Measuring welfare: Consumption, Income, and Wealth

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U. Rome “Tor Vergata”

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Outline

1. Measuring welfare?
2. Income
3. Practicalities
Welfare?
Measuring poverty and inequality
five building blocks

1) a concept of living standards
2) high-quality data on households’ living standards
3) a distribution of living standards (inequality)
4) a critical level (poverty line) below which individuals are classified as “poor”
5) a poverty measure
What is the standard of living?

Amartya Sen

Tony Atkinson

Angus Deaton
Amartya Sen
(1933-)

- 1998 Nobel Prize in Economics
- Why?
- “(…) for his contributions to welfare economics”
«The living standard cannot be defined completely afresh by us ‘professionals’, and we must not sacrifice all the richness of the idea of the living standard to get something nicely neat and agreeably simple»
Amartya Sen
Commodities and Capabilities, 1987.

According to Sen, the standard of living has multiple meanings:

▪ happiness
▪ fulfillment
▪ money
▪ health
▪ freedom
▪ ...

Most economists have not been very interested in the plurality of focus.
Mainstream economists have picked the term ‘utility’.

Originally, utility was a synonym of satisfaction, that is, the psychic pleasure that originates from owning or consuming goods.

This is how laypeople would use the term utility.

Modern economists use a specific and technical definition of utility which has become a cornerstone of the standard microeconomic theory.
Tony Atkinson
(1944-2017)

«The typical economist, when asked to consider the problem of poverty, has in mind the standard microeconomic theory of a household taking decisions about which goods and services to buy from a given income».

[Atkinson, 2019: 6]
Angus Deaton
(1945-)

2015 Nobel Prize in Economics
“(…) for his analysis of consumption, poverty, and welfare”
Two key references

Deaton and Muellbauer (1980)

Deaton and Zaidi (2002)
Deaton and Zaidi (2002)

This paper needs no introduction – only 2% of the World Bank’s publications surpass 1,000 downloads (Doemeland and Trevino, 2014). DZ has more than 8,000.
DZ’s very first recommendation: standard of living = MMU

<table>
<thead>
<tr>
<th>Box 1. Summary of Theoretical Issues and Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Issue</strong></td>
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<tr>
<td>Money Metric Utility (MMU) vs. Welfare Ratio (WR)</td>
</tr>
<tr>
<td>MMU is the amount required to sustain a level of living and requires that consumption be adjusted by a Paasche price index that reflects the prices the household faces and whose weights are different for each household.</td>
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<tr>
<td>WR is an indication of how much better or worse off a household is than a reference household (usually at the poverty line) and requires consumption to be adjusted by a Laspeyres price index that reflects the prices faced by the reference household but whose weights are the same for all households.</td>
</tr>
<tr>
<td>The use of MMU can cause difficulties in analyzing the impact of redistributive policy but, on the other hand, WR does not necessarily represent welfare correctly. The latter is the more serious drawback in practice.</td>
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</tbody>
</table>
... MMU?

$$MMU = \frac{x}{Paasche\ index}$$

where $x$ is nominal consumption expenditure.
March 2002, the World Bank has released new Guidelines.

MMU (consumption) confirmed.

Available here: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099225003092220001/p1694340e80f9a00a09b20042de5a9cd47e
Question

- Other options to proxy \textit{standard of living}?
Options to proxy standard of living

Option 1
Consumption

Option 2
Income

Option 3
Wealth

MMU

persons

income

persons

wealth

persons
Income, consumption, savings and wealth

- Income, consumption and wealth are three separate, but related entities.
- The discussion of their respective roles in welfare measurement is a long standing one.
- We start from the Stiglitz-Sen-Fitoussi Report.
Stiglitz, Sen and Fitoussi

- In 2008, the President of the French Republic, Nicolas Sarkozy, created the “Commission on the Measurement of Economic Performance and Social Progress” (CMEPSP).

- The key idea was, in a nutshell, “to go beyond GDP”.

