



Agricultural Prices, Household Wellbeing, and Poverty Alleviation

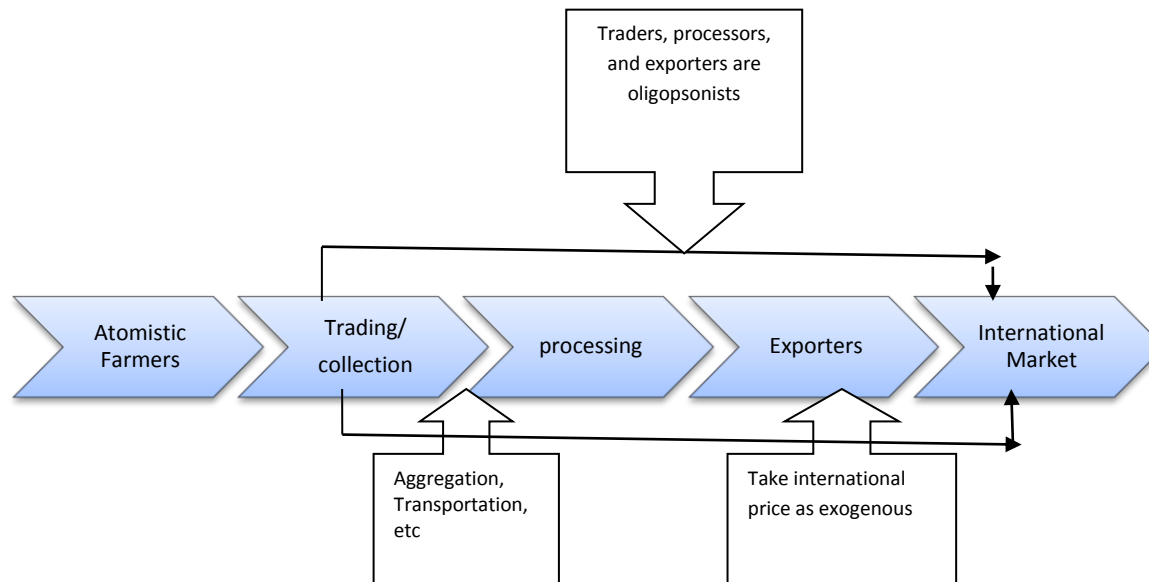
The Role of Agricultural Supply Chains and Household Constraints

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Motivation

(1 of 2)

- ❑ Agricultural productivity in Africa is one third of that of Asia
- ❑ Part of the problem lies in market structures and poor institutions, policies, and infrastructure.



Motivation

(2 of 2)

- ❑ Cash crops (coffee, cocoa, cotton, tobacco, vanilla, etc.) are a major source of export revenue.
- ❑ Food crops (maize, cassava, millet, sorghum, rice, etc.) constitute the dietary base for most smallholder farmers.
- ❑ Like in the case of cash crops, food products are also commercialized along a supply chain that includes farmers, silo owners, intermediaries, and food processors.

Objective

Our overall objective is to study market and institutional constraints affecting further development of the traditional agriculture export sector (cash crops) and the import-substitution agriculture sector (food crops)

- how constraints affect poverty and inequality reduction
- food security issues
- and the development of a competitive agribusiness sector

Methodology

- ❑ First part: three building blocks
 - ❑ Model of supply chains
 - ❑ Calibration and simulation of competition and farm constraints
 - ❑ Welfare and poverty impacts
- ❑ Use simulation analysis to isolate and quantify the effect of changes in the level of competition in domestic markets on household income.
- ❑ Investigate the role played by household constraints and institutions.
- ❑ Second part: role of Grassroots Institutions (GRI) in alleviating constraints

Stylized Facts

- ❑ Farmers produce:
 - ❑ Cash crops (for export)
 - ❑ Food crops
 - ❑ Compete locally with imports
 - ❑ Compete internationally as exports

- ❑ They sell through intermediaries (imperfect competition)

