

# Economywide And Distributional Effects Of Targeted Agricultural Commercialization Policies: An Applied Integrated Micro-Macro Approach

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# Overview: What is this article about?

- ❑ Integrating a farm household (FH) market participation model into a CGE-MS framework to explore direct and indirect effects of Agricultural Commercialization policies.
- ❑ Focus on policies such as access to inorganic fertilizers/mechanization.
  - ❑ Where? ➔ Malawi ( South-Eastern Africa), has launched one of vast inorganic fertilizer subsidy program (Affordable Input Program, 2020/2021).
- ❑ Findings (non exhaustive):
  - ❑ If the program targets FH with surplus of labor and absent from cereal market, there is a greater orientation towards markets (both at extensive and intensive margins)
  - ❑ Reallocation of labor to farms (price and wage adjustment) leading to positive indirect effects on nonfarm households and other institutions.
  - ❑ Low performance of non agriculture sector due to increased labor costs.
  - ❑ Pro-poor growth driven by agriculture sector, that benefits domestic agents.

# Motivation

- ❑ Literature on farmers' market participation(FMP) focuses on partial equilibrium effects
  - ❑ **Income /Consumption** (generally **or**)→ Positive direct effects at FH level.
    - ❑ *von Braun(1995); Muriithi & Matz (2015); Carletto et al. (2017), Ogotu et al.(2019)*
    - ❑ *Bellemare (2012) ; Maertens & Vande Velde (2017) ); Abdul-Rahaman & Abdulai (2020); Arouna et al.(2021)*→ **contract farming**
  - ❑ **Limitations:**
    - ❑ Incomplete picture →indirect effects affecting nonfarmers/other institutions (*von Braun, 1995*).
    - ❑ No way to gauge the contribution of FMP to development at national level. (*Bellemare & Bloem , 2018*)
- ❑ Studies using CGE to fill this gap (*Lofgren & Robinson,1999 ; Jonasson & al., 2014*)
  - ❑ Are scarce and face important limitations (*ex: absence of government, investment, etc...*).
  - ❑ Overlook the roles of extensive margins and heterogeneities among FHs (representative FHs).
  - ❑ Focus mainly on price policies (margins, transaction costs), ignoring productivity constraints.
  - ❑ Distributional analysis is absent.

