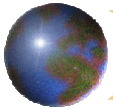


# Transmission of world food prices to African markets

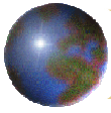
Nicholas Minot (IFPRI)

Presented at the Comesa policy seminar  
"Food price variability: Causes, consequences, and policy options"  
on 25-26 January 2010 in Maputo, Mozambique  
under the Comesa-MSU-IFPRI African Agricultural Markets Project (AAMP)

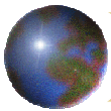
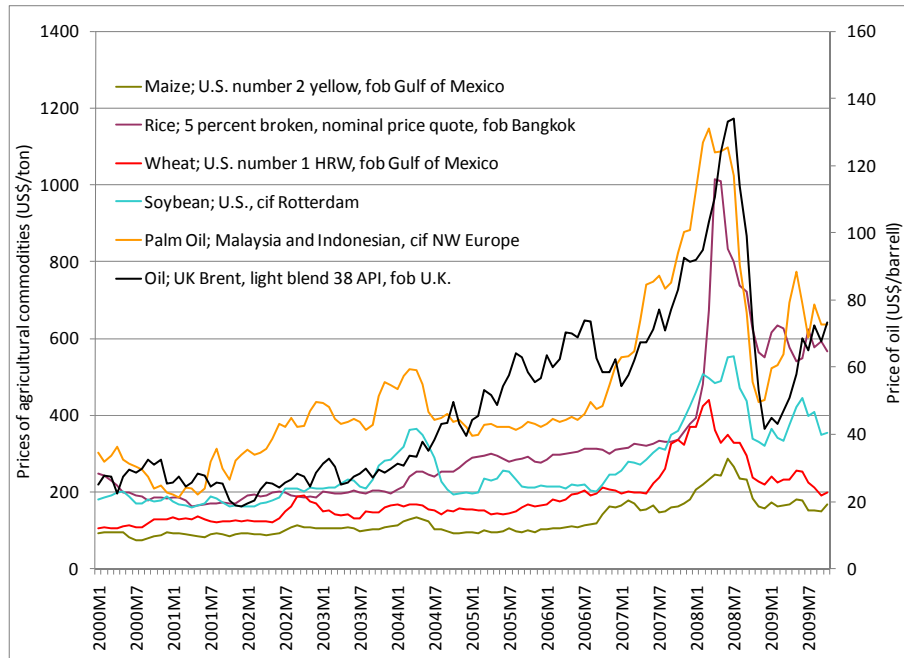


## Outline

- Motivation
- Previous research
- Price trends in 2007-2008
- Statistical analysis of price trends
- Discussion of results

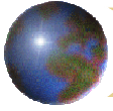


## Motivation



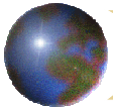
## Motivation

- If world price shocks are transmitted, then impact of global food crisis of 2007-08 more worrisome
- If world price shocks are not transmitted, then Africa is (at least partially) insulated from food price shocks



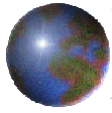
## Previous research

- Mundlak and Larson (1992)
  - International-local price transmission for 58 countries
  - Very high transmission, median elasticity 0.95
  - But statistical problem (non-stationarity)
- Quiroz and Soto (1996)
  - Similar data but 78 countries
  - Better statistical method (error correction model)
  - No long-run relationship (LRR) for 30 of 78 countries
  - No LRR for 7 of 16 African countries
- Conforti (2004)
  - Price transmission for 16 countries
  - Ethiopia: LRR for 4 of 7 commodities
  - Ghana: no LRR for maize and sorghum
  - Senegal: LRR for rice but not maize



## Description of trends

- Data
  - 83 prices
  - Maize, rice, wheat, beans, sorghum, and teff
  - Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mali, Mozambique, Senegal, South Africa, Tanzania, Uganda, and Zambia
  - Source: FAO GIEWS
- Method
  - Calculate ratio of % increase in domestic price increase over the % increase in world price over June 2007 to June 2008
  - Example: If domestic price of maize rises 40% and world maize price rises 80%, then ratio is 50%

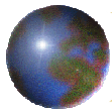


## Description of trends

### Eastern Africa

- Ethiopia – price increases 83-184%, larger than increases in world markets
- Kenya – 19-100%
- Rwanda – 36-64%
- Tanzania – 54-99%

