Institute for Fiscal Studies

A tax and benefit microsimulation model for Ghana: GHATAX

Ross Warwick

TaxDev

UKaid from the British people

@TheIFS #TaxDev

Policy considerations

Institute for Fiscal Studies

Going beyond revenue/expenditure

- Estimates of the cost of policies to government are vital
- But so are the impacts on households

Policy considerations

Institute for Fiscal Studies

Going beyond revenue/expenditure

- Estimates of the cost of policies to government are vital
- But so are the impacts on households

Policy modelling tools can estimate the distributional impact

- These are commonly used in developed countries
- Less available in developing countries due to data, administrative or capacity constraints

Introduction to microsimulation

Institute for Fiscal Studies

An analytical tool for modelling the impact of policy

- At the individual/household level
- Focus on revenue and distributional impacts of tax and benefit policy
  - Can also look at work incentives
- For instance:
  - How much extra revenue would be collected by increasing the top rate of income tax by 5%?
  - How much would poor households benefit from abolishing fuel duties?
- Important part of IFS work in the UK

GHATAX

Institute for Fiscal Studies

A tax and benefit microsimulation tool for Ghana

Three important contributions

- Specific, quantitative policy analysis
- Address questions of broader research and policy interest
- Capacity building role

GHATAX

Institute for Fiscal Studies

A tax and benefit microsimulation tool for Ghana

Three important contributions

- Specific, quantitative policy analysis
- Address questions of broader research and policy interest
- Capacity building role

→ Enhance and embed evidence-based policymaking on taxation

Model features

Institute for Fiscal Studies

Model functions and outputs

- Static and non-behavioural (for now)
- Analysis relating to:
  - Taxes: income tax, SSCs, VAT, import duties, excise duties
  - Main cash benefits
- A flexible model with a suite of user-specified options
  - Written in Stata
  - Not hard-coded

Running the model

```
scalar VAT1 = 0.00              // Staples
scalar VAT2 = 0.00              // Fruit and vegetables
scalar VAT3 = 0.00              // Staple meat and poultry
scalar VAT4 = 0.00              // Fish and seafood
scalar VAT5 = 0.00              // Water
scalar VAT6 = 0.00              // Electricity
scalar VAT7 = 0.00              // Petrol
scalar VAT8 = 0.00              // Diesel
scalar VAT9 = 0.00              // Transport services
scalar VAT10 = 0.00             // Education
scalar VAT11 = 0.00             // Health
scalar VAT12 = 0.00             // Fertiliser
scalar VAT13 = 0.00             // Kerosene
scalar VAT14 = 0.00             // Gas
scalar VAT15 = 0.00             // Postal services
scalar VAT16 = 0.00             // Processed food (informal)
scalar VAT17 = 0.15             // Processed food (formal)
scalar VAT18 = 0.15             // Other raw foodstuffs
scalar VAT19 = 0.15             // Dairy products
scalar VAT20 = 0.15             // Meat and fish products
```

```
* Tax thresholds - 2016 system
* The user can edit the income tax
* the user must adjust the number o

scalar NUMBANDS = 5

scalar BAND0 = 0
scalar BAND1 = 0
scalar BAND2 = 2592
scalar BAND3 = 3888
scalar BAND4 = 5700
scalar BAND5 = 38880
scalar BAND6 = 1000000000000

* Tax rates
* The user can edit the income tax

scalar RATE1 = 0.00
scalar RATE2 = 0.05
scalar RATE3 = 0.10
scalar RATE4 = 0.175
scalar RATE5 = 0.25
```

- The user can edit a wide range of parameters for simulation
- Results are compared to a “baseline” scenario – generally the existing system

