Construction of Income Concepts and Components
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Learning Event on the Commitment to Equity Methodology

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Market Income

+ Contributory pensions

Direct transfers

Direct taxes

Gross Income

Net Market Income

Market Income plus Pensions

Disposable Income

Indirect subsidies

Indirect taxes

Disposable Income plus Indirect subsidies

Disposable Income minus Indirect Taxes

Consumable Income

Education and health services

Co-payments, user fees

Market Income plus Pensions plus All Transfers

Final Income

Disposable Income minus Indirect Taxes

Indirect subsidies

Indirect taxes
Market Income

Market Income plus Pensions

Market Income plus Pensions plus All Transfers

Gross Income

Disposable Income

Disposable Income plus Indirect subsidies

Disposable Income minus Indirect Taxes

Consumable Income

Market Income plus Pensions minus All Taxes

Final Income

Education and health services

Co-payments, user fees
Market Income

- Wage and salary income
- Fringe benefits
  - Bonus pay
  - Employer contributions to health insurance
- Self-employment income (farm and non-farm)
- Retirement income
- Capital income
  - Interest
  - Dividends
  - Rent
- Private transfers
  - Child support
  - Alimony
  - Remittances
  - Private contributory pensions
- Imputed rent for owner-occupied housing
- Value of own production
Imputed Rent for Owner-Occupied Housing

• Direct identification
  – e.g., Brazil
  – "How much would this house be rented for if it were rented?"

• Prediction
  – e.g., Bolivia
  – Take households that rent and use the question asking how much they pay in rent
  – Predict rental rates based on characteristics (number of rooms; access to electricity, sanitation, piped water; geographic location; household income; etc.)
  – Use coefficients from this regression in an out-of-sample prediction to predict rental value of owner occupied housing
  – See Appendix C of the CEQ Handbook

• Alternate Survey (with Prediction)
  – e.g., United States
  – No question on how much paid in rent
  – Predict using alternate housing survey with this question
• Secondary Source (National Accounts)
  – e.g., Armenia
  – Use a secondary source estimate of average imputed rent as a proportion of income and inflate market income by that amount
  – National Income Accounts have imputed rent for owner-occupied housing, and it is 2.74% of household expenditure
  – Imputed rent = expenditure (equivalent to disposable income) * 2.74% for households that own their dwelling
Value of Own Production

• Direct Identification (for each item consumed)
  – e.g., Brazil
  – For each item purchased, ask how obtained
  – If own production or taken from own business inventory, value is still asked; use this value

• Direct Identification (one question only)
  – Some surveys ask one question about the total value of own production
  – Use this value in market income
Market Income

+ Contributory pensions

Market Income plus Pensions

+ Direct transfers

Gross Income

- Direct taxes

Net Market Income

+ Direct transfers

Disposable Income

+ Indirect subsidies

Disposable Income plus Indirect subsidies

- Indirect taxes

Disposable Income minus Indirect Taxes

- Indirect subsidies

Consumable Income

+ Education and health services

Market Income plus Pensions minus All Taxes

- Co-payments, user fees

Consumable Income

Final Income

Market Income plus Pensions plus All Transfers
Contributory Pensions

• Only includes pensions from the public contributory system
  – Non-contributory pensions are included in direct transfers
  – Private contributory pensions are included in market income

• Direct identification
  – Some surveys ask one question about the total value of own production
  – Use this value in market income

• Inference
  – e.g., Argentina
  – One question about pensions; use amount to infer whether it was a contributory or non-contributory pension since the latter was a specified amount
Market Income