Country	Market	Commodity	Type of market	Increase in domestic price converted to US\$	Increase in domestic price as a pct of the increase in world price
Ethiopia	Addis	Maize	Wholesale	184%	236%
	Addis	Teff	Wholesale	100%	111%
	Addis	Wheat	Wholesale	83%	141%
	Addis	White sorghum	Wholesale	121%	175%
	Jimma	Wheat	Wholesale	92%	156%
Kenya	Mekele	Wheat	Wholesale	132%	224%
	Busia	Beans	Wholesale	100%	112%
	Busia	Maize	Wholesale	62%	80%
	Eldoret	Beans	Wholesale	23%	26%
	Eldoret	Maize	Wholesale	55%	71%
	Kisumu	Beans	Wholesale	19%	21%
	Kisumu	Maize	Wholesale	56%	71%
	Mombasa	Beans	Wholesale	54%	60%
	Mombasa	Maize	Wholesale	74%	95%
	Nairobi	Beans	Wholesale	54%	60%
Rwanda	Nairobi	Maize	Wholesale	71%	91%
	Kigali	Beans	Wholesale	36%	40%
	Kigali	Maize	Wholesale	63%	81%
Tanzania	Kigali	Rice	Wholesale	64%	42%
	Dar es Salaam	Beans	Wholesale	54%	60%
	Dar es Salaam	Maize	Wholesale	99%	127%
	Dar es Salaam	Rice	Wholesale	71%	47%
Average				76%	97%

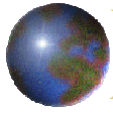


## Description of trends

### Southern Africa

- Malawi – Most prices rise more than 100%, but cassava constant
- Mozambique – 36-123%
- South African maize – 7-32%
- Zambia – 43-57%

Country	Market	Commodity	Type of market	Increase in domestic price converted to US\$	Increase in domestic price as a pct of the increase in world price
Malawi	Lilongwe	Maize	Retail	171%	219%
	Lilongwe	Rice	Retail	53%	35%
	Liwonde	Maize	Retail	164%	210%
	Lizulu	Maize	Retail	244%	313%
	Mzimba	Maize	Retail	174%	223%
Mozambique	Mzuzu	Cassava	Retail	-2%	-2%
	Mzuzu	Maize	Retail	156%	200%
	Mzuzu	Rice	Retail	29%	19%
	Nsanje	Maize	Retail	159%	203%
	Maputo	Maize	Retail	62%	79%
South Africa	Maputo	Rice	Retail	54%	35%
	Nampula	Cassava	Retail	36%	40%
	Nampula	Maize	Retail	123%	158%
	Johanesburg	Wheat	Wholesale	32%	54%
Zambia	Johanesburg	White maize	Wholesale	7%	9%
	Johanesburg	Yellow maize	Wholesale	9%	12%
	National avg	Maize	Retail	57%	73%
Zambia	National avg	Maize flour	Retail	56%	72%
	National avg	Wheat flour	Retail	43%	73%
Average				86%	107%



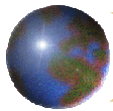
## Description of trends

### Summary by commodity

- Lowest price increases among non-tradable commodities: cassava, plantains, and beans.
- Highest price increases among major cereals: maize, rice, and wheat
- Generally less than world price increases, exceptions maize and wheat

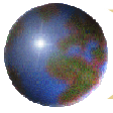
Commodity	Nbr of price series	Increase in domestic price (in US\$)	Increase in domestic price as a pct of the increase in world price
Beans	9	41%	45%
Cassava	5	12%	13%
Maize	26	87%	112%
Millet	5	43%	62%
Plantains	2	9%	9%
Rice	24	62%	41%
Sorghum	4	56%	81%
Wheat	7	65%	111%
Average	83	63%	71%

Source: Calculated based on data from FAO (2009b).



## Statistical analysis: Data & methods

- Data sources
  - International prices: FAO (<http://www.fao.org/es/esc/prices/PricesServlet.jsp?lang=en>)
  - Domestic prices: FEWS-NET and others
  - Monthly price data for nine sub-Saharan African countries
  - 62 price series (commodity-market combinations)
  - 5-10 years of monthly data, usually including 2008
- Methods
  - Convert domestic prices to real US\$ prices
  - Test for stationarity using ADF test
  - Test for cointegration (long-run relationship) using Johansen test
  - If long-run relationship, use error correction model

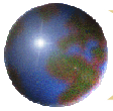


## Statistical analysis: Methods

- Methods – Model used

$$\Delta p_t^d = \alpha + \rho(p_{t-1}^d - \beta p_{t-1}^w) + \delta \Delta p_{t-1}^w + \theta \Delta p_{t-1}^d + \varepsilon_t$$