J. Stiglitz  A. Sen  J.P. Fitoussi
The Stiglitz-Sen-Fitoussi (2009) report

- Six Nobel laureates contributed to the production of the SSF report (ca. 300 pages).
- We focus on Recommendation 3.
Recommendation 3

Income and consumption are crucial for assessing living standards, but in the end they can only be gauged in conjunction with information on wealth. A household that spends its wealth on consumption goods increases its current well-being but at the expense of its future well-being (...). We need comprehensive accounts of assets and liabilities (...).

Underlying Recommendation 3 is an intertemporal framework.
OECD (2013)
the joint distribution of consumption, income, and wealth

This publication presents an internationally agreed framework to support the joint analysis of micro-level statistics on household income, consumption and wealth.
Options to proxy standard of living

Option 1
Consumption

Option 2
Income

Option 3
Wealth
Option 2: Income

- «Among economic measures of living standards, the main competitor to a consumption based measure is a measure based on income» (Deaton and Zaidi 2002: 13)

- «In some countries, notably in Latin America, income is the only available indicator of economic welfare.» (World Bank 2015: 32)

Should we go for income or consumption? It depends.

- **Consumption** is “better” for low- and middle-income countries, where material deprivation is a priority.

- **Income** is “better” in contexts where living standards are ‘high’ and/or the focus is on minimum rights to resources, and **inequality**.
Additional reasons to focus on income?
The incomes of the poor
the RIGA database

- Income (and wealth) help explain why households are poor or vulnerable

- One example: The Rural Income Generating Activities (RIGA) project
  - Database on sources of income, with 35 surveys covering 19 countries in Africa, Asia, Eastern Europe and Latin America
Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa

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b Università di Torino and Food and Agriculture Organization of the United Nations, Italy
c World Bank, United States

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ABSTRACT

This paper uses comparable income aggregates from 41 national household surveys from 22 countries to explore the patterns of income generation among rural households in Sub-Saharan Africa, and to compare household income strategies in Sub-Saharan Africa with those in other regions. The paper seeks to understand how geography drives these strategies, focusing on the role of agricultural potential and distance to urban areas. Specialization in on-farm activities continues to be the norm in rural Africa, practiced by 52 percent of households (as opposed to 21 percent of households in other regions). Regardless of distance and integration in the urban context, when agro-climatic conditions are favorable, farming remains the occupation of choice for most households in the African countries for which the study has geographically explicit information. However, the paper finds no evidence that African households are on a different trajectory than households in other regions in terms of transitioning to non-agricultural based income strategies.

© 2016 The World Bank. Published by Elsevier Ltd. This is an open access article under the CC BY IGO license (http://creativecommons.org/licenses/by/3.0/igo/).
Reliance on farm income is greater in Africa, and is associated with households being poorer.

Share of income sources in total rural household income

- **Agriculture**
  - Crops: 55%
  - Livestock: 25%

- **Non-Agriculture**
  - Rural wage employment: 8%
  - Non-farm wage employment: 13%
  - Non-farm self-employment: 15%
  - Transfers: 15%
  - Other: 3%

Data from Davis et al. (2016), table 2.
Gender gaps

Data on income (and wealth) are needed to analyze economic inequality between men and women
Income?
How do economists define income, exactly?

- Economists use the seminal definition of income provided by John Hicks (1904-1989).

- A British economist, Hicks was awarded the Nobel prize in 1972.

- Here we need his book Value and Capital, published in 1939:

  “income is the value of what a person could consume in a given year, if she chose to keep her wealth constant”. 

“income” and “wealth” were defined as stocks, even though they are almost always treated as flows in macroeconomics.
Towards an operational definition of income

- We need a definition that is concrete, detailed, useful for the purposes of data collection.

- To collect data on income, we need to answer a number of practical questions. A few examples:
  
  - Should we interview individuals or households?
  - Should the revenue realized by selling an asset (e.g., a car, etc.) count as income?
  - Should in-kind receipts count as income?
  - ...

- Where to find answers?
A bit of history

▪ How did international standards for the measurement of income through household surveys come about?

▪ Throughout the years, many cross-country initiatives aimed at producing standard definitions and sets of guidelines.

▪ Next two slides: main historical milestones.
Early efforts

- **Mid 1960s**
  Preparatory studies, under the aegis of the United Nations Statistical Commission.

