$

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Income Distribution

"The choice of a classification system or taxonomy for households, say, should not, therefore, be determined independently of the way in which goods or factors of production are classified. This is one general principle that can be recommended. A second is that classification systems should be designed in such a way that any underlying duality is apparent."
(Pyatt and Round, 2012, p 267)

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Theory of Social Accounting Part 1

The End

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