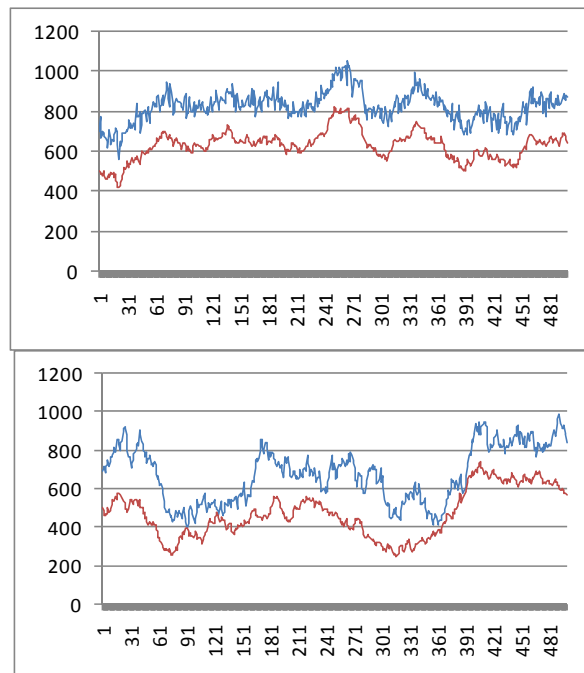
Change in domestic price  
 Error correction term (speed of adjustment)  
 Long-run relationship  
 Long-run elasticity of transmission  
 Short-run elasticity of transmission  
 Lagged change in world price  
 Lagged change in domestic price

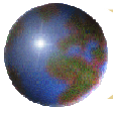


## Statistical analysis: Methods

### Illustration

- In both graphs, prices are co-integrated, meaning a long-term relationship
- In first graph, rapid adjustment to long-term relationship
- In second graph, slow adjustment to long-term relationship

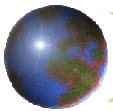
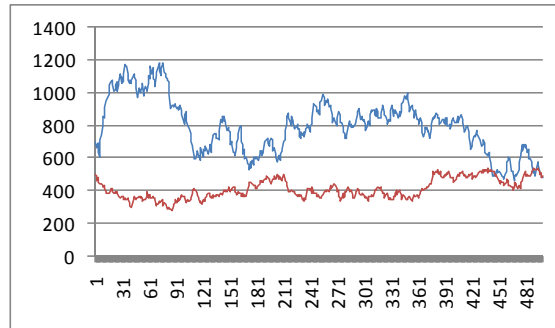




# Statistical analysis: Methods

## Illustration

- In this graph, no long-term relationship between two graphs
- Statistical tests to distinguish whether or not long-term relationship exists

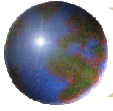


# Statistical analysis: Summary results

## By country:

- Percentage of price showing transmission from world to domestic markets
- Higher transmission in Tanzania, Mozambique, & Malawi
- Lower transmission in Ghana and Zambia
- No higher in coastal countries

	Prices with relationship	Total nbr. of prices	Percentage
Ethiopia	1	3	33%
Ghana	1	7	14%
Kenya	0	2	0%
Malawi	3	8	38%
Mozambique	4	11	36%
South Africa	0	4	0%
Tanzania	4	16	25%
Uganda	0	2	0%
Zambia	0	9	0%
<b>Total</b>	<b>13</b>	<b>62</b>	<b>21%</b>

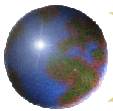


## Statistical analysis: Summary results

By commodity:

- Transmission highest for rice
- Lower for maize and sorghum

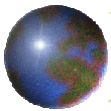
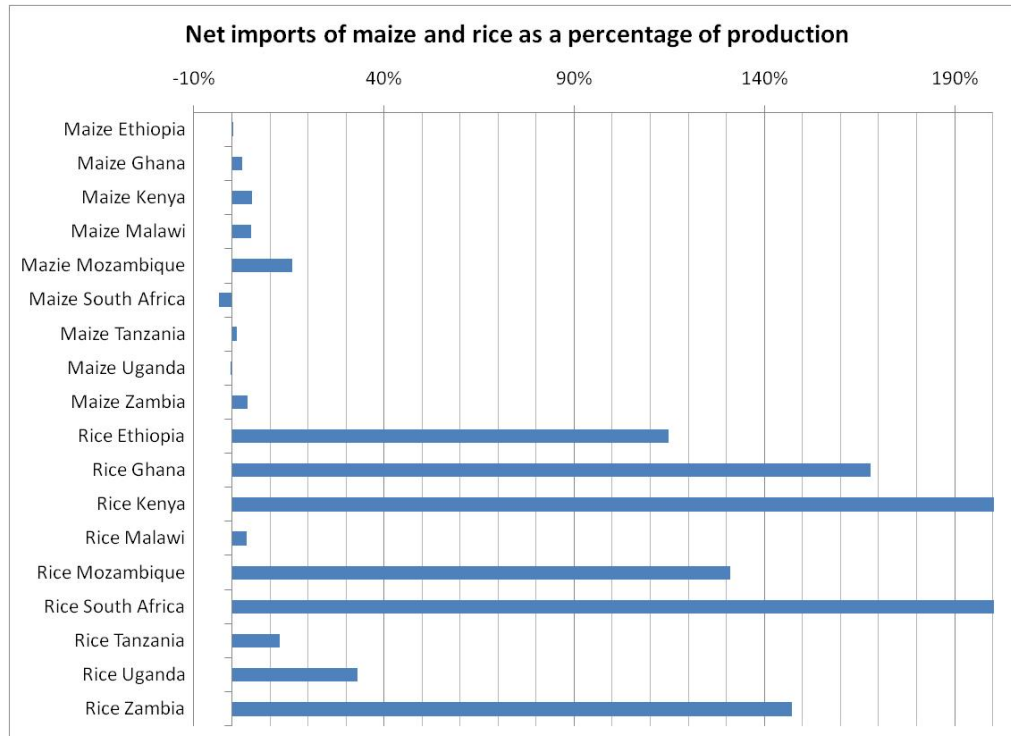
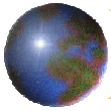
	Prices with relationship	Total nbr. of prices	Percentage
Maize	4	40	10%
Rice	8	17	47%
Sorghum	1	4	25%
Wheat	0	1	0%
Total	13	62	21%



## Discussion

- Reasons for lack of price transmission in maize
  - ▣ Most African countries are self-sufficient in maize
  - ▣ Domestic price falls between export parity and import parity
  - ▣ Even efficient markets will not show price transmission in this situation
  - ▣ Intervention in maize markets also reduces transmission
    - Kenya supports price, Tanzania bans exports, Malawi and Zambia have large state trading enterprises that intervene in maize markets
- Reasons for higher price transmission in rice
  - ▣ Almost all African countries rely on rice imports
  - ▣ Imports are usually more than half of domestic consumption

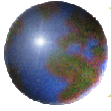




## Discussion

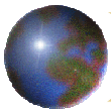
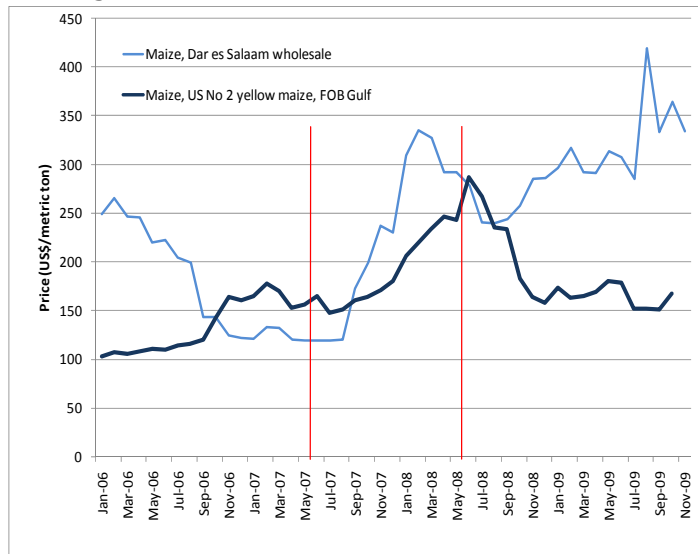
### ● Conflicting results:

- Trends show sharp increases in food prices (including maize)
  - Price of maize, rice, and wheat increase more than 60% between June 2007 and June 2008
  - Percentage increase in maize and wheat price larger than percentage increase in world price
- ... but statistical analysis shows weak relationship between world and domestic prices (particularly in maize)
  - 47% of African rice markets statistically linked to world markets
  - 10% of African maize markets statistically linked to world markets



## Discussion

### ● Conflicting results – Example of maize in Tanzania



## Discussion

### ● Most likely explanation

- Increase in rice and wheat prices caused by higher world prices
- Increase in maize prices not due to higher world maize prices
- Rather price of maize and non-tradable commodities rose due to:
  - Substitution effects with rice & wheat
  - Oil price increase which raised cost of transport
  - Grain export bans by Ethiopia, Tanzania, Zambia, and Malawi, among others
  - Local events such as post-election violence in Kenya and rationing of foreign currency in Ethiopia