Market Income plus Pensions

Market Income plus Pensions plus All Transfers

Consumable Income

Final Income

Gross Income

Net Market Income

Disposable Income

Disposable Income plus Indirect subsidies

Disposable Income minus Indirect Taxes

Education and health services

Co-payments, user fees

Contributory pensions

Direct transfers

Direct taxes

Indirect subsidies

Indirect taxes

Market Income plus Pensions minus All Taxes
Market Income plus Pensions

- Market Income plus Pensions = Market Income + Contributory Pensions

\[ m^{+P} = m + P \]
Direct Transfers: Components

- Cash Transfer Programs
  - Conditional and Unconditional
- Non-Contributory Pensions
- Scholarships
- Public Works Programs
  - Also known as "Pay for Work" and "Welfare to Work" programs
  - Include full wage and do not attempt to subtract opportunity cost of individual's time
- Food transfers
  - Considered direct transfers because have well-defined market value, are close substitutes for cash
- Refundable Tax Credits
  - Pay cash to low-income families with no tax liability
  - Function as a transfer
Direct Transfers: Allocation

• Direct Identification
  – Many examples from all countries

• Inference
  – Non-Contributory Pensions in Argentina
    • All pensions grouped together; infer whether non-contributory or contributory based on amount and program rules for non-contributory pensions
  – Milk Transfers in Brazil
    • For families that live in eligible region, assume that if they reported the milk they consumed as having been donated, it was from the government
  – Public Scholarships in United States
    • All scholarships grouped together; infer whether Pell grant (government scholarship for low-income) based on amount and program rules
Direct Transfers: Allocation

• Simulation
  – Targeted Transfers in Argentina and Bolivia
    • Simulated according to program rules and eligibility criteria (based on income, having children, etc.)
    • Assumed perfect targeting, full coverage and take-up of target population, and no leakages
  – Refundable Tax Credits in US
    • Simulated according to program rules and eligibility criteria (based on income, having children, etc.)
    • Adjusted for imperfect take-up by attributing no benefit to households in which no members reported filing a tax return
Direct Transfers: Allocation

• Imputation
  – Food aid in Ethiopia
    • Whether a household receives food aid is reported in survey, but not amount received
    • Total government spending on food aid distributed equally across households that report receiving aid
  – School lunches, uniforms, and textbooks in Ecuador
    • Whether a child receives free school lunches, uniform, and textbooks is reported in the survey
    • Value imputed by distributing total spending from national accounts to households that receive these benefits
  – School uniforms and textbooks in Sri Lanka
    • Same method as in Ecuador
  – Note: scale down totals from national accounts
Direct Transfers: Allocation

• Alternate Survey (with Direct Identification)
  – Conditional Cash Transfer in Indonesia
    • Included in a 2013 survey but not the 2012 survey used in the analysis
    • Compute distribution of benefits by region and expenditure decile in 2013 survey
    • Distribute benefits in 2012 survey among eligible households within each region-decile pair
Underestimation of Beneficiaries

• Combines Direct Identification with Imputation
• In most surveys, number of recipients of direct transfers underestimated
  – Compared to national accounts
  – e.g., Bolsa Família in Brazil
    • 7.3 million beneficiaries according to survey
    • 12.4 million beneficiaries according to Ministry of Social Development
  – Even a large problem in developed country surveys
• Solution
  – Assume some beneficiaries erroneously did not report receiving benefit
  – Assume they are similar to beneficiaries that did report receiving benefits
  – Impute benefits to households that did not report benefit but similar to those that did
  – Details on next slide
Underestimation of Beneficiaries

• Let
  – \( N \) = number of recipients according to national accounts
  – \( S \) = number of recipients according to survey
  – \( H = N - S \) = number of recipients we will impute benefits to

• Requirement: \( H < S < N \)

• Estimate propensity score for program participation
  – Probit of program participation dummy on
    • household income
    • possession of various household assets, consumer durables
    • number of children
    • race of household head
    • region or state
    • rural or urban area
    • etc.

