Day 1 - Session 3
Fiscal Incidence Analysis in Practice: Construction of Income Concepts
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Income Concepts

Market Income

- Contributory Pensions

Market Income plus Pensions

- Non-Taxable Income

Gross Income

- Non-Taxable Income

- Direct Transfers

Disposable Income

- Direct Transfers

- Direct Taxes

Net Market Income

- Direct Transfers

- Direct Taxes

Consumable Income

- Indirect Subsidies

- Indirect Taxes

Final Income

- In-Kind Transfers (Education, Health)

- Copayments, User Fees
Allocation Methods

• **Direct Identification**
  – All information to estimate and allocate benefits comes directly from the household survey

• **Imputation**
  – Some information from survey (e.g., respondent reports attending public school, or receiving a direct transfer in a survey that doesn’t ask for the amount received)
  – Some information from public/administrative accounts, reports, or program rules

1. **Direct imputation** – uses information from survey and national accounts; no knowledge of program rules needed

2. **Simulation** – uses information from program rules to simulate who receives (pays), and/or how much is received (paid)

• **Inference**
  – Used when e.g. social programs grouped with other income sources; compare amount reported to possible benefit amounts
Allocation Methods

• Prediction
  – Use of regression to predict income from a particular source, benefits received, or taxes paid
  – For example, using rental data to predict “imputed rent” for owner occupied housing

• Alternate Survey
  – When primary survey lacks necessary questions, look for alternate survey
  – Any of above methods can be used in alternate survey
  – Then allocate benefits in main survey using
    ▪ Matching techniques
    ▪ Prediction (using covariates common to both surveys)
    ▪ Estimate benefits/taxes by quantile (e.g., percentile) in alternate survey, assign averages for everyone in that quantile in primary survey

• Secondary Sources
  – Last resort
  – For example, benefits by decile from government report or other study
**Income Concepts**

- **Market Income**
  - Contributory Pensions
  - Non-Taxable Income
  - Taxable Income
  - Direct Transfers

- **Market Income plus Pensions**

- **Gross Income**
  - Direct Transfers
  - Direct Taxes
  - Indirect Subsidies

- **Disposable Income**

- **Consumable Income**
  - In-Kind Transfers (Education, Health)
  - Copayments, User Fees

- **Final Income**

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
  – Vast majority of countries with CEQ Assessments
  – "How much would this house be rented for if it were rented?"

• Prediction
  – e.g., Bolivia, Georgia, Honduras
  – 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 or consumption; etc.)
  – Use coefficients from this regression in an out-of-sample prediction to predict rental value of owner occupied housing
Imputed Rent for Owner-Occupied Housing

• Alternate Survey + 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

• Exclude
  – In Bolivia, one question that could be used, but upon examination the responses were highly unreliable
  – In Honduras, not included in survey and no credible way to estimate and allocate
Income Concepts

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In-Kind Transfers (Education, Health)

Copayments, User Fees
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
  – Most countries

• Simulation
  – e.g., Indonesia
  – No question on pension receipt, so simulate it based on program rules using characteristics from household survey such as likely sector of work before retirement

• 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 plus Pensions

- Market Income plus Pensions = Market Income + Contributory Pensions
- **Important**
  - If pensions are treated as deferred income (PDI), market **income** is treated as the “pre-fisc” income concept
  - If pensions are treated as government transfers (PGT), market **income plus pensions** is treated as the “post-fisc” income concept
Income Concepts

- **Market Income**
  - Contributory Pensions
  - **Market Income plus Pensions**
  - **Gross Income**
    - **Disposable Income**
      - **Consumable Income**
        - In-Kind Transfers (Education, Health)
        - **Final Income**
        - **Net Market Income**
          - Direct Transfers
          - **Direct Taxes**
          - **Indirect Subsidies**
          - **Indirect Taxes**
          - **Direct Transfers**
          - **Non-Taxable Income**
          - **Taxable Income**
          - **Direct Transfers**
          - **Direct Taxes**
          - In-Kind Transfers (Education, Health)
          - **Final Income**

- **Copayments, User Fees**
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

- Direct 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
  - Important: scale down totals from national accounts
Direct Transfers: Allocation

• Simulation
  – Targeted Transfers in various countries
    ▪ Simulated according to program rules and eligibility criteria (based on income, having children, etc.)
    ▪ Argentina, Bolivia: Assumed perfect targeting, full coverage and take-up of target population, and no leakages
    ▪ In Uganda, perfect targeting and full coverage and take-up would have over-estimated, so randomly allocate among eligible until exhausting total number beneficiaries
  – 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

- 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 (Meyer et al., 2015)

• 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
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
- **Important**
  - If pensions treated as deferred income, compare market income plus pensions with gross income to see effect of direct transfers
  - If pensions treated as government transfer, compare market income with gross income to see effect of direct transfers (including pensions)
    - Master Workbook includes results for “Direct transfers excluding pensions” and “Direct transfers including pensions”
Income Concepts

Market Income

Contributory Pensions

Market Income plus Pensions

Direct Transfers

Gross Income

Direct Taxes

Net Market Income

Direct Transfers

Disposable Income

Indirect Subsidies

Consumable Income

Indirect Taxes

In-Kind Transfers (Education, Health)

Final Income

Copayments, User Fees
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 (we are working on this)
- Assumption: direct taxes fully shifted forward to labor in the form of lower wages
- **Important**: Determine whether reported incomes are gross or net of taxes
  - Gross in Brazil, Colombia, Dominican Republic, Ecuador, El Salvador, Honduras, Jordan, Peru, Russia
  - Net in Argentina, Armenia, Bolivia, Chile, Georgia, Mexico, South Africa, Sri Lanka, Uruguay
Grossing Up