Model

(1 of 2)

❑ Farmers maximize utility

$$U_i = \vartheta_i h_i^\alpha + d_i$$

- there is decreasing marginal utility of AC (h)
- this depends on food security “risk”
- households enjoy monetary income d_i

❑ Subject to a linear endowment constraint:

$$e_i = h_i + f_i + c_i$$

Model

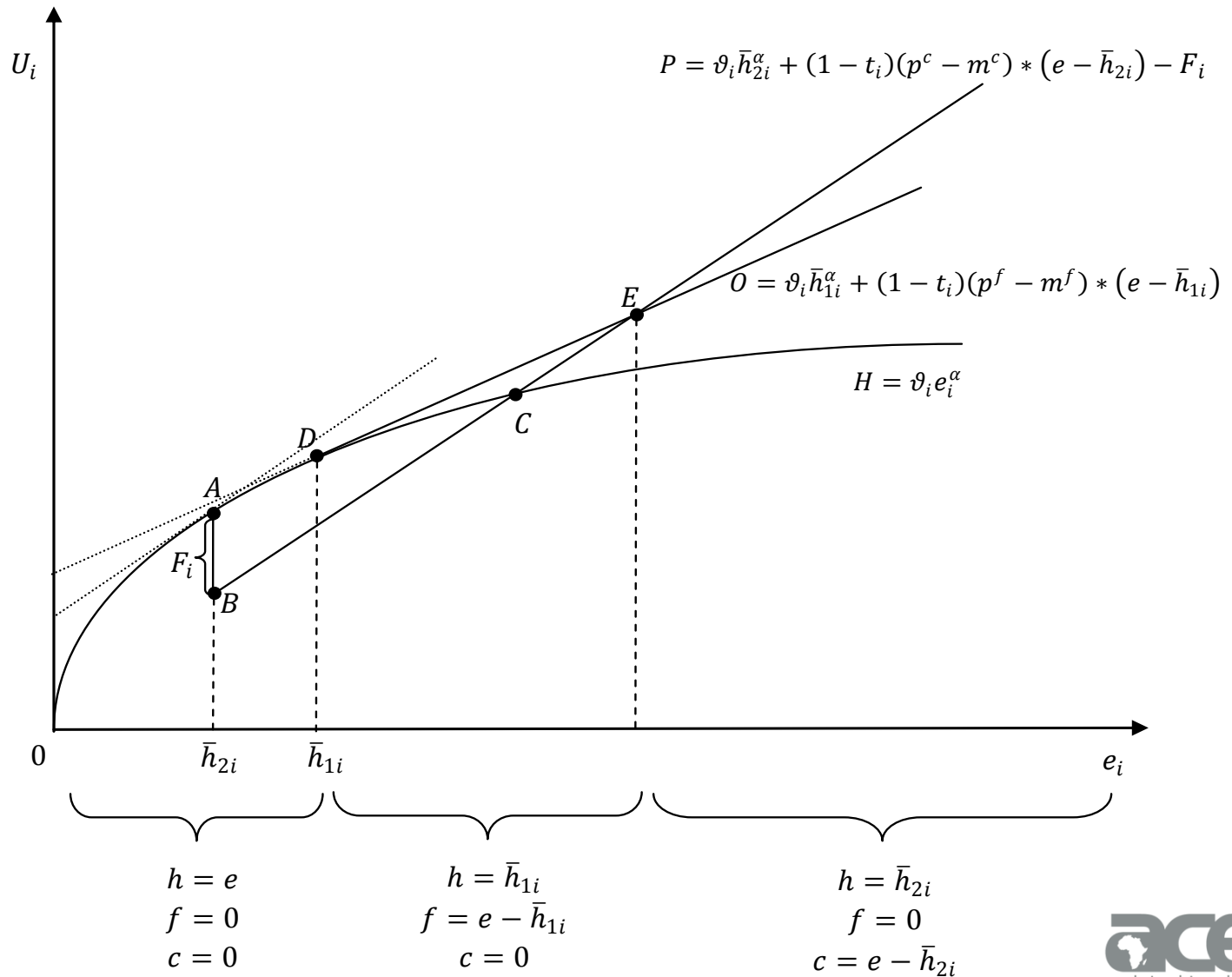
(2 of 2)