Model outputs

Institute for Fiscal Studies

Revenue and expenditure

- By tax/benefit
- In cash terms and proportionally

Model outputs

Institute for Fiscal Studies

Revenue and expenditure

- By tax/benefit
- In cash terms and proportionally

Distributional impacts

- According to income and expenditure
- By household characteristics

Model outputs

Institute for Fiscal Studies

Revenue and expenditure

- By tax/benefit
- In cash terms and proportionally

Distributional impacts

- According to income and expenditure
- By household characteristics

Results in Stata and Excel

- Tables of results as well as variables for further analysis

Model assembly

Institute for Fiscal Studies

Data

- Based on a nationally representative household survey

Model assembly

Institute for Fiscal Studies

Data

- Based on a nationally representative household survey

Collaborative approach

- Built in conjunction with MoF
- Sharing of ideas and local knowledge informed model specifics
- “Learning by doing” approach complements workshops run on tax policy and data analysis
- Encourages feeling of ownership

Challenges

Institute for Fiscal Studies

Informality

- No recording of whether taxes are paid on expenditure
  - Small, informal traders may not pay taxes
  - Solution: use input-output table of Ghana's economy
- No explicit information on whether tax is paid on employment
  - Important implications for revenues and final household incomes
  - Solution: construct proxy variables for the user to choose between

Challenges

Institute for Fiscal Studies

Informality

- No recording of whether taxes are paid on expenditure
  - Small, informal traders may not pay taxes
  - Solution: use input-output table of Ghana's economy
- No explicit information on whether tax is paid on employment
  - Important implications for revenues and final household incomes
  - Solution: construct proxy variables for the user to choose between

Data quality

- Requires checking and scaling against administrative data

GHATAX in action: Income taxes

GHATAX in action: Income taxes

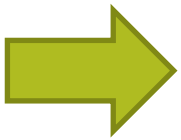
Institute for Fiscal Studies

Income (GH₵)	Tax rate
0 – 2,592	0%
2,592 – 3,888	5%
3,888 – 5,700	10%
5,700 – 38,880	17.5%
38,880 +	25%

GHATAX in action: Income taxes

Institute for Fiscal Studies

Income (GH₵)	Tax rate
0 – 2,592	0%
2,592 – 3,888	5%
3,888 – 5,700	10%
5,700 – 38,880	17.5%
38,880 +	25%



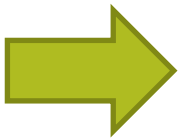
Income (GH₵)	Tax rate
0 – 2,592	0%
2,592 – 3,888	0%
3,888 – 5,700	10%
5,700 – 38,880	17.5%
38,880 +	25%

Abolishing the 5% income tax bracket

GHATAX in action: Income taxes

Institute for Fiscal Studies

Income (GH₵)	Tax rate
0 – 2,592	0%
2,592 – 3,888	5%
3,888 – 5,700	10%
5,700 – 38,880	17.5%
38,880 +	25%