- Case in which reported income in the survey is gross of taxes. Suppose that:
  - Reported income (gross of employee-paid income taxes) in the survey is 10
  - Individual income taxes (reported or simulated) are 2
  - Employer pays 3 in payroll taxes
  - The income gross of taxes of 10 is already net of the employer-paid taxes, so we gross up income from this job to 10+3 = 13
    - 13 is the grossed up income use when we construct market income
  - Direct taxes (ignoring for illustration other components like property taxes) are 2+3 = 5
  - Income net of direct taxes is 13-5 = 8
Case in which reported income in the survey is net of taxes (if not specified, normally we assume net). Suppose:

- Income reported in the survey, which is net of employee-paid income taxes, is 10
- Direct taxes are 2
- The employer pays 3 in payroll taxes
- The income of 10 is already net of taxes paid by both the employee and employer, so we gross it up to 10+2+3 = 15
  - 15 is the grossed up income we use when constructing market income
- Direct taxes (ignoring for illustration other components like property taxes) are 2+3 = 5
- Income net of direct taxes is 15-5 = 10
Direct Taxes: Allocation

• Direct Identification
  – Individual income taxes in Brazil, Colombia, Ecuador, 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)

• Imputation
  – Agricultural income tax in Ethiopia
    ▪ Distribute total collected from national accounts proportionally to land holdings
Direct Taxes: Allocation

• 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 many countries
  – Corporate income taxes in Brazil-US comparison study
    ▪ Requires very broad assumptions about burden of corporate income tax
    ▪ (Still working on improved methodology for corporate income taxes)
Direct Taxes: Allocation

• 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

• 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
Contributions to Social Security

• Contributions by employees
  – Usually direct identification or simulation

• Contributions by employers
  – Can’t be directly identified
  – Simulated in Brazil, Russia, Tunisia, others

• Exclude when no (public) contributory social security system
  – Dominican Republic, Georgia

• **Important**
  – Always include contributions to social security other than the public contributory pension system
  – Only include contributions to the public contributory pension system in the “pensions as government transfers” case
Income Concepts

- **Market Income**
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- **Market Income plus Pensions**
- **Gross Income**
  - Non-Taxable Income
  - Direct Transfers
- **Net Market Income**
  - Direct Taxes
- **Disposable Income**
  - Direct Taxes
  - Indirect Subsidies
- **Consumable Income**
  - Indirect Taxes
  - In-Kind Transfers (Education, Health)
  - Copayments, User Fees
- **Final Income**
Net Market Income

- Net Market Income = Market Income plus Pensions – Direct Taxes and Contributions
- **Important:** make sure that “contributions” follows the instructions above depending on treatment of pensions
**Income Concepts**

- **Market Income**
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    - Direct Transfers
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          - In-Kind Transfers (Education, Health)
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          - Final Income

Disposable Income

- Disposable income
  = Net Market Income + Direct Transfers
  = Gross Income - Direct Taxes
- Note that “disposable income” in PDI case differs slightly from disposable income in “disposable income” in PGT case
  - Contributions to pensions were not subtracted in PDI case
  - But they were subtracted (like taxes) in PGT case
• Disposable income = Consumption
• In PDI case, add in contributions to pensions:
  – Disposable income = Consumption + contributions to pensions
  – For consistency with income definition, since these are not subtracted out
• Then work backwards
  – Gross income = disposable income + direct taxes
  – Market income plus pensions = gross income – direct transfers
  – Etc.
Income Concepts

Market Income

Contributory Pensions

Market Income plus Pensions

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Non-Taxable Income

Taxable Income

Net Market Income

Direct Taxes

Disposable Income

Direct Taxes

Indirect Subsidies

Consumable Income

Indirect Taxes

In-Kind Transfers (Education, Health)

Final Income

Copayments, User Fees
Income Concepts

1. **Market Income**
   - Contributory Pensions
   - Direct Transfers

2. **Market Income plus Pensions**
   - Non-Taxable Income
   - Taxable Income

3. **Gross Income**
   - Direct Transfers
   - Direct Taxes

4. **Disposable Income**
   - Indirect Subsidies
   - Indirect Taxes

5. **Consumable Income**
   - In-Kind Transfers (Education, Health)
   - Copayments, User Fees

6. **Final Income**
Consumable Income

• Consumable Income
  = Disposable Income
    + Indirect subsidies
    – Indirect taxes
Income Concepts

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Contributory Pensions

Market Income plus Pensions

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Gross Income

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Taxable Income

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In-Kind Transfers (Education, Health)

Final Income

Copayments, User Fees
• 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
• Direct 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:

• 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

• Alternate Survey + Prediction + Imputation
  – See next slide
• **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
• **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
Income Concepts

1. Market Income
   - Contributory Pensions
   - Market Income plus Pensions

2. Gross Income
   - Direct Transfers
   - Direct Taxes
   - Non-Taxable Income

3. Disposable Income
   - Indirect Subsidies
   - Indirect Taxes

4. Consumable Income
   - In-Kind Transfers (Education, Health)
   - Copayments, User Fees

5. Final Income
   - Direct Transfers
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
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Copayments, User Fees

Final Income
• Final Income
  = Consumable Income
    + Education and Health Benefits
    – Co-payments and User Fees
Scaling Down

• 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 $R$