• Randomly sample \( H \) of the \( S \) beneficiary households
• Match them to non-beneficiary households with closest propensity score
Underestimation of Beneficiaries

• Caveat: probit has to converge for method to work
  – In other words, covariates predict program participation
  – Works well for targeted transfer programs
  – Unlikely to work for non-targeted programs
• Whether to make this adjustment is country team's decision
• Depends on
  – size of discrepancy
  – local knowledge about which is closer to truth: survey or national accounts
• Ideally, run results both ways
Gross Income

- Gross Income = Market Income plus Pensions + Direct Transfers

\[ g = m^{+P} + B_d \]
Market Income

\[ \text{Market Income} + \text{Contributory pensions} \]

\[ \text{Market Income plus Pensions} \]

\[ \text{Market Income plus Pensions} + \text{Direct transfers} \]

\[ \text{Market Income plus Pensions} - \text{Direct taxes} \]

\[ \text{Gross Income} \]

\[ \text{Net Market Income} \]

\[ \text{Net Market Income} + \text{Direct transfers} \]

\[ \text{Net Market Income} - \text{Direct taxes} \]

\[ \text{Disposable Income} \]

\[ \text{Disposable Income} + \text{Indirect subsidies} \]

\[ \text{Disposable Income} - \text{Indirect taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} \]

\[ \text{Disposable Income minus Indirect Taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} - \text{Indirect taxes} \]

\[ \text{Disposable Income minus Indirect Taxes} + \text{Indirect subsidies} \]

\[ \text{Consumable Income} \]

\[ \text{Consumable Income} + \text{Education and health services} \]

\[ \text{Consumable Income} - \text{Co-payments, user fees} \]

\[ \text{Final Income} \]

\[ \text{Final Income} - \text{Education and health services} \]

\[ \text{Final Income} + \text{Co-payments, user fees} \]

\[ \text{Market Income plus Pensions plus All Transfers} \]

\[ \text{Market Income plus Pensions minus All Taxes} \]
Direct Taxes: Components

- Individual income taxes
- Agricultural income tax (e.g., Ethiopia)
- Payroll taxes
  - Paid by both employee and employer
- Contributions to social security
- Property taxes
- Corporate income taxes
  - Included if possible

- Assumption: direct taxes fully shifted forward to labor in the form of lower wages
Suppose reported pre-tax wage is 10
Reported direct taxes (paid by employee) are 2
Employer pays 3 in payroll taxes
The pre-tax wage of 10 is *net of* employer payroll taxes, so gross up pre-tax wage to 10+3 = 13
  – 13 is the pre-tax wage used when constructing market income
Direct taxes (ignoring other categories) are 2+3 = 5
Post-tax wage is 13-5 = 8
Direct Taxes: Allocation

• Direct Identification
  – Individual income taxes in Brazil, Colombia, Peru
    • Brazil: for each income source, next question is how much was paid in direct taxes for that income source
  – Property taxes in Brazil (expenditure module of survey)

• Simulation
  – Individual income taxes in many countries
    • Simulated according to reported incomes, household characteristics, and tax code
    • Account for evasion by only simulating for those working in the formal sector
    • In case of US (large formal sector), only simulate for those reporting filing a tax return
  – Payroll taxes paid by employer in Brazil
  – Corporate income taxes in Brazil and US
    • Requires very broad assumptions about burden of corporate income tax
Direct Taxes: Components

• Alternate Survey (with Direct Identification)
  – Property taxes in US
    • Property taxes paid reported in alternate survey
    • Use common covariates of dwelling and household characteristics to match households between the two surveys
    • Use property taxes paid of matched household

• Imputation
  – Agricultural income tax in Ethiopia
    • Distribute total collected from national accounts proportionally to land holdings

• Secondary Source
  – Individual income taxes in Mexico
    • Distribution of income taxes by decile obtained from Ministry of Finance and allocated by decile in survey data
Market Income

\[ \text{Market Income} + \text{Contributory pensions} \]

\[ \text{Market Income plus Pensions} \]

\[ \text{Market Income plus Pensions} + \text{Direct transfers} - \text{Direct taxes} \]

\[ \text{Gross Income} \]

\[ \text{Gross Income} + \text{Net Market Income} \]

\[ \text{Gross Income} - \text{Direct taxes} - \text{Direct transfers} \]

\[ \text{Disposable Income} \]

\[ \text{Disposable Income} + \text{Indirect subsidies} - \text{Indirect taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} \]