# Objectives-Contributions

## ❑ Objective

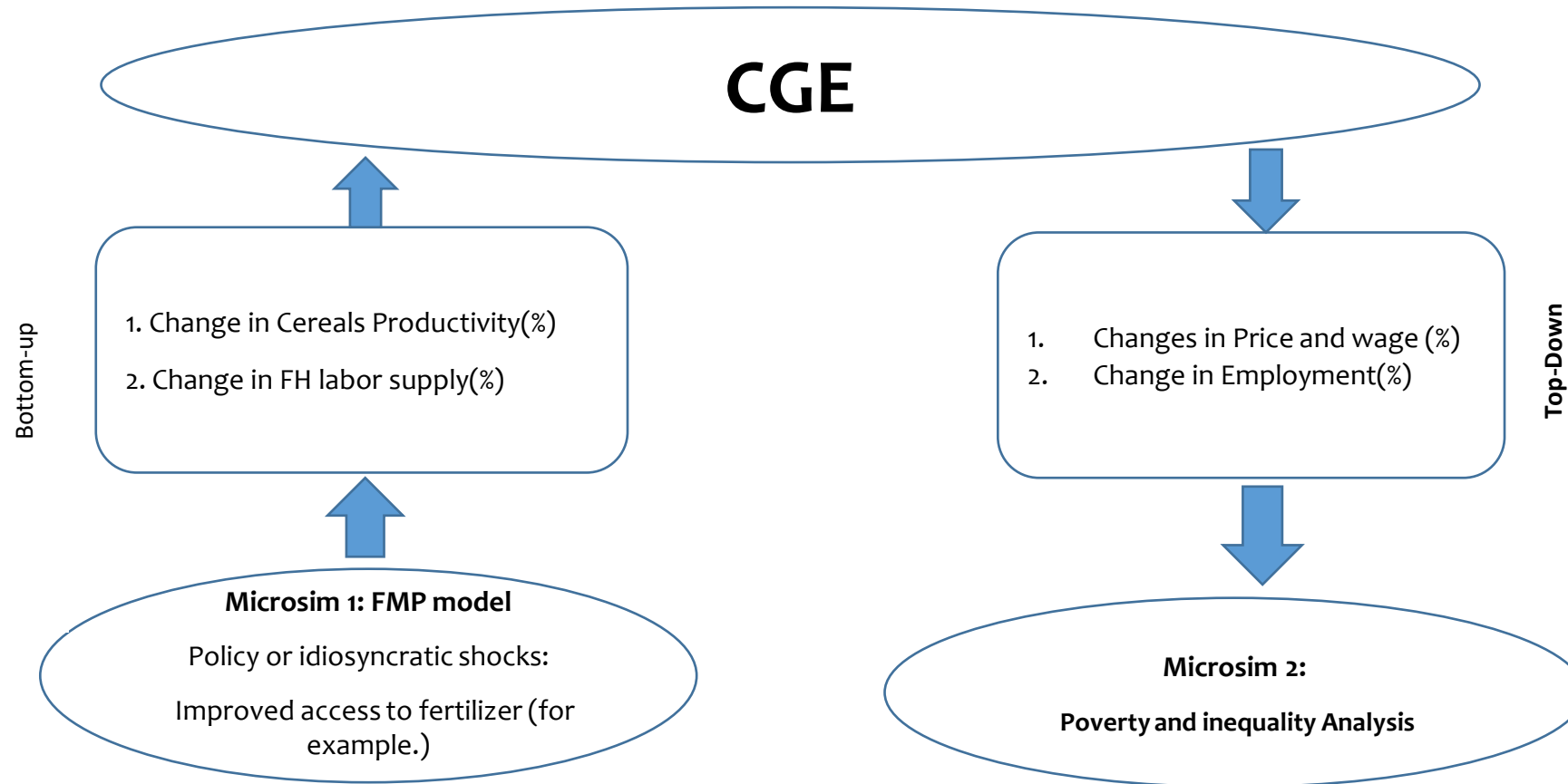
- ❑ Explore indirect and distributional effects of targeted productivity policies encouraging agricultural marketing in Malawi.

## ❑ Contributions

- ❑ Extension of the standard CGE-MS framework=>introduction of the FMP model.
- ❑ Heterogeneity among FHs in output market =>introduction of labor market participation
- ❑ Highlight the role of transitions between market participation regimes

# Overview of Analytical Framework

□ **Bottom-Up/Top-Down**, similar to *Debowicz & Golan (2014)*; *Tiberti et al. (2018)*



# Overview of Analytical Framework

## □ Microsim 1: FMP model

- Drawn from *Camara and Savard (2021) (Working paper version, submission to JAE)*
  - Extension of market participation model by Key et al.(2000)=> introducing labor market.

## □ Identification of 9 market participation regimes =====>

### □ The choice of market participation regime is based on:

- System of market prices (output price and/or wage)
- Transaction costs (fixed and variables)
- Access to agricultural technologies (fertilizer, improved seed, mech.)
- Factor endowment

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Regime 1	cereals seller and labor seller
Regime 2	cereals seller and labor buyer
Regime 3	cereals seller and autarky on the labor market
Regime 4	cereals buyer and labor seller
Regime 5	buyer on both markets
Regime 6	cereals buyer and autarky in the labor market
Regime 7	autarky on cereal market and labor seller
Regime 8	autarky on grain market and labor buyer
Regime 9	autarky on both markets

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- Under each regime, the FH has a system of demand (consumption) and supply (production)

# Overview of Analytical Framework

## ❑ CGE: Extension of EXTER (*Decaluwé, Martens & Savard , 2001*)

- ❑ Static
- ❑ Demand => Stone – Geary utility function
- ❑ Segmentation of labor market into farm and non-farm labor.
- ❑ Types of Households : Farm and non-Farm.
  
