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Gendered fiscal incidence analysis and tax-benefit microsimulation models

Overview, opportunities, and caveats

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Community of Practice on Gender & Tax

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Why tax-benefit microsimulation models?

- Measure the **distributional impact** of tax policies and public spending
  - Fiscal incidence of tax and spending policies (individual or combined)
  - Ex-ante and ex-post **evaluation of policy (reforms)** in terms of distributional impact
  - Incidence on **households or individuals** by income/expenditure levels & demographic characteristics (gender, age, region etc).
- Provide evidence on questions such as:
  - Winner and losers of policy reform? Income, age, **gender**
  - How do policies affect income inequality and absolute and relative poverty? Is the effect **different for men and women**?
  - Are (formal) work incentives affected (second or low-income earners)?
  - Is the **policy well targeted** for its intended purposes?

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Typology of microsimulation models - overview

- Tax-benefit microsimulation models are **partial models**, no general equilibrium effects modelled. Models are either:

  - **Microlevel data driven**

    - Representative survey data including household income and expenditure data: model quality hinges on data quality

    - Administrative (tax) data - restricts model's range of application

    - Or combination of both

    - May be supplemented by national accounts, input-output tables

  - **Hypothetical models**

    - Based on ideal/synthetic individuals or types of households;

    - Illustrative, cross-country comparisons but lack representativeness & limited heterogeneity

    - E.g. **OECD Taxing wages** (second earners) or OECD TaxBEN tool

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Typology of data-driven microsimulation models

- Microdata for households or individuals
- **Modelling approach**:
    1. Static or arithmetic: no behavior and time dimension (first round effects)
    2. Behavioral: static + policy impact on behavior (second round effects)
    3. Dynamic: incorporate time dimension, cohort analysis

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Typology of data-driven microsimulation models

1. **Static or arithmetic models**: no behavior and time dimension (**first round effects**)
   - Takes behavior as given (e.g. women paid and unpaid work and income observed in survey data)
   - Allocates tax burdens and benefits to households and individuals using:
     - observed patterns in data (e.g. consumption, income sources, job)
     - assumptions (e.g. incidence, missing data)
     - detail of policies from tax and benefits legal codes
   - Calculate distributional impact, aggregate tax revenues or gov't outlays of policies
     - <u>Challenge</u>: May overstate revenue gains and (negative) welfare losses from tax increases
   - **Examples: (E-)CEQ**, **SOUTHMOD**, **TaxDev**, EUROMOD, gov't in HICs
     - **Plurality of models**: complementary, vary over fiscal instruments covered, type of model (fiscal incidence analysis (FIA) or microsimulation of reforms), methodology, data used, accessibility, flexibility, countries covered, users.

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Typology of data-driven microsimulation models

1. Static or arithmetic: no behavior and time dimension (first round effects)

2. **Behavioral**: static + policy impact on behavior (**second round effects**)

   o More relevant when policy changes are large

   o Many possible behavioral responses: *labor supply, taxable income*, consumption, fertility, education, entrepreneurship

   o E.g. SOUTHMOD applications

      o Ex-post evaluation of a PIT reform in Uganda: Estimates of **taxable income elasticities** combined with microsimulation to assess implications for tax revenue

      o Ex-ante evaluation of a hypothetical introduction of in-work tax credits in Ecuador: Estimates of (formal) **labor supply elasticities** by gender and demographics combined with microsimultion to assess the impact on (formal/informal) participation rates, poverty and inequality

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Typology of data-driven microsimulation models

1. Static or arithmetic: no behavior and time dimension (first round effects)

2. Behavioral: static + policy impact on behavior (second round effects)

3. **Dynamic**: incorporate **time dimension**, cohort analysis

   o Can account for changes in population due to e.g. aging or career choices

   o Relevant for specific policies: pensions, elderly care, education, lifetime (intrapersonal) redistribution

   o Much more costly and complex to build and higher data requirements

   o Examples: HICs gov't such as Australian Population and Policy Simulation Model (APPSIM)

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Static tax-benefit microsimulation models (1)

hhid	persid	age	income
1	1	50	2000
1	2	45	1000
1	3	12	.
1	4	14	.