\[ \text{Disposable Income minus Indirect Taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} + \text{Indirect taxes} - \text{Indirect subsidies} \]

\[ \text{Consumable Income} \]

\[ \text{Consumable Income} + \text{Education and health services} - \text{Co-payments, user fees} \]

\[ \text{Market Income plus Pensions minus all taxes} \]

\[ \text{Market Income plus Pensions plus all transfers} \]

\[ \text{Final Income} \]
Net Market Income

- Net Market Income = Market Income plus Pensions - Direct Taxes

\[ n = m^{+P} - T_d \]
Disposable income

= Net Market Income + Direct Transfers

\[ d = n + B_d \]

= Gross Income - Direct Taxes

\[ d = g - T_d \]
Market Income

\[ \text{Market Income} + \text{Contributory pensions} \]

\[ \text{Market Income plus Pensions} \]

\[ \begin{align*} &\text{Market Income plus Pensions} \\
&+ \text{Direct transfers} \\
&+ \text{Net Market Income} \end{align*} \]

\[ \begin{align*} &\text{Net Market Income} \\
&- \text{Direct transfers} \end{align*} \]

\[ \begin{align*} &\text{Gross Income} \\
&+ \text{Direct transfers} \\
&- \text{Direct taxes} \end{align*} \]

\[ \text{Disposable Income} \]

\[ \begin{align*} &\text{Disposable Income} \\
&+ \text{Indirect subsidies} \\
&- \text{Indirect taxes} \end{align*} \]

\[ \text{Disposable Income plus Indirect subsidies} \]

\[ \begin{align*} &\text{Disposable Income minus Indirect Taxes} \\
&+ \text{Indirect subsidies} \end{align*} \]

\[ \text{Consumable Income} \]

\[ \begin{align*} &\text{Consumable Income} \\
&+ \text{Education and health services} \\
&- \text{Co-payments, user fees} \end{align*} \]

\[ \text{Final Income} \]

\[ \begin{align*} &\text{Final Income} \\
&+ \text{Market Income plus Pensions plus All Transfers} \end{align*} \]
Indirect Subsidies and Indirect Taxes

- Presented by Gabriela Inchauste
Disposable Income plus Indirect Subsidies

= Disposable Income + Indirect Subsidies

\[ d^{+B_i} = d + B_i \]
Disposable Income minus Indirect Taxes

= Disposable Income - Indirect Taxes

\[ d^{-T_i} = d - T_i \]
Consumable Income

- Consumable Income
  = Disposable Income minus Indirect Taxes
  + Indirect Subsidies

\[ c = d^{-T_i} + B_i \]

= Disposable Income plus Indirect Subsidies
  - Indirect Taxes

\[ c = d^{+B_i} - T_i \]
• Market Income plus Pensions minus All Taxes
  = Market Income plus Pensions - Direct Taxes
    - Indirect Taxes

\[ m^{+P-T} = m^{+P} - T_d - T_i \]
Education

• Valued at government cost for each level
  – Include recurring and investment spending
  – Include administrative costs
  – Possible levels:
    • Day care
    • Preschool
    • Primary
    • Secondary
    • Tertiary
• Disaggregate by geographic area if possible
• Imputation method
  – Combine data in survey on who attends public school at each level with national accounts data on spending
  – If the survey doesn't specifically have a question about whether the child attends public vs. private school
    • See next slide
Education

• Inference + Imputation
  – e.g., Sri Lanka
  – Use question from consumption module on whether household paid facility fees to government schools or school fees to private schools to infer whether child attends public school

• Alternate Survey + Prediction + Imputation
  – e.g., United States
  – Main survey asks whether the child attends school, but not public vs. private
  – Find alternate survey that has income data and public vs. private school attendance
  – For sample of children attending school, predict probability of attending public school using covariates common to both surveys as independent variables (probit in alternate survey)
  – Use coefficients to predict probability in main survey
  – Multiply probability by average spending per student by level
  • Expected value of benefit received
Two main systems: public facilities or public insurance