- **United Nations (1977)**
  First set of guidelines for household income measurement.
1990s-2000s

- **1996 – Birth of the Canberra Group.** The Group includes experts from NSOs, government departments and research agencies.

- **2001 – A new international standard.** The Canberra Group’s Final Report and Recommendations (*Canberra Handbook*) is published.
2010s

- 2011

- We focus on this publication.
Canberra’s definition of household income
“Household income consists of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes windfall gains and other such irregular and typically one-time receipts.”

“Household income receipts are available for current consumption and do not reduce the net worth of the household through a reduction of its cash, the disposal of its other financial or non-financial assets or an increase in its liabilities.”
Ultimately, individual living standards are determined not by individual income alone, but by the pooled income of all household members.

In this context, the statistical reference unit is the household.
Definition of household
UNECE (2009), Canberra (2011: 25)

A private household is either (a) a person living alone in a separate housing unit or who occupies, as a lodger, a separate room (or rooms) of a housing unit but does not join with any of the other occupants of the housing unit to form part of a multi-person household or (b) a group of two or more persons who combine to occupy the whole or part of a housing unit and to provide themselves with food and possibly other essentials for living. The group may be composed of related persons only or of unrelated persons or of a combination of both. The group may also pool their income.

- This definition is very important, in practice.

- DJ will elaborate on this, after the lunch break.
Coverage

“Household income consists of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but...

- We want to capture all economic resources coming into the household.

- That means:
  1. capturing both monetary and in-kind receipts, and
  2. making sure that our measure of income is comprehensive, that it includes all income components.
No windfall gains

“Household income consists of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes windfall gains and other such irregular and typically one-time receipts.”

- Goal: measuring typical income over the course of a given reference period, normally one year

- Exceptional receipts are not representative of income during the reference period.
Windfall gains

- Gambling winnings
- Other examples?
No net worth reduction

“Household income receipts are available for current consumption and do not reduce the net worth of the household through a reduction of its cash, the disposal of its other financial or non-financial assets or an increase in its liabilities.”

- **Net worth** is the value of a household’s assets, net of liabilities (*i.e.* net wealth).

- Examples: *sale of assets, loans obtained, withdrawals from savings*...

- Are these income receipts?

- **No**, because they are linked to a reduction of net worth.
Recap

- Based on the *Canberra Handbook*, we got started with the task of defining household income.

- The term household has been defined.

- Next, we have examined the rationale for **excluding** certain items.

- Now we turn to discussing which items should be **included**.
Building up

- The Canberra Handbook identifies **four main income components:**

  1. income from **employment**;
  2. property income;
  3. income from the production of household services for **own consumption**;
  4. current **transfers** received.

- Defining 1) - 4) requires attention to **detail:** we must look at the components one by one.
1. Income from employment
Definition of income from employment

- Income from employment comprises payments, both cash and in kind, received in exchange for participation in economic activities in a strictly employment related capacity.

- Income from employment consists of employee income and income from self-employment.
Employee income

- Includes both the wage itself, and all cash and non-cash benefits received on top of it.

- Operationally, the construction of employee income requires 9 (nine!) pieces of information.
Employee income

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wages and salaries</td>
<td>Cash bonuses and gratuities</td>
<td>Commissions and tips</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Directors’ fees</td>
<td>Profit-sharing bonuses and other profit-related pay</td>
<td>Shares offered as part of employee remuneration</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Free or subsidized goods and services from an employer</td>
<td>Severance and termination pay</td>
<td>Employers’ social insurance contribution</td>
</tr>
</tbody>
</table>
Wages are usually computed by multiplying an hourly pay rate by the number of hours worked.

A salary is a fixed sum paid for a specific period of time worked, such as weekly or monthly.

There is no internationally agreed upon definition of ‘wages and salaries’

In this context, wages and salaries indicates any remuneration paid in cash for time worked or work done in all jobs, plus the remuneration for time not worked (such as annual holidays)
**SECTION 10: NON-FARM HOUSEHOLD BUSINESSES**

NOW SOME QUESTIONS ABOUT **NON HOUSEHOLD MEMBER EMPLOYEES** (NUMBERED IN QUESTION 18) WORKING IN THE BUSINESS - IF MORE THAN 12 NON-HOUSEHOLD MEMBER EMPLOYEES ASK THE RESPONDENT TO SELECT THE 12 HIGHEST PAID.