Micro data on households

- Social benefits
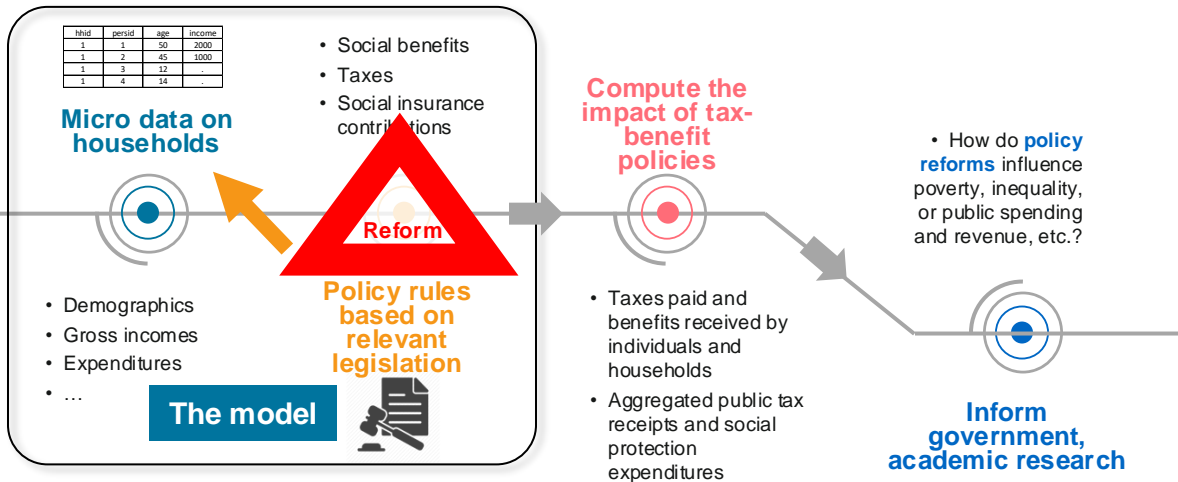- Taxes
- Social insurance contributions

- Demographics
- Gross incomes
- Expenditures
- …

Policy rules based on relevant legislation

The model

Static tax-benefit microsimulation modelling (2)

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Micro data on households

hhid	persid	age	income
1	1	50	2000
1	2	45	1000
1	3	12	.
1	4	14	.

- Social benefits
- Taxes
- Social insurance contributions

Reform

- Demographics
- Gross incomes
- Expenditures
- …

Policy rules based on relevant legislation

The model

Compute the impact of tax-benefit policies

- Taxes paid and benefits received by individuals and households
- Aggregated public tax receipts and social protection expenditures

- How do **policy reforms** influence poverty, inequality, or public spending and revenue, etc.?

Inform government, academic research

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Static microsimulation models

- **Incidence: economic = statutory**
  - ○ Taxes (credits) on wages lower (increases) wages, Value-Added tax (VAT) increases final prices
  - ○ Challenges with modelling non-compliance (informality) & nuanced incidence

- **Fiscal instruments**
  - ○ Tax: Personal income tax (PIT), Social Security Contributions (SSC), VAT, property and land taxes, excise taxes
  - ○ Spending: various cash transfers, indirect subsidies, in-kind transfers (education & health)

- **Gendered impacts**
  - • Explicit discrimination in law
  - • **Interaction of fiscal policies with existing gendered differences** in work, income & consumption (no behavior)
  - • Evidence mostly from HICs: equalising impact of combined direct taxes and cash transfers because systems are progressive & **women overrepresented among poor**
    - ➤ Multiple factors contribute to women being poorer than men.
    - ➤ Policy solutions need to address various areas not just tax.

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# Challenges measuring outcomes by gender

- **Measuring** unearned income or expenditure **at the individual level is difficult**
  - Most survey data: unearned income and expenditure is at the household level.
  - Need individual incomes and expenditure to allocate tax burdens and benefits
  - Evidence from income inequality assumes household income is allocated in equal parts across adult members – unrealistic.
- **Limited use of administrative data**: only few countries record the sex of the taxpayer
- Different approaches to overcome challenges:
  - Use intrahousehold allocation rules
  - Compare only individual earnings and benefits
  - Compare households with different gender characteristics: female vs male headed, or proportion of female members, or gender of main earner, may be combined with number of dependents.

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Other considerations

- Models **may not estimate 100% accurately** revenue changes

- How to rank households from poor to rich (income, consumption, expenditure)

- Whether to assess relative impact as a share of (consumption) expenditure or income

- Benefits of **analysing the tax and transfer system as a whole & packages of reforms**

  - Progressive impact of reform to personal income tax (PIT) on earned income of formal workers may be dampened by regressive structure of social insurance contributions

  - Not all taxes have to be progressive; non-progressive taxes can be used to fund more progressive spending making the overall system more progressive

    - E.g., VAT exemptions vs (targeted) cash transfers to achieve equity objectives

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# Distributional impact of removing VAT exemptions& using 100% revenue gain to fund a Universal Transfer
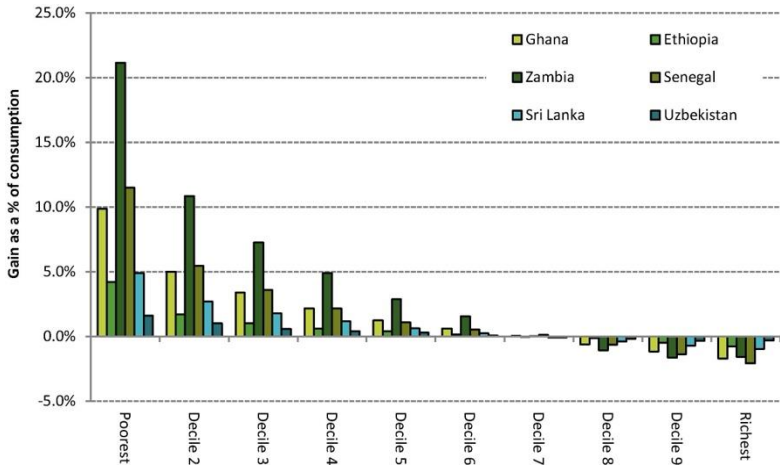
From Warwick et al (2022):
The redistributive power of cash transfers vs VAT exemptions: A multi-country study (figure 6.1)

