The Impact of Agricultural Price Distortions on Inequality and Poverty in South Africa

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Outline

- Objectives and motivation
- Main characteristics of the models
- The sequential approach
- Overview of the (preliminary) results
- Conclusion

Objectives and motivation

Objective:

- Evaluate the impact of trade liberalisation on poverty and inequality in South Africa
- Analyse the role of agricultural trade and the distortions it faces

Motivation:

- Doha round is said to be the “development round”
- The protection of agricultural markets in rich countries is pointed out for its negative effects on developing countries
- Commitment of the South African government toward trade liberalisation
- 1/3 of the population in extreme poverty
- High income inequality (Gini = 0.67)

Main difficulties

- Trade liberalisation = macroeconomic phenomenon
- Poverty and inequality = microeconomic phenomenon

Proposed approach:

- Combine a computable general equilibrium (CGE) model with a microsimulation (MS) model using a “top-down” sequential approach

Why combining a CGE and a microsimulation model?

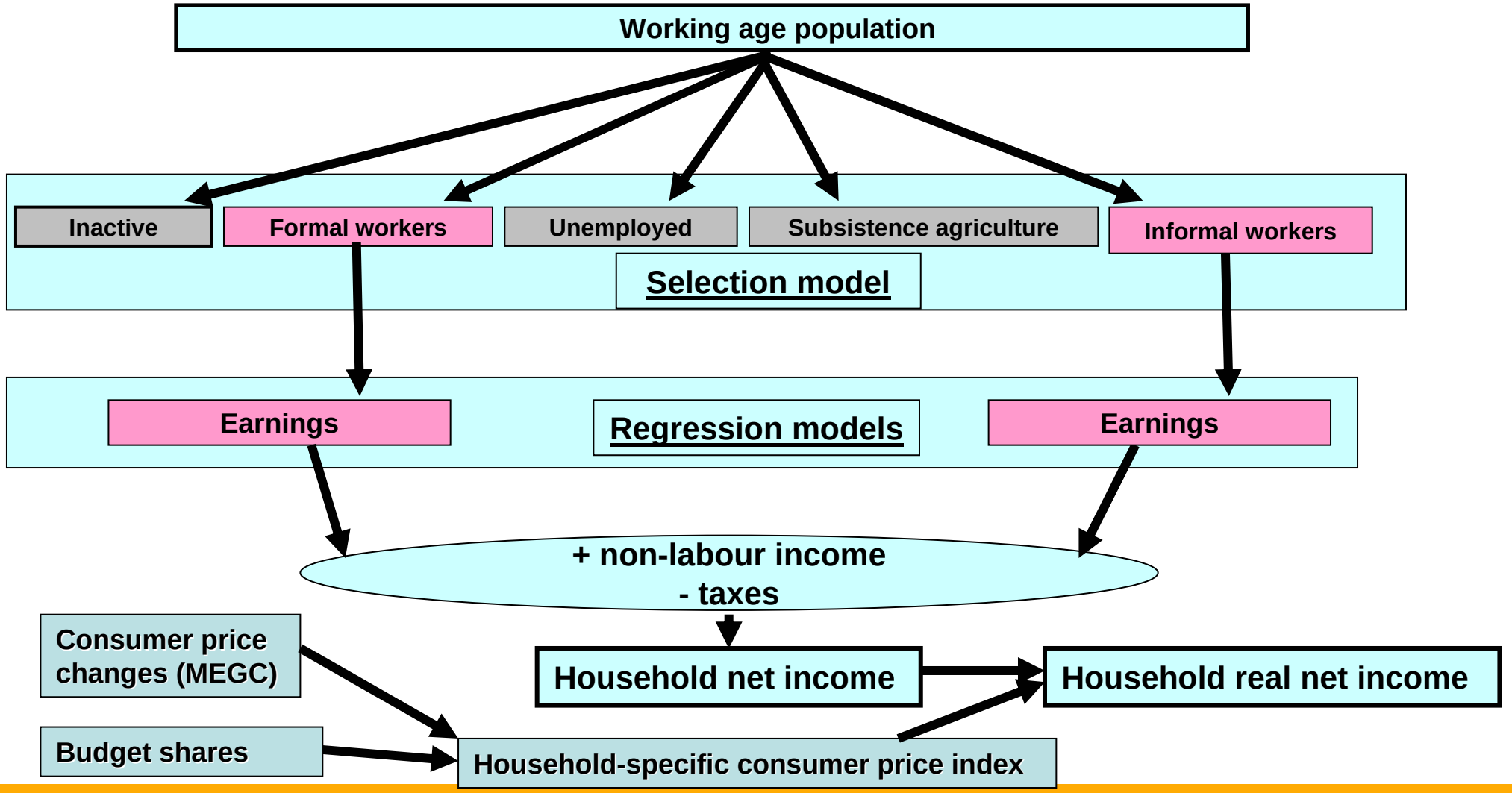
- Conventional approach relies on a single CGE model…
- …but the drawbacks are important, especially when dealing with poverty and inequality issues:
  - ☞ unavoidably limited number of representative household groups (RHG)
  - ☞ exogeneity assumptions about within-RHG income distribution
- …which means that CGE models are not the most appropriate tools to assess poverty and inequality impacts
- Advantages of using a microsimulation model:
  - avoid using the representative agent assumption
  - take into account the diversity of individual behaviours
  - measure within-group income distribution changes