- d_i consists of

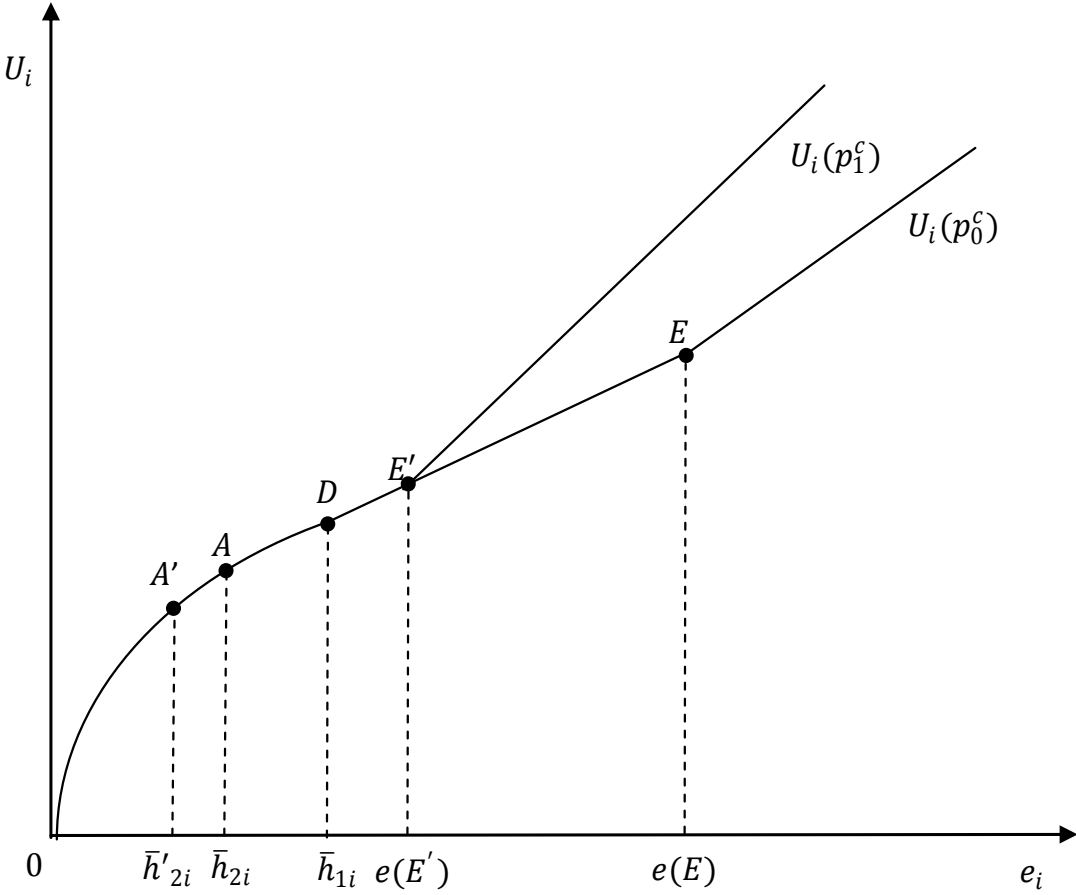
$$d_i = (1 - t_i)(p^f - m^f) * f_i + (1 - t_i)(p^c - m^c) * c_i - F_i$$

- Where
 - f , p^f , m^f food crop quantity, price and marginal cost, respectively
 - c , p^c , m^c cash crop quantity, price and marginal cost
 - t transport cost
 - F fixed cost of producing crops for export.