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<td>Adult (18+) 1</td>
<td>Paid regular employee 2</td>
<td>1 2 3 4</td>
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<td>1 2 3 4</td>
<td>Day 1</td>
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<td>2</td>
<td>Female .2</td>
<td>Child (&lt;18) .2</td>
<td>Unpaid helpers/Family Workers ... 4</td>
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<td>1 2 3 4</td>
<td>Week 2</td>
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<td>Male...1</td>
<td>Adult (18+) 1</td>
<td>Paid regular employee 2</td>
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<td>Month 3</td>
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<td>Female .2</td>
<td>Child (&lt;18) .2</td>
<td>Unpaid helpers/Family Workers ... 4</td>
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<td>1 2 3 4</td>
<td>Other (specify) .94</td>
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<td>5</td>
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<td>Adult (18+) 1</td>
<td>Paid regular employee 2</td>
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<td>Unpaid helpers/Family Workers ... 4</td>
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<td>Male...1</td>
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<td>Paid regular employee 2</td>
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<td>8</td>
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<td>Child (&lt;18) .2</td>
<td>Unpaid helpers/Family Workers ... 4</td>
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<td>Other (specify) .94</td>
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<td>Paid regular employee 2</td>
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<td>Day 1</td>
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<td>Week 2</td>
<td>1 2</td>
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<td>11</td>
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<td>Adult (18+) 1</td>
<td>Paid regular employee 2</td>
<td>1 2 3 4</td>
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<td>1 2 3 4</td>
<td>Month 3</td>
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<td>12</td>
<td>Female .2</td>
<td>Child (&lt;18) .2</td>
<td>Unpaid helpers/Family Workers ... 4</td>
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<td>1 2 3 4</td>
<td>1 2 3 4</td>
<td>Other (specify) .94</td>
<td>1 2</td>
</tr>
</tbody>
</table>
Cash bonuses and gratuities

- This category includes payments for work done that are not strictly wages or salaries, *i.e.* they are not linked to time worked, and/or they are given in addition to usual compensation.

- **Cash bonuses and gratuities** are end-of-year or one-time bonuses, that supplement salary.

- For example, some employees may receive an extra month’s salary at the end of the year.
3/9 Commissions and tips

- This category includes payments for work done that are not strictly wages or salaries, *i.e.* they are not linked to time worked, and/or they are given in addition to usual compensation.

- **Commissions** are earned by salespeople based on sales made.

- **Tips** go beyond the amount of the bill of a service worker, and are given voluntarily by clients.
Self-employment income

- The basis for the measurement of income from self-employment is the concept of net income: value of gross output less operating costs.

- Profits occur when receipts are greater than operating expenses, while a loss occurs when operating expenses are greater than receipts.
Components of self-employment income
Canberra Handbook (2011: 11-13)

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<tbody>
<tr>
<td></td>
<td>Profit or loss from</td>
<td>Goods and services produced for</td>
<td>Goods produced for</td>
</tr>
<tr>
<td></td>
<td>unincorporated</td>
<td>barter</td>
<td>consumption</td>
</tr>
<tr>
<td></td>
<td>enterprises</td>
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<td></td>
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</tbody>
</table>
Unincorporated enterprise?

An unincorporated enterprise is a business which is not considered as a legal entity separate from the owner.

Examples include small family businesses like farms and retail shops, or self-employed taxi drivers, lawyers and health professionals.
Components of employment income: Recap
Canberra Handbook (2011: 11-13)

1. **Income from employment**
   a. **Employee income**
      - Wages and salaries
      - Cash bonuses and gratuities
      - Commissions and tips
      - Directors’ fees
      - Profit-sharing bonuses and other forms of profit-related pay
      - Shares offered as part of employee remuneration
      - Free or subsidised goods and services from an employer
      - Severance and termination pay
      - Employers’ social insurance contributions
   b. **Income from self-employment**
      - Profit/loss from unincorporated enterprise
      - Goods and services produced for barter, less cost of inputs
      - Goods produced for own consumption, less cost of inputs
Three more income components

1. income from employment;

2. property income;

3. income from the production of household services for own consumption;

4. current transfers received.
2. Property income
Definition

▪ This is the income that is generated from the ownership of assets.