Main characteristics of the models

- **MICRO**
  - Behavioural static microsimulation
  - Data: Income and Expenditure Survey of 2000 & Labour Force Survey of September 2000
  - 26,230 households, 103,840 individuals
  - 52,144 individuals aged between 15 and 65 in the behavioural component of the model
  - 5 occupational choices:
    - Inactive
    - Unemployed
    - Subsistence Agriculture
    - Informal worker
    - Formal worker

- **MACRO**
  - Static Computable General Equilibrium
  - Data: Social Accounting Matrix for 2002
  - 110 sectors including 17 agricultural & 12 food processing sectors (but no informal sector)
  - 4 factors of production:
    - 3 types of labour:
      1. skilled
      2. semi-skilled
      3. low-skilled
    - sector specific capital

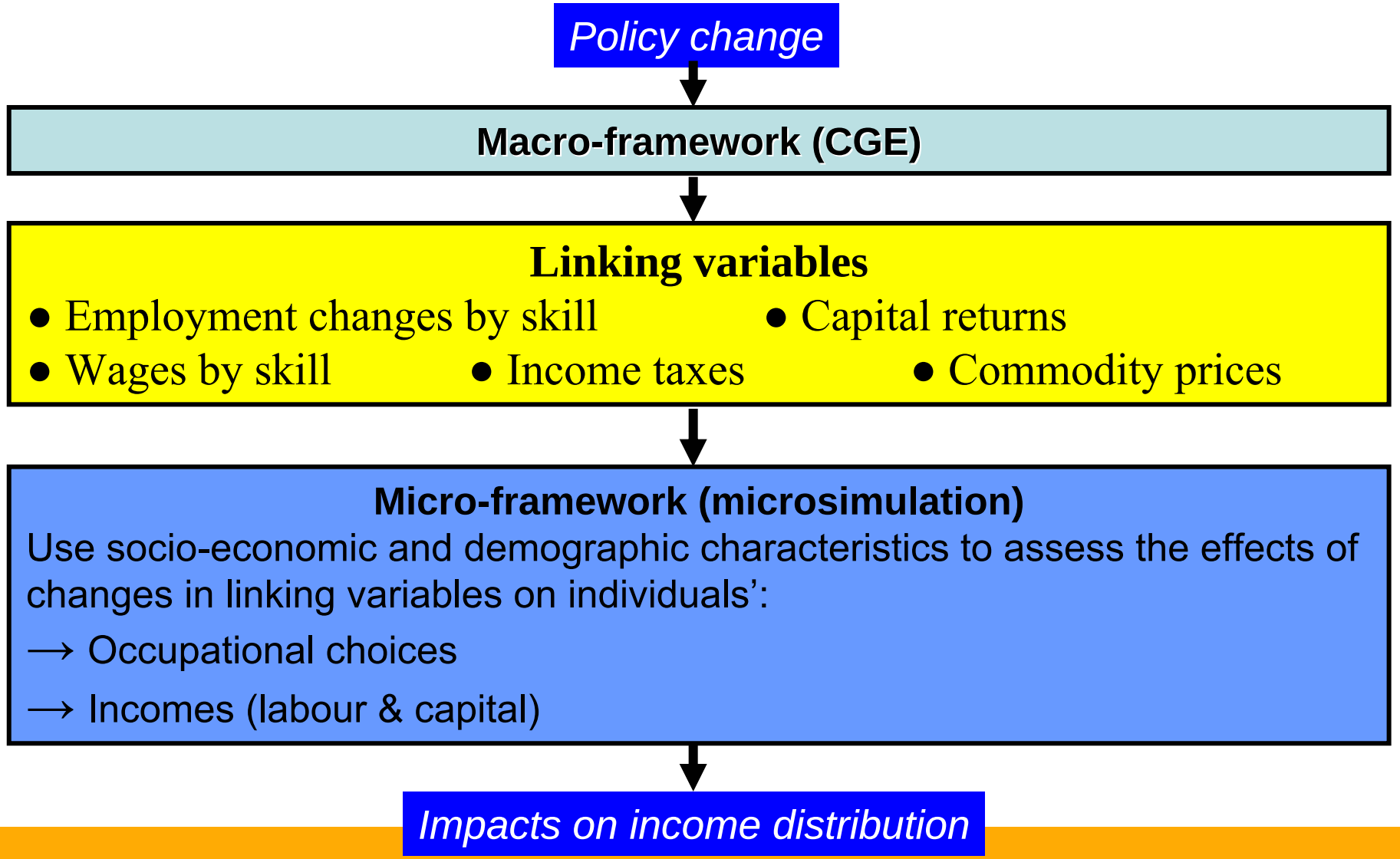
Microsimulation (MS) model



The selection model

- Multinomial Logit Model used to determine occupational choices
  - Individual-level implicit utility function for each occupational choice *j*:
    - $U_{ij} = a_j + Z_{ij}.B_j + \mu_{ij}$
      - where: Z_{ij} = set of individual characteristics
  - Where:
    - $Z_{ij}.B_j = SK_i.B1_j + SS_i.B2_j + PNE_{ij}.B3 + \ldots$
      - where: SK_i indicates skilled level
        SS_i indicates semi-skilled level
        PNE_{ij} predicted net income in sector *j*

The sequential top-down approach



Micro-macro consistency

- Objective = transmit the changes in prices, earnings, capital return, income taxes and employment levels from the CGE to the microsimulation model
  - Prices and capital return:
    - changes from the CGE model are directly passed on to the MS model (where prices and capital return are exogenous)
  - Income taxes:
    - Exogenous in microsimulation model →Direct transmission of CGE changes
    - But iterative process necessary to ensure consistency of total income taxes in both models
  - Formal earnings:
    - Use average changes in formal earnings by skill level as estimated by the CGE to update potential formal earnings of all working-age individuals
  - Informal earnings:
    - Difficulty: no informal sector in the CGE model