Public facilities
- Divide total spending in national accounts by number of visits in survey data to obtain spending per visit
- Disaggregate by type of care as much as possible
  - Primary and in-patient care in Armenia, Indonesia
  - Basic health facility vs. hospital in Peru
  - Three levels of childbirth care in Bolivia

Public insurance
- Divide total spending in national accounts by number of covered individuals to obtain spending per insured
- Disaggregate by age if possible
  - Spending on public health insurance varies greatly by age
- Disaggregate by type of public health insurance if applicable

Some countries: combination of both systems

Disaggregate by geographic area if possible
- e.g. Brazil: average spending for each care type-state cell
Health

• Imputation method
  – Combines data from national accounts on amount spent on public health facilities; public health insurance with survey data on who benefits

• Alternate Survey + Imputation
  – Find survey with income data and use of public health facilities or public insurance coverage
  – e.g., Guatemala, South Africa

• Prediction (shouldn't be necessary)
  – If national accounts spending on public health facilities or public health services is not available (very rare)
  – Predict cost of different services using spending on similar services at private facilities in consumption module

• Secondary Source (shouldn't be necessary)
  – Only if no information on use of health services or insurance coverage in main or alternate survey
  – e.g., Chile, Mexico
• For all income components imputed using amounts from national accounts
• Scale down benefits to avoid overestimating effect of that component
• Example: primary education benefits
  – Divide primary spending in national accounts by disposable income in national accounts to obtain the ratio $R$
  – Scale down primary education benefits in the survey until the ratio of primary education benefits in the survey to disposable income in survey also equals $R$
Market Income

\[ \text{Market Income} + \text{Contributory pensions} \]

\[ \text{Market Income plus Pensions} \]

\[ \text{Market Income plus Pensions} + \text{Direct transfers} - \text{Direct taxes} \]

\[ \text{Gross Income} \]

\[ \text{Gross Income} + \text{Net Market Income} \]

\[ \text{Net Market Income} - \text{Direct transfers} + \text{Direct taxes} \]

\[ \text{Disposable Income} \]

\[ \text{Disposable Income} + \text{Indirect subsidies} - \text{Indirect taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} \]

\[ \text{Disposable Income minus Indirect Taxes} \]

\[ \text{Disposable Income plus Indirect subsidies} + \text{Indirect taxes} - \text{Indirect subsidies} \]

\[ \text{Consumable Income} \]

\[ \text{Consumable Income} + \text{Education and health services} - \text{Co-payments, user fees} \]

\[ \text{Market Income plus Pensions plus All Transfers} \]

\[ \text{Final Income} \]

\[ \text{Market Income plus Pensions minus All Taxes} \]
User Fees

• Usually directly identified in survey if common in country
• These user fees can also be used to more accurately approximate education or health benefits
• Use local knowledge to determine most plausible scenario (see Wagstaff, 2012):
  – User fee is independent of benefit (use imputation method described before to calculate benefits)
    • e.g., health in Indonesia
  – Subsidized portion of health care is constant; user fee is total cost minus fixed subsidy
  – User fee is proportion of total cost of care
    • e.g., health in Jordan
Market Income plus Pensions plus All Transfers

= Market Income plus Pensions + Direct Transfers
  + Direct Subsidies + (Education and Health Benefits - Co-payments and User Fees)

\[ m^{+P+B} = m^{+P} + B_d + B_i + B_k - F \]
Market Income

+ Contributory pensions

Market Income plus Pensions

Direct transfers

Gross Income

Direct transfers

Net Market Income

Direct taxes

Disposable Income

Indirect subsidies

Disposable Income plus Indirect subsidies

Indirect taxes

Disposable Income minus Indirect Taxes

Indirect taxes

Consumable Income

Education and health services

Market Income plus Pensions plus All Transfers

Final Income

Co-payments, user fees

Market Income plus Pensions

Final Income
Final Income

• Final Income
  = Consumable Income + (Education and Health Benefits
  - Co-payments and User Fees)

\[ f = c + B_k - F \]