▪ It consists in returns from:
  ▪ financial assets (e.g. interest, dividends)
  ▪ non-financial assets (e.g. rents)
  ▪ intellectual assets (e.g. royalties)

▪ Straightforward, no special caveats
## Components of property income

Canberra Handbook (2011: 13)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Income from financial assets</td>
</tr>
<tr>
<td>2</td>
<td>Income from non-financial assets</td>
</tr>
<tr>
<td>3</td>
<td>Royalties</td>
</tr>
</tbody>
</table>
3. Income from the production of household services for own consumption
Definition

- **Services** produced within the household for the household’s own consumption, and not for the market (net of the expenses that go into their production) are considered income, similarly to goods produced for own consumption.

- Most of these components are difficult to measure, and most are ultimately excluded from the actual computation of income.
## Components of income from household services

*Canberra Handbook (2011: 14)*

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net value of owner-occupied housing services</td>
<td>Value of unpaid domestic services</td>
<td>Value of services from household consumer durables</td>
</tr>
</tbody>
</table>
1/3 Net value of owner-occupied housing services

- For owner-occupiers, housing services is the imputed value of the services received (i.e. value of inhabiting the dwelling) less the value of the housing costs incurred.

- This corresponds to the imputed market rent less the current expenses of the household in their role as a landlord.
2/3 Value of unpaid domestic services

- Unpaid domestic services include own-produced services such as laundry, cooking meals, caring for adults and children, housekeeping, as well as unpaid volunteer work.

- In the operational definition of income, the value of unpaid domestic services is excluded.

- Q. Why?

- A. Difficult to measure.
Income from services of household consumer durables, such as washing machines and refrigerators, refers to the imputed value of the flow of services provided by these items.

In the operational definition of income, the value of the services from consumer durables are excluded.

Q. Why?

A. Difficult to measure.
4. Current transfers received
Definition

- **Transfers** are receipts (from other households, from the government, from charities…) for which the recipient does not provide anything in return.
The importance of government transfers
Social safety nets are rapidly expanding in Africa

Source: Beegle, Coudouel, Monsalve (2018)
The importance of private transfers
Remittance flows vs. other capital flows to developing countries (World Bank 2017)

## Components of income from transfers

*Canberra Handbook (2011: 15)*

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Social security pensions / schemes</td>
</tr>
<tr>
<td>2</td>
<td>Pensions and other insurance benefits</td>
</tr>
<tr>
<td>3</td>
<td>Social assistance benefits</td>
</tr>
<tr>
<td>4</td>
<td>Current transfers from non-profit institutions</td>
</tr>
<tr>
<td>5</td>
<td>Current transfers from other households</td>
</tr>
</tbody>
</table>
Aggregation
Aggregation

- Aggregating income components in different ways produces specific income measures, suitable for different analytical purposes.

- **Total** and **disposable** income are the main income aggregates one can produce.
The aggregation plan

- **Q:** What’s an aggregation plan?
- **A:** Formula for adding up elementary income components.

- Two examples:
  1) Canberra
  2) Italy: Survey of Household Income and Wealth
Canberra
Canberra (2011: 11)

Income from employment
▪ Employee income
▪ Income from self-employment

+ Property income

+ Income from household production of services for own consumption

+ Current transfers received
  = Total income

- Current transfers paid
  ▪ Direct taxes (net of refunds)
  ▪ Compulsory fees and fines
  ▪ Current inter-household transfers paid
  ▪ Employee and employers’ social insurance contributions
  ▪ Current transfers to non-profit institutions

  = Disposable income
Italy’s Survey on Household Income and Wealth (SHIW)