    - The changes in potential informal earnings by skill level are **defined relative to the changes in total formal earnings and total formal employment levels** (as estimated by the CGE model), using elasticities estimated by the microsimulation model
    - More info later

Micro-macro consistency

- Transmission of employment changes:
  - Difficulty: employment is endogenous in both models
  - **Formal sector**: Need to impose some constraints on the aggregate results of the MS model in order to reproduce the numbers obtained from the CGE model
    - adjust the constant a_{FS} and the coefficients $B1_{FS}$ and $B2_{FS}$ associated with skill level in the equation defining the utility level in the formal sector ($U_{i,FS}$)
    - iterative process
  - **Changes in other labour market segments**: Mobility across sectors is freely determined by the MS model at the individual level
    - No macro constraint on aggregates
    - Mobility depends on household and individual characteristics and changes in potential earnings and non-labour income (and indirectly on changes in formal employment)

Main assumptions

- Macro (CGE)
  - Capital and skilled labour: mobile, fully employed (fixed supply), flexible real wages/return
  - Semi-skilled and low-skilled labour: mobile, unemployment (flexible supply), fixed nominal wages
  - Fixed fiscal deficit (adjustment through income taxes)

- Micro (Microsimulation)
  - Relationship between formal and informal sector: **informal earnings** depend positively on total formal earnings and total formal employment
    - Implicit assumptions:
      - Total formal earnings = main determinant of consumption of informal goods and services
      - Formal employment expansion draws on informal workers → positive effect on informal wages

Micro data

South African population and the labour market (in 1000s)

	Blacks	Coloureds	Asians	Whites	TOTAL	Rural	Urban
Inactive[a]	22,857	2,425	642	2,107	**28,032**	14,327	13,705
Unemployed	3,356	282	69	99	**3,806**	1,306	2,500
Subsistence agriculture	704	19	1	12	**736**	629	107
Informal workers[b]	2,935	268	32	122	**3,357**	1,540	1,817
Formal workers	4,327	1,019	359	1,602	**7,307**	1,840	5,466
TOTAL	**34,180**	**4,013**	**1,104**	**3,941**	**43,238**	**19,643**	**23,595**