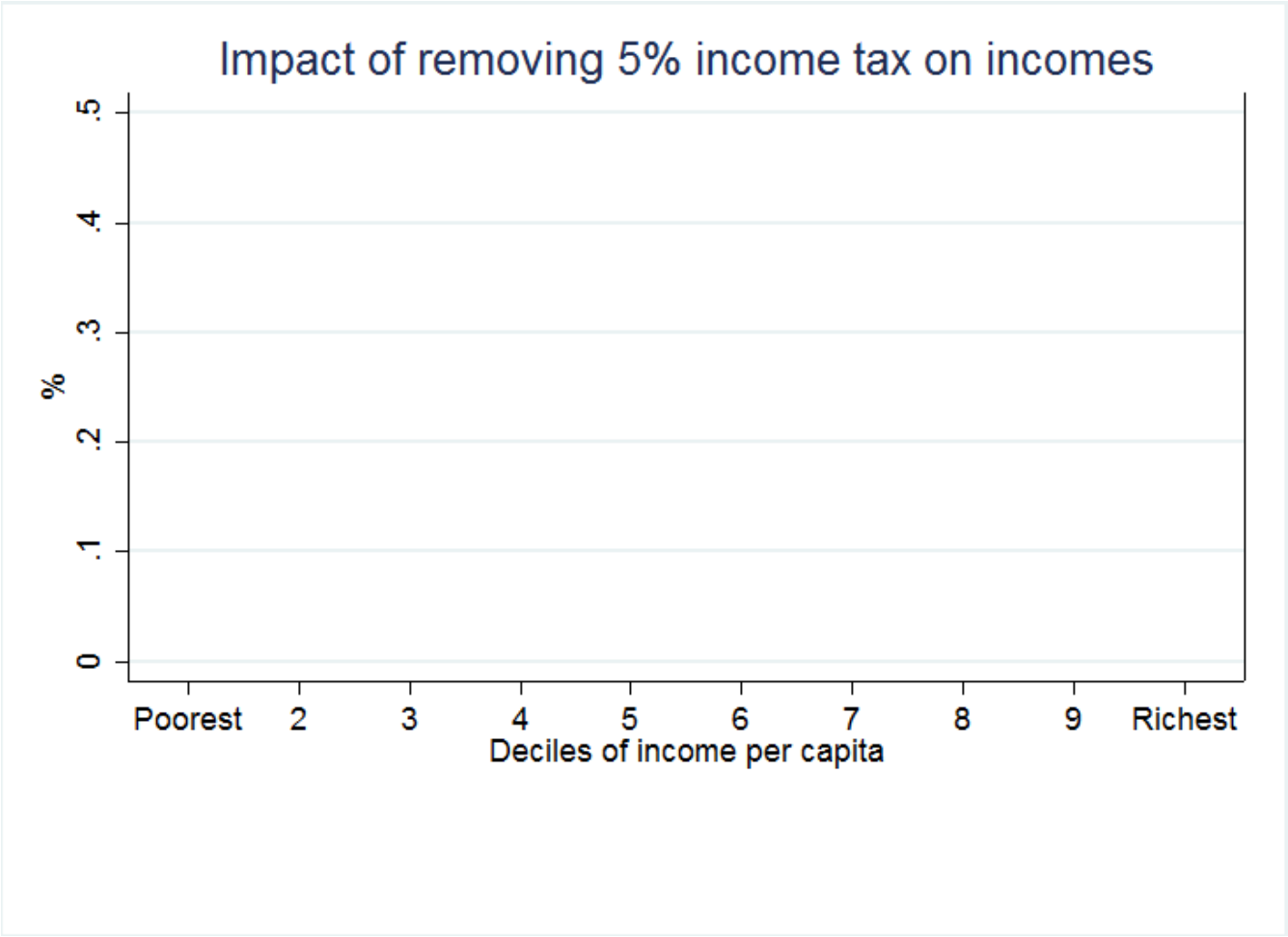


Income (GH₵)	Tax rate
0 – 2,592	0%
2,592 – 3,888	0%
3,888 – 5,700	10%
5,700 – 38,880	17.5%
38,880 +	25%