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>Net disposable income</td>
</tr>
<tr>
<td>YL</td>
<td>Payroll income</td>
</tr>
<tr>
<td>YL1</td>
<td>Net wages and salaries</td>
</tr>
<tr>
<td>YL2</td>
<td>Fringe benefits</td>
</tr>
<tr>
<td>YT</td>
<td>Pensions and net transfers</td>
</tr>
<tr>
<td>YTP</td>
<td>Pensions</td>
</tr>
<tr>
<td>YTP1</td>
<td>Arrears</td>
</tr>
<tr>
<td>YTA</td>
<td>Other transfers</td>
</tr>
<tr>
<td>YTA1</td>
<td>Financial assistance (wage suppl., etc.)</td>
</tr>
<tr>
<td>YTA2</td>
<td>Scholarships</td>
</tr>
<tr>
<td>YTA3</td>
<td>Alimony and gifts</td>
</tr>
<tr>
<td>YTA31</td>
<td>received</td>
</tr>
<tr>
<td>YTA32</td>
<td>paid(-)</td>
</tr>
<tr>
<td>YM</td>
<td>Net self-employment income</td>
</tr>
<tr>
<td>YMA1</td>
<td>Self-employment income</td>
</tr>
<tr>
<td>YMA2</td>
<td>Entrepreneurial income</td>
</tr>
<tr>
<td>YC</td>
<td>Property income</td>
</tr>
<tr>
<td>YCA</td>
<td>Income from real-estate</td>
</tr>
<tr>
<td>YCA1</td>
<td>Actual rents</td>
</tr>
<tr>
<td>YCA2</td>
<td>Imputed rents (2)</td>
</tr>
<tr>
<td>YCF</td>
<td>Income from financial assets (3)</td>
</tr>
<tr>
<td>YCF1</td>
<td>Interest on deposits</td>
</tr>
<tr>
<td>YCF2</td>
<td>Interest on government securities</td>
</tr>
<tr>
<td>YCF3</td>
<td>Income from other securities</td>
</tr>
<tr>
<td>YCF4</td>
<td>Interest payments (-)</td>
</tr>
</tbody>
</table>

\[ Y = YL + YT + YM + YC \]
Recap

- We have discussed the income components based on Canberra (2011)

- The devil truly is in the details: not all definitions are clear on their face, the inclusion of some items and exclusion of others is not intuitive, and so on. Being specific is crucial.

- Armed with this knowledge, we can design a questionnaire that collects income data that are *comprehensive* (nothing is left behind), and that *match the needs of users* (allowing them to construct relevant aggregates).
Practicalities
Two topics

- Questionnaire
- Data
Useful material

- **C4D2 training initiative:**
  

- **LSMS Guidebooks:**
  
Questionnaire – A check list

1. Where to place income and wealth questions in the structure of the questionnaire?

2. Who should the respondent(s) be?

3. How to write ‘good questions’?

4. What is the optimal recall period?

5. How to minimize reticence and non-response?

6. Is there an optimal length for the questionnaire?
Is it sufficient to interview the household head to obtain accurate information on household income?

NO
Table 1. *Summary statistics for CombinedInc and HusbandInc*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean or proportion</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent households in which $CombinedInc = HusbandInc$</td>
<td>6.06</td>
<td>[1.28–10.84]</td>
</tr>
<tr>
<td>Percent households in which $CombinedInc &gt; HusbandInc$</td>
<td>65.66</td>
<td>[56.14–75.18]</td>
</tr>
<tr>
<td>Percent households in which $CombinedInc &lt; HusbandInc$</td>
<td>28.28</td>
<td>[19.25–37.31]</td>
</tr>
<tr>
<td>All households: Percent difference between $CombinedInc$ and $HusbandInc$ (base income is $HusbandInc$)</td>
<td>26.31</td>
<td>[10.60–42.02]</td>
</tr>
</tbody>
</table>

When the husband is the only respondent, total household income is *underestimated* by 26%.

Conclusion:

while limiting interviews to one person has the advantage of reducing the time and expense of household surveys, this appears detrimental in terms of accuracy, and may lead to incorrect conclusions on the determinants of poverty.
Data
3. Data issues

▪ **Data validation** is a complex activity aimed at verifying that data intended for analytical purposes are **reliable**.