- ❑ Wage curve in labor market.(Blanchflower & Oswald,1994).
- ❑ Labor supply is exogenous and determined by Microsim1.
- ❑ Closure rule:
  - ❑ Exogenous : public expenditure, current account balance, capital specific to each sector, public saving
  - ❑ Endogenous : real exchange rate, indirect tax rates

# Overview of Analytical Framework

## □ Microsim 2: Poverty module

- Updating expenditure per capita following each simulation
  - For non-targeted households, the changes in expenditure per capita come from changes in labor and capital income
  - For targeted FH, the change is computed from Microsim 1
- Adjust the updated consumption per capita using household-specific price index
- Compute FGT and Gini indices, Growth incidence curve (Ravallion & Chen, 2003).



# Context, Data and Scenarios

## □ Context

- Malawi (Southeastern Africa), one of poorest countries in the world.
  - Poverty rates: 51.50 % (2016); 50.7% (2019), *World Development Indicators (2022)*
  - Agriculture
    - 1/3 of GDP- employs 80% of population. (*Schuenemann et al., 2018*)
    - 72% of land to food production (cereals mostly), dominated by small farmers. (*Matchaya, 2012*)
    - Rainfed production (low level of irrigation and mechanization)=> low productivity
- Country's development agenda includes
  - Increase productivity and make small farmers market oriented
  - 10% of public expenditure to agriculture (objective of Comprehensive Africa Agriculture Development Program)
  - Launch of Farm inputs Subsidy Program (FISP) in 2005
    - Allowed 1.5 millions small farmers to access to inorganic fertilizer and improved seed (*Arndt, et al., 2016*). Limited impact due to targeting issues.
    - Ended in 2019
  - Launch of Affordable Inputs Program (AIP) in 2020/2021 to replace FISP and reach more famers (*Nyondo et al., 2021*).

## □ Data

- Microsim 1 and 2 : Integrated Household Survey (IHS4) for 2016/2017 (LSMS-ISA)- National representative survey
- CGE: Social Accounting Matrix for 2014 (IFPRI, 2017)

# Context, Data and Scenarios

## □ Data-Categories of FH

- Almost 95.7% of farmers produce only or partly cereals.

Variables	Description	Proportion (%)
Regime 1	Seller on cereal and labor markets	5.2
Regime 2	Cereals seller and labor buyer	1.8
Regime 3	Cereals seller and autarky on the labor market	3.7
Regime 4	Cereals buyer and labor seller	5.9
Regime 5	Buyer on cereal and labor markets	1.2
Regime 6	Cereals buyer and autarky on the labor market	2.8
Regime 7	Autarky on cereals market and labor seller	37.1
Regime 8	Autarky on cereals market and labor buyer	3.2
Regime 9	Autarky on cereals and labor markets	22.0

# Context and Scenarios

## ❑ Scenarios

- ❑ Affordable Inputs Program (AIP) since 2020/2021 → reach the maximum of smallholder farmers.
  - ❑ Access to inorganic fertilizer and provision of improved seeds (maize)
    - ❑ We don't consider the improved seeds component.
- ❑ Sim1 : **extension** of inorganic fertilizer use (50% of land) by producers
  - ❑ i.e non-users of fertilizer, who have labor surplus and are absent from cereal market- **regime 7**
- ❑ Sim 2 : **extension** of inorganic fertilizer use (50% of land) by producers
  - ❑ non-users of fertilizer and excluded from markets- **regime 9**
- ❑ Sim 3: Sim1 + extension of mechanization (20%).