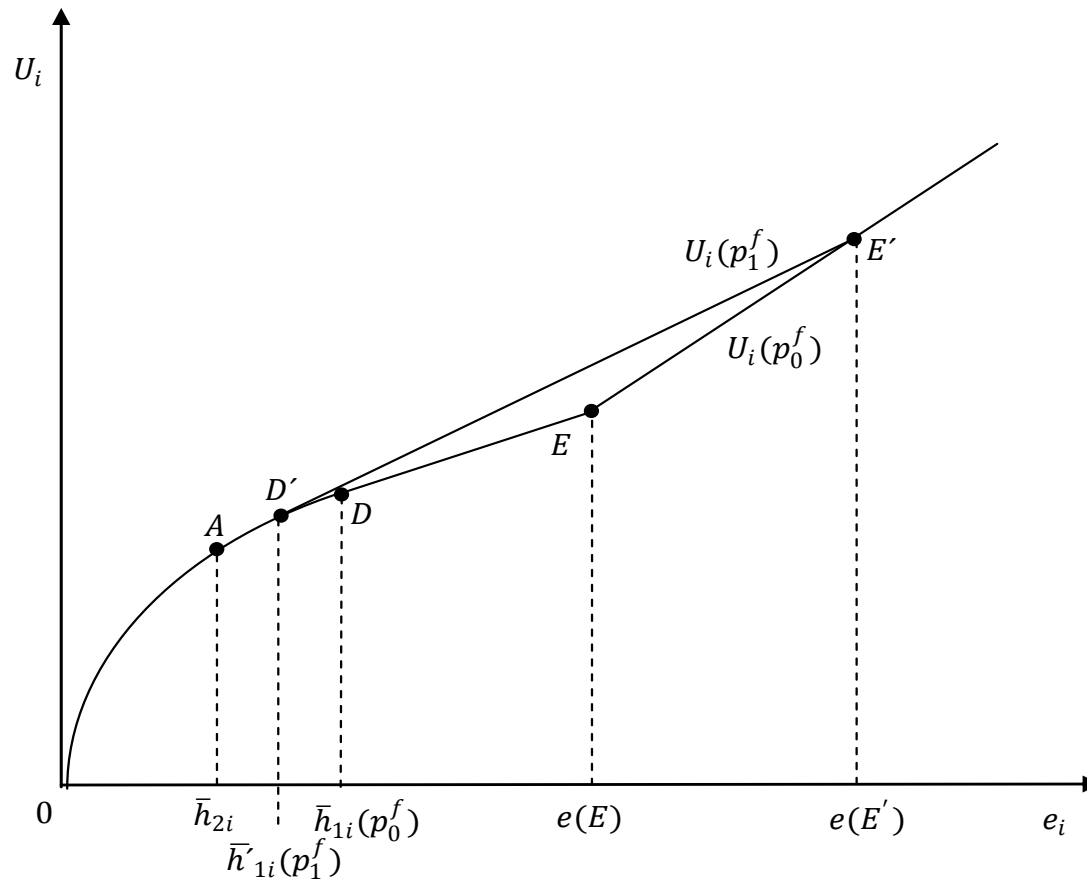
Graphical Solution



Increase in P_c



Increase in Pf



Oligopsonist problem

- n oligopsonists buy the crop from farms and sell them abroad for international price P^c .
- They maximize profits:

$$\pi(P^c, p^c, u_j^c) = \max_{c_j} (P^c - p^c - u_j^c) \cdot c_j,$$

- Where
 - u_j^c is the marginal cost of production for the oligopsonist j .
 - C_j is the quantity demanded

Solution

- ❑ We calibrate the model with country-crop-specific data
 - ❑ Market shares
 - ❑ Production, export, import
 - ❑ Farm gate price, domestic market price, international price
 - ❑ Farmer's margin
- ❑ Then we must solve the model numerically
- ❑ Once it is done, we shock equilibrium to generate comparative static results
- ❑ Together with data from national surveys, we use the results to generate welfare analysis
- ❑ Tanzania: cotton, maize, rice, and cassava

