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# Short introduction to the Ghanaian Microsimulation Model (GHAMOD)

# GHAMOD – the Ghanaian Model

- **User-friendly Standalone user interface:** stable, great control and guidance over user actions, increased functionality
- Model workings are transparent, and the **user has full control** over the simulations carried out
- The current version (v1.0) of GHAMOD is underpinned by the **2012/13 Ghana Living Standards Survey Round 6 (GLSS 6)**
- Can be **easily updated** with new data and policy reforms when required

# GHAMOD data

- The first step in microsimulation is to collect **data on the incomes and expenditures of individuals** in a representative survey of households
- Current version of GHAMOD is underpinned by **Ghana Living Standards Survey Round 6 2012/13 (GLSS 6)** data
- This represents the characteristics of the Ghanaian population in 2012/13
- The dataset after cleaning contains information on **71,321 individuals in 16,677 households**
- **Nationally representative**

# GHAMOD policies (i)

- The second step is to have a series of **policy rules** which can be **applied to the individuals in the data** to determine what social grants they are entitled to and what taxes they should pay
- To simulate a policy we must be able to:
  - translate the rules into the “language” of the software (simple code)
  - **collect the information needed** to apply the rules (more difficult due to data constraints)
  - Policy rules for the years **2013 to 2016** have been incorporated into GHAMOD V1.0

# GHAMOD policies (ii)

The policies that are currently simulated in GHAMOD are:

## **Social grants and social insurance**

- Livelihood Empowerment Against Poverty (LEAP)
- School Capitation Grant
- Employee/Employer Social Security Contributions

## **Direct and indirect taxes**

- Income tax
- VAT
- Excise taxes

# GHAMOD – what does it not do?

- Some existing policies are **not simulated** (mostly due to data restrictions), e.g. public and private pensions
- **No changes in behaviour simulated**, e.g. people working less due to higher taxes
- **No macro-economic effects** are considered– only direct impact on households (micro level) considered
- **However**, the output from the model can be used as the **starting point for more complex analyses** involving behavioural change and micro-macro linkages
  - *Work in progress:* research paper analysing how formal sector work reacts to tax increases due to social protection expansion - combines microsimulation with estimate of behavioural response

# A simulation example

# Simulating an old-age pension using GHAMOD

Simulate the impacts of an **old-age pension reform** in Ghana:

- given to **all person above 65** years of age with **no existing pension** receipts
- **Amounts** the same **as in the LEAP** cash transfer scheme (32 Cedis a month for a single recipient, more if more than one eligible in the household) in 2013, i.e. year of GLSS 6

# Screen capture from GHAMOD

The screenshot displays the GHAMOD software interface for Ghana. The main window title is "Ghana - EUROMOD G3.0+ (C:\Users\Kobby\Dropbox\Ghana microsimulation (1)\EM Ghana Files\_G3.0+\)". The interface includes a menu bar with options like "Countries", "Display", "Country Tools", "Administration Tools", "Add-Ons", "Applications", and "Help & Info". Below the menu is a "Run EUROMOD" button and a "Countries" list showing "Ghana" and "GH".

The central part of the screen is a table with the following columns: "Policy", "Grp/No", "GH\_2013", "GH\_2014", "GH\_2015", "GH\_2016", and "Comment". The table lists 20 policies, with their status for each year. A red box highlights the "Policy years" columns (GH\_2013 to GH\_2016). Another red box highlights the "Policies" column, and a third red box highlights the "Description of policies" column. A red arrow points from the "Policy years" label to the highlighted columns. Another red arrow points from the "Policies" label to the highlighted policy names. A third red arrow points from the "Description of policies" label to the highlighted descriptions.