# Results

## □ Farm Households Responses

Transition Matrix (%)

		Before simulation		
		Sim1	sim2	sim3
After simulation		Regime 7	Regime 9	Regime 7
	Regime 1	0.0	0.0	0.2
	Regime 2	0.0	0.1	0.0
	Regime 3	11.7	5.0	23.9
	Regime 4	7.9	17.5	3.0
	Regime 5	0.0	0.0	0.0
	Regime 6	0.0	0.0	0.0
	Regime 7	77.9	0.7	48.5
	Regime 8	2.6	8.7	7.1
	Regime 9	0.0	68.1	17.2

Variation of Cereal Production and Labor Supply (%)

	Sim1	Sim2	Sim3
Changes in cereal production	2.0	0.9	5.6
Changes in farm labor supply	5.3	-2.1	17.9

# Results

## □ Sectorial Implications

	Value Added(%)			Labor Demand(%)			Market Price(%)			Capital Return(%)		
	sim1	sim2	sim3	sim1	sim2	sim3	sim1	sim2	sim3	sim1	sim2	sim3
Cereals	2.6	0.2	7.4	2.1	-2.3	6.3	-4.1	0.2	-12.3	-5.4	0.5	-17.0
Tobacco	0.3	-0.3	1.0	0.9	-0.8	3.0	-2.2	0.9	-6.8	-6.5	2.0	-19.6
Mining	-1.4	0.4	-4.5	-0.8	1.3	-4.3	0.7	-0.3	2.4	-1.0	0.2	-3.0
Transportation	-0.3	0.2	-1.1	-4.3	0.7	-12.5	1.2	-0.2	3.5	1.2	-0.2	3.4
Communication	-0.3	0.2	-1.2	-0.8	0.5	-3.0	1.4	-0.3	4.5	1.4	-0.4	4.4
Finance, assurance	-0.3	0.1	-1.0	-1.0	0.5	-3.4	1.3	-0.4	4.3	1.2	-0.5	4.0
Business services	-0.5	0.2	-1.5	-0.7	0.2	-2.4	0.1	0.0	0.2	-0.8	0.3	-2.8
Public services	-1.4	0.4	-4.5	-0.8	0.9	-3.5	1.5	-0.4	4.7	1.1	-0.5	3.9
Education	-0.8	0.2	-2.5	-2.7	0.9	-8.8	1.2	-0.2	3.8	0.4	-0.1	1.3
Health	-1.1	0.4	-3.7	-1.4	0.4	-4.5	1.4	-0.4	4.5	1.0	0.1	2.6

# Results

## □ Macroeconomic Implications

Variables	sim1	sim2	sim3
GDP	0.2	0.0	0.3
Investment	0.2	0.1	0.5
Firms' income	0.4	0.1	0.7
Government's income	1.2	1.2	1.7
Farm wage	-7.3	2.8	-21.9
Nonfarm wage	2.0	-0.7	6.6
Equivalent Variation, farm households	1.2	1.0	1.8
Equivalent Variation, non-Farm households	0.5	-0.7	2.5