Abolishing the 5% income tax bracket

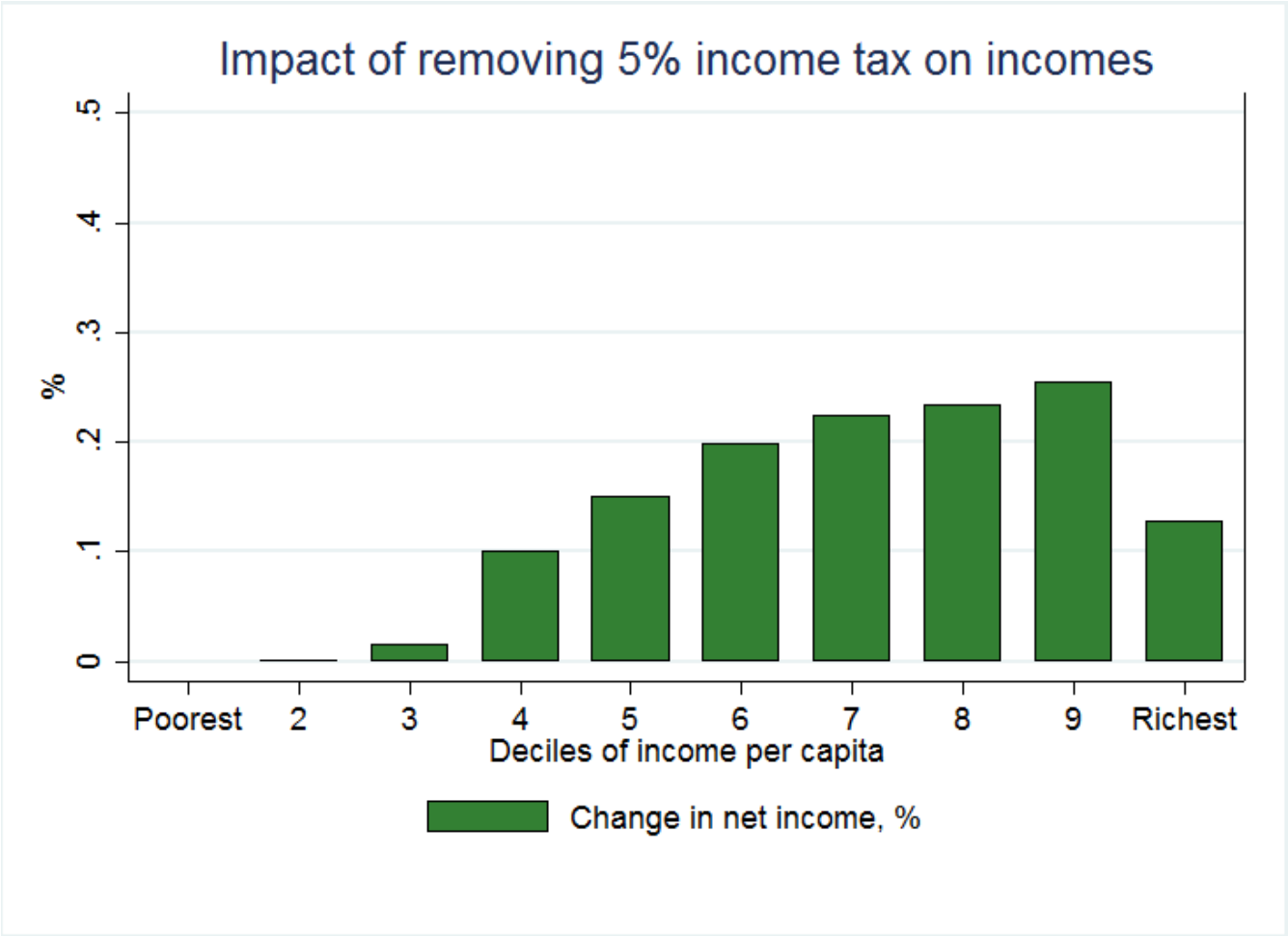
- A boon for Ghana's poor?