Policy	Grp/No	GH_2013	GH_2014	GH_2015	GH_2016	Comment
1. SetDefault_gh		on	on	on	on	DEF: Set Default
2. uprate_gh		on	on	on	on	DEF: UPDATING FACTORS
3. ConstDef_gh		on	on	on	on	DEF: Constants
4. ildef_gh		on	on	on	on	DEF: INCOME CONCEPTS
5. tundef_gh		on	on	on	on	DEF: ASSESSMENT UNITS
6. neg_gh		on	on	on	on	DEF: Recode negative self-employment income to zero
7. expenditure_gh		on	on	on	on	DEF: Merge expenditure variables
8. expenditure_indirect_gh		on	on	on	on	DEF: Create variables for other indirect taxes
9. expenditure_fuel_gh		on	on	on	on	TAX: Calculate fuel excises
10. tscer_gh		on	on	on	on	TAX: Employer social contributions
11. tscee_gh		on	on	on	on	TAX: Employee social contributions
12. indtax_gh		on	on	on	on	TAX: Other indirect taxes
13. vat_gh		on	on	on	on	TAX: Value Added Tax
14. vat_on_exc_gh		on	off	off	off	TAX: Value Added Tax on good that are also subject to other indirect taxes
15. poa01_gh		n/a	n/a	n/a	n/a	BEN: Old-age pension reform idea
16. bsa_gh		on	on	on	on	BEN: LEAP transfer programme
17. bed01_gh		on	on	on	on	BEN: School capitation grant
18. tiniy_gh		on	on	on	on	TAX: Capital income tax
19. tin_gh		on	on	on	on	TAX: Labour income tax
20. tinbs_gh		on	on	on	on	TAX: Presumptive Tax

Policies

Description of policies

# Introducing a "new" pension policy to GHAMOD

Policy is "on"

50 cedi per month

65 plus and not pensioner yet

Individual level not household

poa02_gh		on	BEN: simple pension
DefConst		on	
\$poa2	1	50#m	
BenCalc		on	
Comp_Cond	1	{dag>=65} & {poa=0}	
Comp_perTU	1	\$poa2	
Output_Var		poa02_s	
TAX_UNIT		tu_individual_gh	

# Results of the old-age pension simulation

Examine **poverty, inequality and government costs and revenues** in scenario with old age pension in 2013:

- **Poverty lower** by approximately **3 percentage points** among households with older persons
- Would have increased **government expenditure** by **437 million Cedi** in 2013 (approximately 700 million Cedi in present terms)

# GHAMOD resources

- **GHAMOD Country Report**
  - Documents how underlying **data** were **modified** and how **policies are modelled**
  - model results are **compared with external data** (macro validation)
- **Data requirement document (DRD)**
  - Explains all variables used in the model
  - Available upon request (detailed excel)

# GHAMOD training course

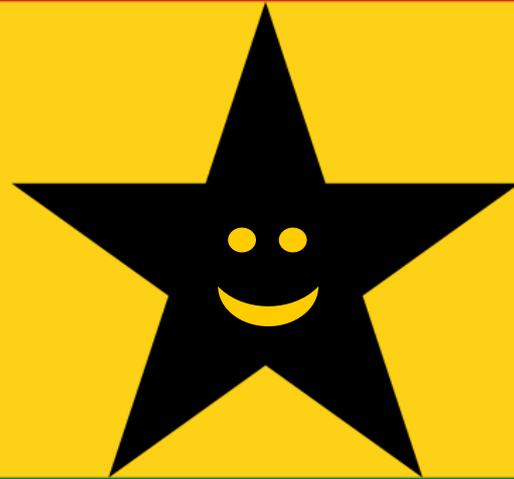
- From this afternoon until Friday afternoon
- Aims:
  - Explain GHAMOD underlying data and coding of policies
  - Explain the software used by GHAMOD
  - Participants learn how to
    - Amend existing policy
    - Introduce a new policy
    - Examine the implications of adopting a policy that is being used elsewhere (e.g. a child grant)
- After the course: participants can start using the model

# Obtaining GHAMOD

- Users will need to sign a **licence** that gives access to EUROMOD software, GHAMOD policy modelling and the underpinning data
- The licence is **free of charge**
- Users need to acknowledge use of model and data (GLSS 6) citing WIDER and Ghana Statistical Services
- Underlying **GLSS6** with suitable amendments that the model requires
- Research papers submitted to WIDER for consideration as WIDER Working Papers

# Conclusion

- The model will be kept **up to date**
  - Updating of policies
  - When new data become available, the model will be amended so that it can also work on the basis of them
- **More research projects** using GHAMOD and other SOUTHMOD country models to come
- We encourage interested people to join the **microsimulation users group**
- Suggestions for **improvements** and **ideas** for simulations are highly welcome!



**Happy simulations!!!**



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