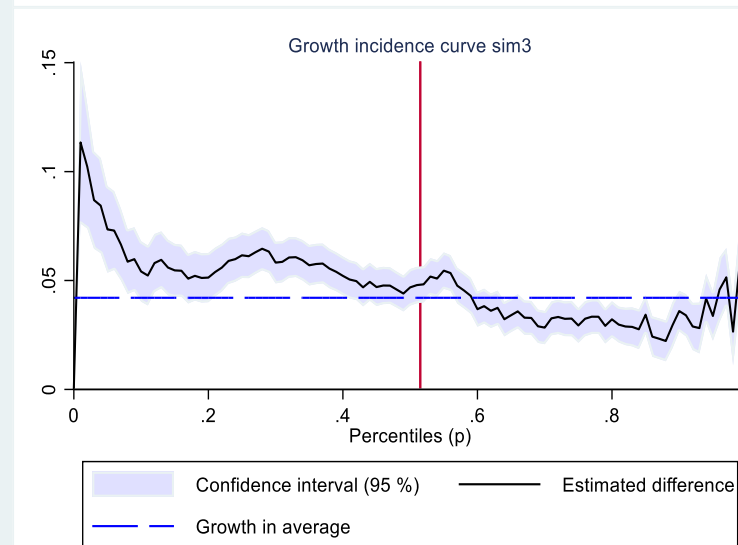
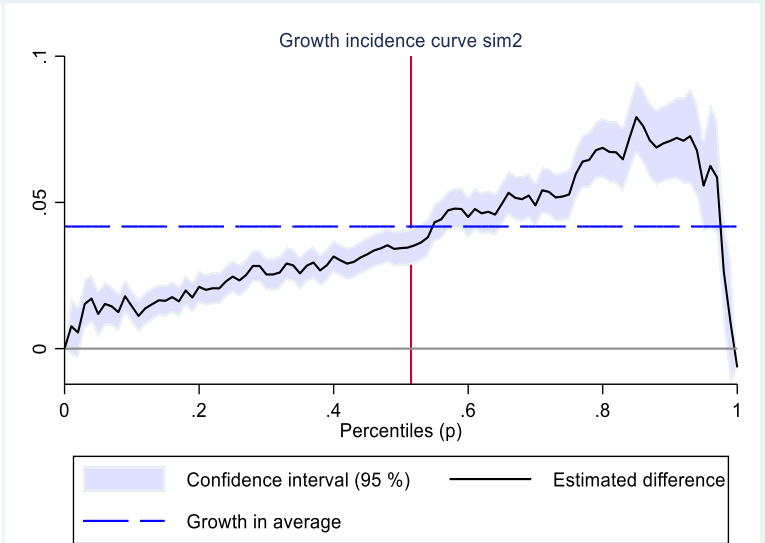
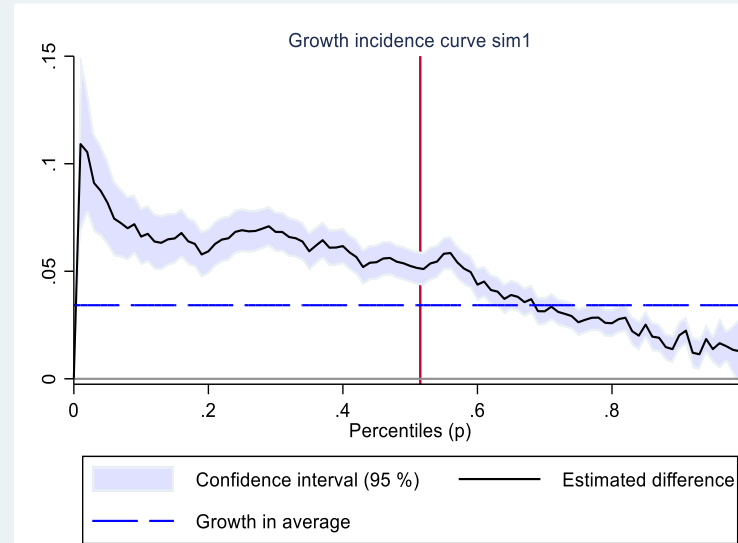
# Results

## □ Poverty and Inequality

National				
	FGT0	Diff	Gini	Diff
Reference	52.0		41.0	
Sim I	48.0	-4.0	40.0	-1.0
sim2	50.0	-2.0	41.0	0.0
Sim3	49.0	-3.0	40.0	-1.0

Farmers				
	FGT0	Diff	Gini	Diff
Reference	57.0		33.0	
Sim I	53.0	-4.0	31.0	-1.0
sim2	54.0	-3.0	34.0	2.0
Sim3	55.0	-2.0	31.0	-1.0

Non-Farmers				
	FGT0	Diff	Gini	Diff
Reference	39.0		49.0	
Sim I	37.0	-1.0	49.0	0.0
sim2	39.0	1.0	49.0	0.0
Sim3	34.0	-5.0	48.0	-1.0



# Conclusion

- ❑ First study that integrates FMP model into CGE-MS framework
  - ❑ Considers both extensive and intensives margins.
  
- ❑ As for our results, we find that the indirect effects of participation in markets result in:
  - ❑ An increase in social welfare and a decrease in inequality.
  - ❑ A positive contribution to the development process (growth and welfare).
  
- ❑ However, the agricultural marketing policy :
  - ❑ May raise inter-sectoral constraints that limit its contribution
    - ❑ Labor reallocation effect and GE price effects