GHATAX in action: Income taxes



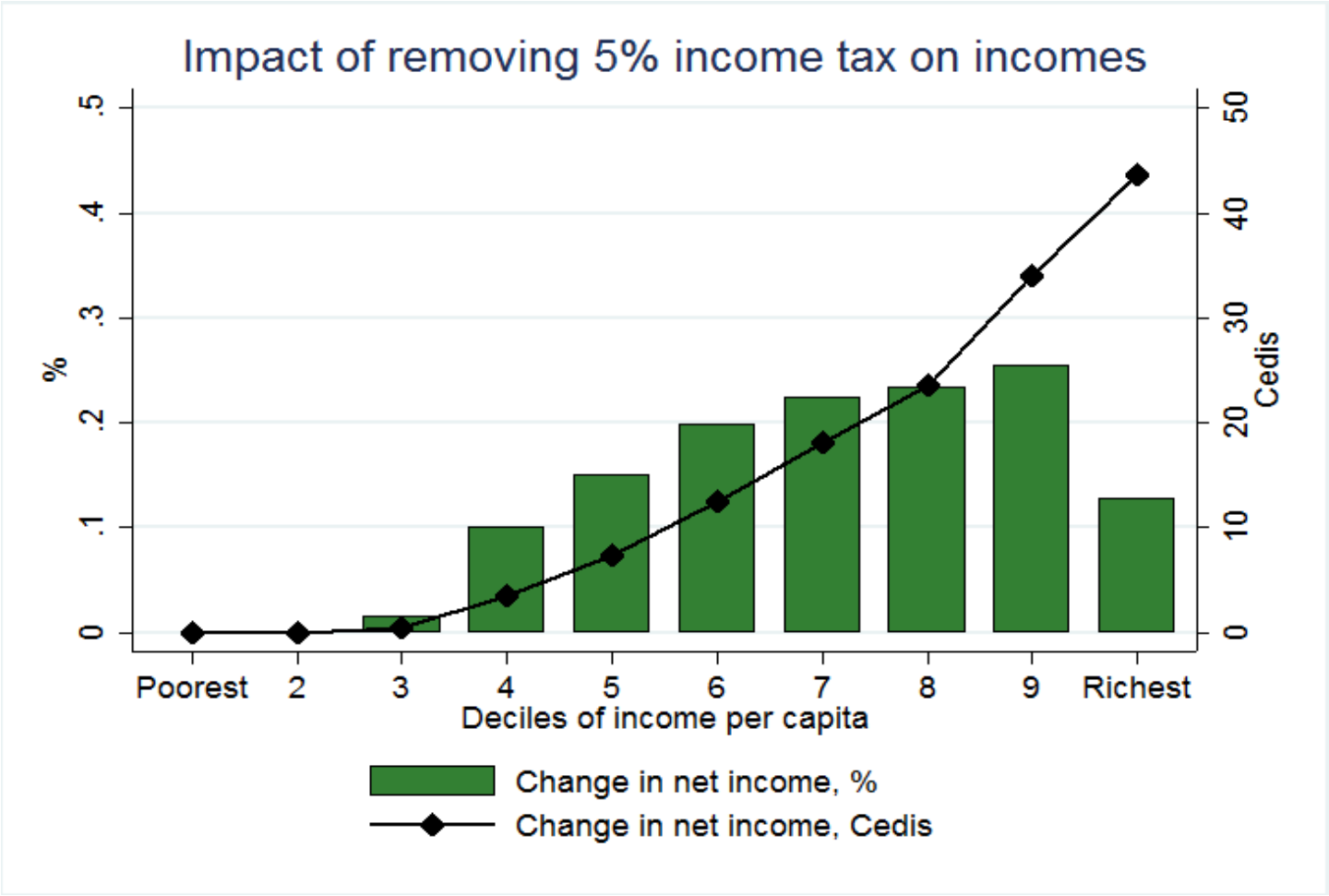
GHATAX in action: Income taxes

Institute for Fiscal Studies



GHATAX in action: Income taxes

Institute for Fiscal Studies



GHATAX in action: VAT exemptions

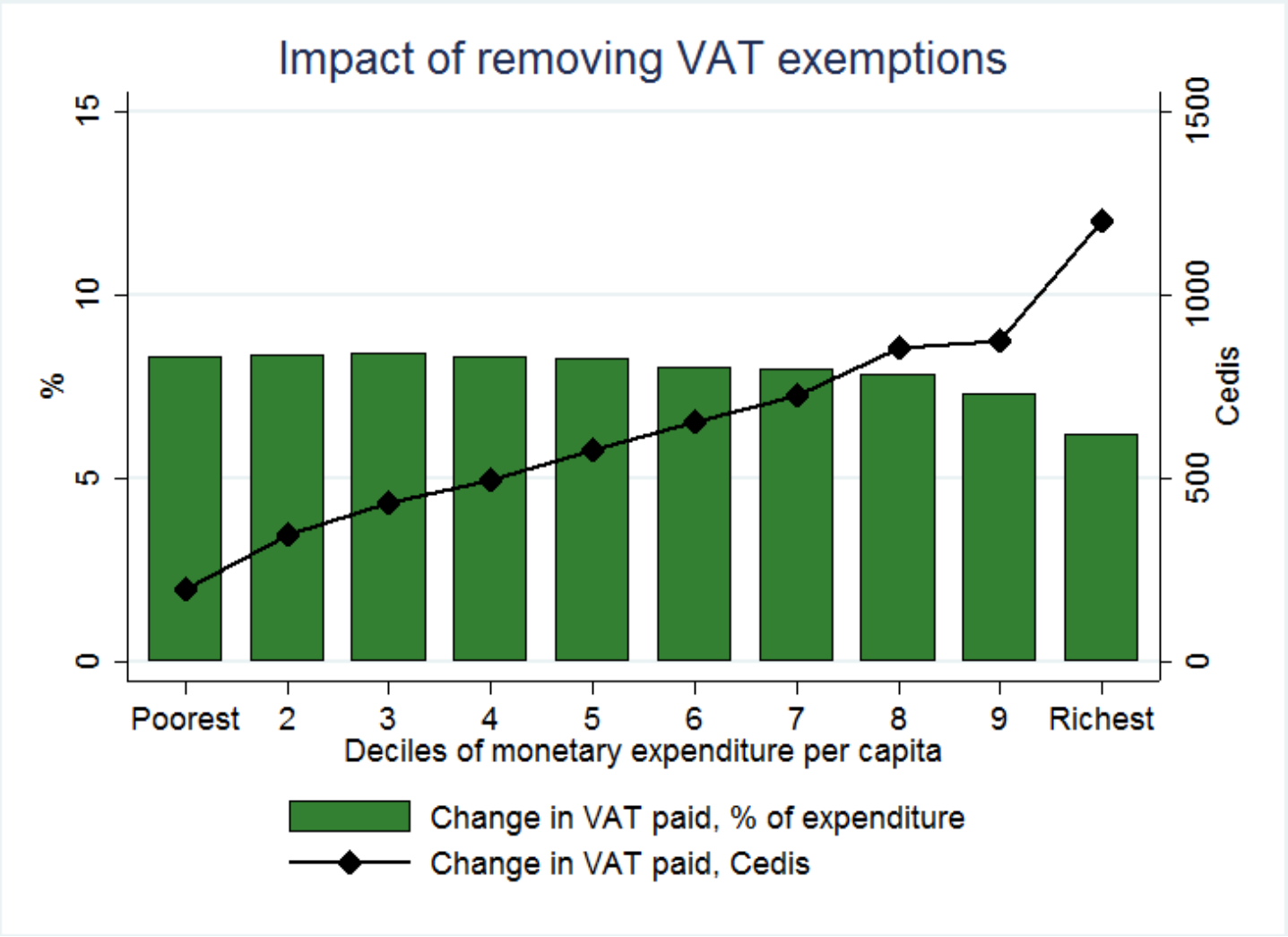
Institute for Fiscal Studies

Are VAT exemptions progressive?

- Basic goods and services are often VAT exempt or zero-rated
  - Reasoning: poor households commit a greater fraction of their expenditure to these
  - In Ghana, this covers many food items, health, education and so on
- But richer households spend more on these overall
- If more VAT was raised, this could (in principle) be redistributed to poorer households by cash transfers, for instance