TaxDev & CEQ models used

https://doi.org/10.1016/j.worlddev.2021.105742

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Gendered impact of PIT and domestic indirect taxes
Abrokwah et al, 2023 using Ghatax

Figure 4.9. Effect of the total tax system, by gender of household head
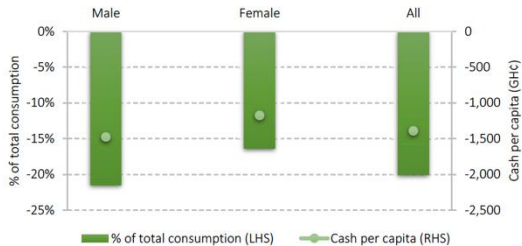
Note: 'Male' and 'female' represent households where the head of the household is a male and female, respectively.

Source: Authors' computation based on GHATAX model; underlying data are GLSS7 and 2015 SAM.

- Overall, excise duties are regressive. Other elements of the tax system are progressive.

- **Female-headed households are poorer and spend lower budget shares** on excisable products such as alcohol and tobacco.

- In sum, female-headed households **pay less tax overall** than male-headed households.

- Static model **co-developed by TaxDev and Tax Policy Unit, MoF of Ghana**

- Analysis co-produced by researchers from both organizations

- Not available to the public yet; no transfers included

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ECUAMOD: Simulating women's labor force response to an in-work child credit

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- Female **informal employment** in Ecuador is **high**.
- What if the government were to **introduce an in-work benefit** for mothers working in the formal sector at relatively lower wages?
- Will it encourage women to work more in the formal sector? (-> **behavioral impact**)

The employment effects of a simulated in-work child credit

Figure 1: Female employment changes under a simulated in-work child credit
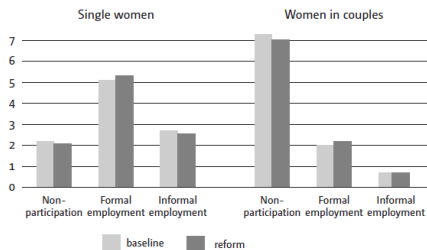
Impact on income poverty

Table 1
Changes in poverty under the simulated in-work child credit

	Baseline	Reform	
		static	behavioural
Poverty			
FGT0 (%)	25.91	25.66	24.91
FGT1 (%)	9.49	9.30	9.02
Extreme poverty			
FGT0 (%)	9.53	9.39	9.03
FGT1 (%)	3.18	3.05	2.98

Jara HX, Rattenhuber P. (2022). Female labour supply and informal employment in Ecuador. WIDER Working Paper 2022/47. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2022/178-5.

SOUTHMOD: comparative analyses

Poverty gap (<$2.15/day)

Legend:
- Women (red)
- Men (blue)

Country	Δ value
Ethiopia	Δ +0.07
Ghana	Δ -0.12
Mozambique	Δ +0.00
Rwanda	Δ +0.13
Tanzania	Δ -0.02
Uganda	Δ +0.08
Zambia	Δ +0.35
Zanzibar	Δ +0.11
Viet Nam	Δ +0.26
Bolivia	Δ +0.17
Colombia	Δ +0.49
Ecuador	Δ +0.11
Peru	Δ +0.05

x-axis: Poverty gap (disp. income) minus Poverty gap (orig. income)

Lastunen J, de Mahieu A, Gasior K, Jara HX, Pirttilä J. (2024). Microsimulation of tax-benefit systems in the Global South: a comparative assessment. WIDER Working Paper 2024/35. Helsinki: UNU-WIDER. https://doi.org/10.35188/UNU-WIDER/2024/439-9.

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SOUTHMOD project

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LSE International Inequalities Institute

JRC Joint Research Centre

– **Collaborative project** that aims to develop microsimulation models for the Global South + related research + capacity development

– Goal to provide researchers and local policymakers with reliable information and tools to improve tax and social protection policies

– **Cross-country comparative** models

13 national teams

– 13 models **freely accessible** models covering Africa, Latin America, Asia

– **NEW**: **SOUTHMOD online training**

Norad

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TaxDev:
Centre for Tax Analysis in Developing Countries

– TaxDev: established in 2016 & jointly delivered by IFS and ODI
  ▪ Funded by UK Government

**UK Government
Centres of Expertise**
Public Finance

– Key objectives:
  1. To support and sustain the use of evidence in the tax policymaking process in 6 partner countries.
  2. To generate high-quality, theoretical and empirical evidence on tax & development.
  3. To increase the uptake of tax research and resources and strengthen networks and learning.

▪ Long-term partnerships with MoFs (& increasingly RAs)
▪ Advisers are embedded in TPUs in each country
▪ IFS and ODI teams in London provide remote support and visit regularly
▪ Network of Research Associates and Fellows from universities in UK and internationally
▪ Maximize expertise of both institutions & benefits of working across countries and with external partners
▪ More info on website: https://www.taxdev.org/

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