Results (Farm Gate Price): Cotton

	Baseline	Leader Split	Leaders merge	Exit of largest	Equal market shares	Perfect Competition
<i>Competition Policy</i>	0.00	2.56	-3.44	-3.52	1.55	18.17
Increase of 10% in:						
<i>International Price</i>	18.82	22.06	14.32	14.20	20.40	40.90
<i>Marginal Cost of Producing Cash Crop</i>	0.61	3.11	-2.27	-2.40	2.22	18.18
<i>Fixed Cost of Producing Cash Crop</i>	0.56	3.10	-2.40	-2.51	2.13	18.18
<i>Household Resources (endowment)</i>	-2.21	0.59	-5.82	-5.97	-0.78	18.18
<i>Risk and Food Security Parameter</i>	2.81	4.88	0.24	0.15	4.28	18.18
<i>Food Crop Price</i>	0.40	2.81	-2.63	-2.72	1.94	18.18
<i>Marginal Cost of Producing Food Crop</i>	-0.17	2.45	-3.67	-3.77	1.41	18.18
<i>Non-Farmer demand</i>	-	-	-	-	-	-

Results: Cassava

	Baseline	Leader Split	Leaders merge	Exit of largest	Equal market shares	Perfect Competition
<i>Competition Policy</i>	0.00	0.06	-0.06	-0.06	0.00	1.28
Increase of 10% in:						
<i>International Price</i>	11.59	11.69	11.48	11.48	11.59	13.78
<i>Marginal Cost of Producing Cash Crop</i>	-0.03	0.03	-0.10	-0.10	-0.03	1.28
<i>Fixed Cost of Producing Cash Crop</i>	-0.33	-0.26	-0.41	-0.41	-0.33	1.28
<i>Household Resources (endowment)</i>	0.18	0.23	0.13	0.13	0.18	1.28
<i>Risk and Food Security Paremeter</i>	0.68	0.71	0.66	0.66	0.68	1.28
<i>Cash Crop Price</i>	0.83	0.85	0.81	0.81	0.83	1.28
<i>Marginal Cost of Producing Food Crop</i>	0.16	0.20	0.11	0.11	0.16	1.28
<i>Non-Farmer demand</i>	0.07	0.13	0.01	0.01	0.07	1.28

Results: Maize

	Baseline	Leader Split	Leaders merge	Exit of largest	Equal market shares	Perfect Competition
<i>Competition Policy</i>	0.00	-0.02	0.02	0.02	0.00	-0.44
Increase of 10% in:						
<i>International Price</i>	8.43	8.44	8.42	8.42	8.43	8.65
<i>Marginal Cost of Producing Cash Crop</i>	-0.17	-0.18	-0.16	-0.16	-0.17	-0.44
<i>Fixed Cost of Producing Cash Crop</i>	-0.18	-0.19	-0.17	-0.17	-0.18	-0.44
<i>Household Resources (endowment)</i>	0.24	0.21	0.27	0.27	0.24	-0.44
<i>Risk and Food Security Paremeter</i>	0.38	0.35	0.42	0.42	0.38	-0.44
<i>Cash Crop Price</i>	0.84	0.79	0.91	0.91	0.84	-0.44
<i>Marginal Cost of Producing Food Crop</i>	0.15	0.12	0.18	0.18	0.15	-0.44
<i>Non-Farmer demand</i>	0.03	0.01	0.05	0.05	0.03	-0.44