Income distribution

	Blacks	Coloureds	Asians	Whites	TOTAL	Rural	Urban
Income per capita[a]	6,268	10,695	19,824	48,495	**10,874**	5,139	15,649
Headcount Index ($1/day)[b]	12.1	1.9	0.5	0.0	**9.8**	16.7	4.0
Headcount Index ($2/day)[c]	35.6	10.3	1.1	0.2	**29.2**	46.4	14.8
Gini	0.59	0.51	0.47	0.47	**0.67**	0.63	0.62

Note: (a) Average annual disposable income per capita in Rand (b) R87/month/capita in 2000 prices (b) R174/month/capita in 2000 prices.

Source: Authors' calculations from IES 2000 and LFS 2000:2

South Africa and international trade

	GDP	Imports			Exports		
	share	Share	Intensity (%)	Tariff (%)	Share	Intensity (%)	Tax rate (%)
Total	100	100	13.3	5.3	100	13.2	0.8
Agriculture	**4.3**	**1.8**	**8.1**	**4.8**	**4.3**	**17.3**	**0.1**
Summer cereals	0.5	0.2	5.0	1.0	0.3	7.9	0.0
Winter cereals	0.2	0.4	23.3	14.6	0.0	2.4	0.0
Oilseeds & legumes	0.1	0.1	14.0	4.1	0.0	4.3	0.0
Fodder crops	0.0	0.0	2.4	2.5	0.1	28.2	0.0
Sugarcane	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Cotton & tobacco	0.1	0.4	91.8	3.9	0.3	95.0	0.0
Vegetables	0.3	0.0	0.3	2.8	0.1	7.0	0.0
Fruits	1.0	0.1	6.7	2.8	**2.8**	58.9	0.0
Livestock	1.6	0.3	2.8	0.5	0.4	4.5	0.0
Fishing	0.0	0.1	95.8	1.7	0.1	97.3	2.0
Forestry	0.3	0.2	15.1	1.7	0.2	10.7	2.0
Industry	33.1	**86.1**	22.1	6.2	**80.9**	22.5	0.9
Mining	8.4	11.0	43.1	0.1	31.4	67.7	1.8
Manufacturing	20.0	75.1	23.3	7.2	49.4	18.4	0.4
Other industry	4.8	0.1	0.2	0.0	0.1	0.1	0.3
Private services	**47.6**	12.1	4.3	0.0	14.9	4.9	0.0
Public services	**15.0**	0.0	0.0	0.0	0.0	0.0	0.0

The 4 scenarios

1. Global trade liberalisation (**all commodities , all countries except South Africa**)

2. Global trade liberalisation of **only agricultural commodities (all countries except SA)**

3. Domestic trade liberalisation **(all commodities , SA only)**

4. Domestic trade liberalisation of **only agricultural commodities (AS only)**

Main results (preliminary)

- Scenario 1 (liberalisation of all products, rest of the world)
  - Small positive impact on GDP (+0,3%) but negative impact on agriculture
  - Growth in formal low-skilled employment in services leads to a small decrease in poverty
  - Decrease in consumer prices also contributes to poverty alleviation
- Scenario 2 (liberalisation of agricultural products, rest of the world)
  - Small positive impact on GDP (+0,2%) but < scenario 1
  - Positive impact on agriculture (< scenario 1)
  - Similar decrease in poverty despite smaller increase in employment because of the more pro-poor reduction in consumer prices
- Scenario 3 (liberalisation of all products, SA only)
  - Positive impact on GDP (+0,7%) and on agriculture (+1,3%)
  - Larger decrease in poverty largely based on the increase in formal low-skilled and semi-skilled employment
- Scenario 4 (liberalisation of agricultural products, SA only)
  - GDP largely unchanged but negative impact on agriculture
  - Minor decrease in poverty largely due to decreasing agricultural prices

Limitations and advantages

- Advantages:
  - Microsimulation accounts for the heterogeneity of individuals' behaviour with respect to labour market choices
    - Avoid using representative agent assumptions
    - Identification of winners and losers at the household level
    - Allow in-depth analysis of poverty and inequality issues
  - Flexible approach allowing the linking of complex models developed separately

- Limits:
  - Lack of theoretical and empirical consistency between the macro and the micro parts of the model
    - For instance: no informal sector in the CGE model
  - Limited number of production factors in the CGE (4 factors)
  - Top-down approach: no feedback from the MS model to the CGE model

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