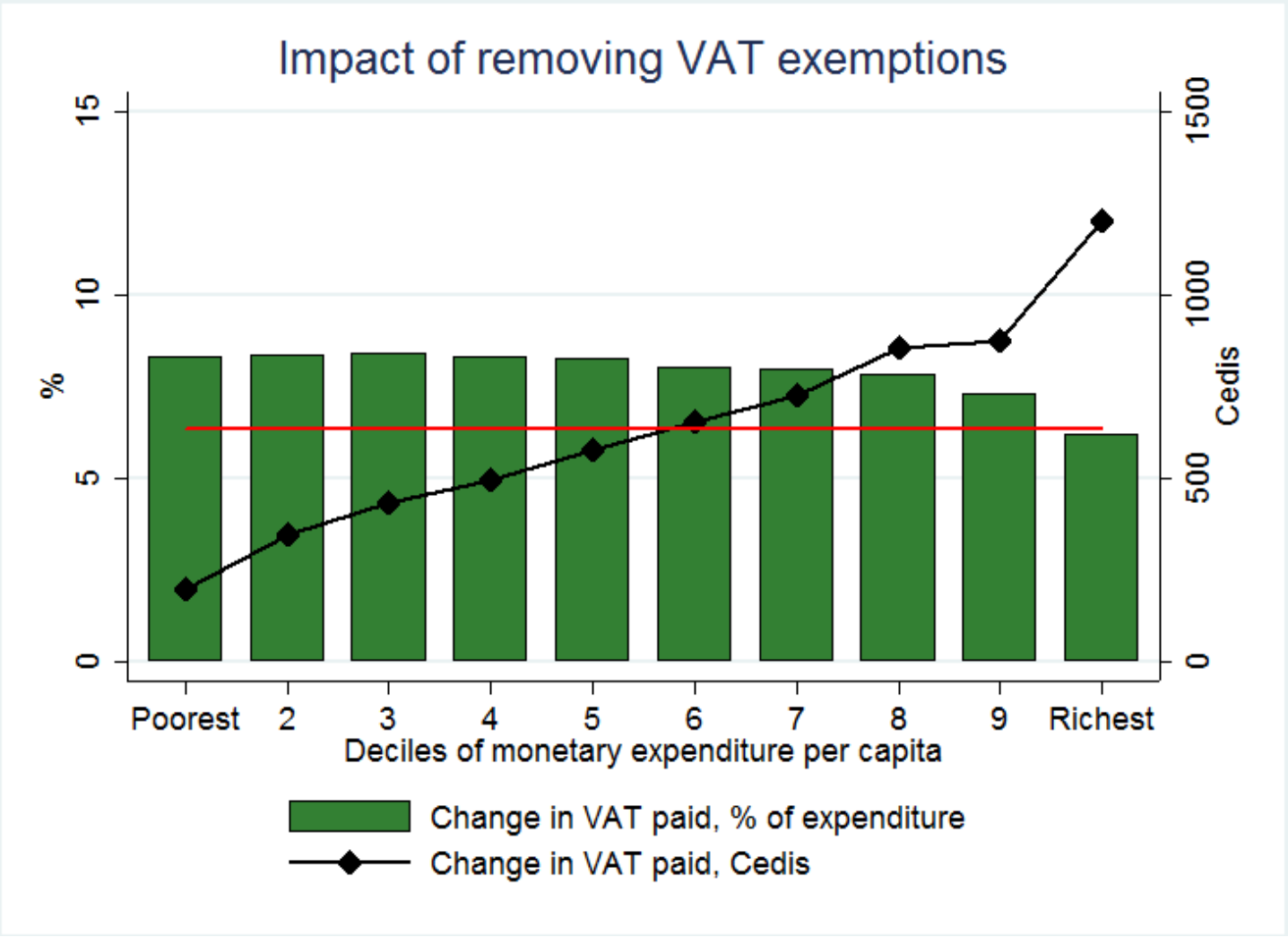
GHATAX in action: VAT exemptions

Institute for Fiscal Studies



GHATAX in action: VAT exemptions

Institute for Fiscal Studies



GHATAX in action: VAT exemptions

Institute for Fiscal Studies

Feeding into wider research

- Potential collaboration with the World Bank
- Cross-country analyses to provide an evaluation of the redistributive impact of VAT exemptions and reduced rates
- Drawing on evidence from different countries where the scope for alternative means of redistribution differ
  - How well targeted is VAT policy compared to other means?
- This can help inform policy aimed at redistribution and poverty reduction

Looking forward

Institute for Fiscal Studies

New features

- Adding in new data sources, poverty statistics and finalising outputs

Looking forward

Institute for Fiscal Studies

New features

- Adding in new data sources, poverty statistics and finalising outputs

Capacity building and institutional embedment

- Workshops and model building sessions to be held in Accra in April
- Further training in the summer on more advanced material

Looking forward

Institute for Fiscal Studies

New features

- Adding in new data sources, poverty statistics and finalising outputs

Capacity building and institutional embedment

- Workshops and model building sessions to be held in Accra in April
- Further training in the summer on more advanced material

Related work

- ETHTAX – a microsimulator for Ethiopia