▪ Outliers
Outliers

Source: Appendix A
What data challenges are specific to income (or wealth)?

- Both **negatives** and **zeros** are, in principle, legitimate values for income and wealth variables.

- In the presence of negative values, the **Gini index can exceed 1**, and the **Lorenz curve can go below zero**.

- Inequality estimates are **highly sensitive** to their inclusion (or exclusion), even when the number of these values is small.
Belotti et al. (2022) have provided a new Stata command, `outdetect`, that facilitates the assessment of the incidence of outliers and their potential impact on selected statistics of interest.
. use malawi17, clear

. outdetect pcinc, replace
Warning: pcinc has 127 zero values. Used in calculations.
Warning: pcinc has 544 negative value(s). Used in calculations.

outdetect set-up:

Normalization: Yeo and Johnson (2000)
Z-score: (x−median)/q
α = 3
Outlier detection target: top and bottom
(12447 observations are used)

Incidence of outliers:

<table>
<thead>
<tr>
<th></th>
<th>Freq.</th>
<th>Percent</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom</td>
<td>356</td>
<td>2.86</td>
<td>24.79</td>
</tr>
<tr>
<td>Top</td>
<td>1080</td>
<td>8.68</td>
<td>75.21</td>
</tr>
<tr>
<td>Total</td>
<td>1436</td>
<td>11.54</td>
<td>100.00</td>
</tr>
</tbody>
</table>
Impact evaluation

This is a sensitivity exercise: what would happen if we excluded all observations that were flagged as outliers from calculations?

For example, Gini would go down by... 47.6 percentage points!

<table>
<thead>
<tr>
<th>Summary stats</th>
<th>Raw</th>
<th>Trimmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>698.23</td>
<td>138.86</td>
</tr>
<tr>
<td>Median</td>
<td>112.96</td>
<td>105.64</td>
</tr>
<tr>
<td>SD</td>
<td>35714.74</td>
<td>119.13</td>
</tr>
<tr>
<td>CV(%)</td>
<td>5115.07</td>
<td>85.79</td>
</tr>
<tr>
<td>IQR</td>
<td>174.44</td>
<td>137.02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inequality</th>
<th>Raw</th>
<th>Trimmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini</td>
<td>0.9302</td>
<td>0.4540</td>
</tr>
<tr>
<td>MLD</td>
<td>1.8528</td>
<td>0.3913</td>
</tr>
<tr>
<td>Theil</td>
<td>5.2877</td>
<td>0.3083</td>
</tr>
<tr>
<td>CV2</td>
<td>1308.0905</td>
<td>0.3680</td>
</tr>
<tr>
<td>A(0.125)</td>
<td>0.4508</td>
<td>0.0387</td>
</tr>
<tr>
<td>A(1)</td>
<td>0.8432</td>
<td>0.3238</td>
</tr>
<tr>
<td>A(2)</td>
<td>0.9989</td>
<td>0.9948</td>
</tr>
<tr>
<td>p90/p10</td>
<td>27.1919</td>
<td>14.3151</td>
</tr>
</tbody>
</table>
On the presence of zero and negative incomes

- 80% of 354 examined surveys contain negative incomes, 83% contain zero values
- Negative incomes are often not trivial in size
Zero-inflated distributions

Evaluation of robust outlier detection methods for zero-inflated complex data

M. Templ\textsuperscript{a}, J. Gussenbauer\textsuperscript{b} and P. Filzmoser\textsuperscript{c}

\textsuperscript{a}Zurich University of Applied Sciences, Winterthur, Switzerland; \textsuperscript{b}Statistics Austria, Vienna, Austria; \textsuperscript{c}Vienna University of Technology, Vienna, Austria
Treatment of outliers

- Main methods of dealing with outliers:
  1) removing them from the dataset (trimming)
  2) reducing the weights of outliers (trimming weight)
  3) changing the values of outliers (winsorisation, imputation)
  4) using robust estimation techniques (M-estimation).

- No consensus: “Any way of treating outliers which is not totally inappropriate prevents the worst.” (Huber 1981: 4)

- Documentation, transparency, and reproducibility. And multiple imputation!
References

Thank you for your attention!