Results: Rice

	Baseline	Leader Split	Leaders merge	Exit of largest	Equal market shares	Perfect Competition
<i>Competition Policy</i>	0.00	-0.03	0.04	0.04	0.00	-0.85
Increase of 10% in:						
<i>International Price</i>	8.84	8.81	8.87	8.87	8.84	8.24
<i>Marginal Cost of Producing Cash Crop</i>	-0.09	-0.12	-0.05	-0.05	-0.09	-0.85
<i>Fixed Cost of Producing Cash Crop</i>	-0.03	-0.06	0.02	0.02	-0.03	-0.85
<i>Household Resources (endowment)</i>	-0.03	-0.06	0.02	0.02	-0.03	-0.85
<i>Risk and Food Security Parameter</i>	0.14	0.09	0.19	0.19	0.14	-0.85
<i>Cash Crop Price</i>	0.23	0.18	0.29	0.29	0.23	-0.85
<i>Marginal Cost of Producing Food Crop</i>	0.10	0.05	0.15	0.15	0.10	-0.85
<i>Non-Farmer demand</i>	0.11	0.06	0.16	0.16	0.11	-0.85

First-Order Welfare Impacts

- ❑ With the price changes from the simulations and the income and budget shares from the household surveys, we measure welfare impacts
- ❑ First order approximation: works well for small price changes
- ❑ We calculate average impacts for all the populations, the poor and the non-poor

Welfare Impacts: Cotton

	Baseline	Leader Split	Leaders merge	Exit of largest	Equal market shares	Perfect Competition
Total						
<i>Competition Policy</i>	0.00	0.02	-0.03	-0.03	0.01	0.16
<i>International Price</i>	0.17	0.20	0.13	0.13	0.18	0.37
Poor						
<i>Competition Policy</i>	0.00	0.01	-0.02	-0.02	0.01	0.08
<i>International Price</i>	0.08	0.10	0.06	0.06	0.09	0.18
Non Poor						
<i>Competition Policy</i>	0.00	0.04	-0.05	-0.06	0.02	0.29
<i>International Price</i>	0.30	0.35	0.23	0.23	0.32	0.65
Producers						
<i>Competition Policy</i>	0.00	0.44	-0.59	-0.60	0.26	3.11
<i>International Price</i>	3.22	3.77	2.45	2.43	3.49	6.99

Welfare Impacts

(1 of 2)

- ❑ Increased competition and complementary policies in cotton show positive welfare impacts across households.
- ❑ The impacts are large for cotton producers.
- ❑ Even though there is net production of cassava, competition and higher prices create (small) welfare losses because of the distribution of consumption shares.
- ❑ Higher maize and rice prices (due to lower competition in the supply chain) create welfare losses because these are staple crops.

Welfare Impacts

(2 of 2)

- ❑ Impacts are generally small
- ❑ This is standard in the literature
 - ❑ Price changes are typically small
 - ❑ Net benefit ratios are also small (For some crops, income shares or budget shares can be large, but the average net share is small)
- ❑ No discernible differences between poor and non-poor, in general (in part because of the small impacts)

Ongoing Simulations

	Burkina Faso	Ethiopia	Ghana	Malawi	Niger	Nigeria	Senegal	Tanzania	Uganda	Zambia	Total
Cassava			X			X		X	X		4
Cocoa			X								1
Coffee		X							X		2
Cotton	X			X				X		X	4
Cowpea							X				1
Dairy								X			1
Livestock	X				X				X		3
Maize	X	X	X	X	X	X	X	X	X	X	10
Millet					X	X	X		X		4
Poultry	X		X								2
Rice	X		X		X	X	X	X			6
Sorghum	X	X			X	X			X		5
Tobacco				X						X	2
Wheat		X									1
<i>Total</i>	6	4	5	3	5	5	4	5	6	3	46

Second Part

Role of GRI in Alleviating Constraints

- ❑ Part of the problem: Farm constraints
- ❑ Study how grassroot institutions come to life to alleviate these constraints
- ❑ Survey and classification of GRI in Africa
- ❑ Three micro case studies on GRI
 - ❑ Northern Ghana: Social Networks Analysis
 - ❑ Coffee quality upgrading in Uganda and Ethiopia: coordination problems to solve the provision of critical public goods and the lack of knowledge about characteristics of foreign demand
 - ❑ Not decided yet: volunteers?



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Asanteni Sana!