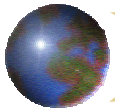


# *The Effects of Market Deregulation on Maize Marketing Margins in South Africa*

L. Ndibongo-Traub and T.S. Jayne

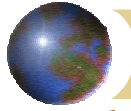
Paper presented at 26<sup>th</sup> Conference of IAAE

Queensland, Australia, August 12-18, 2006



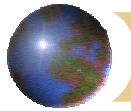
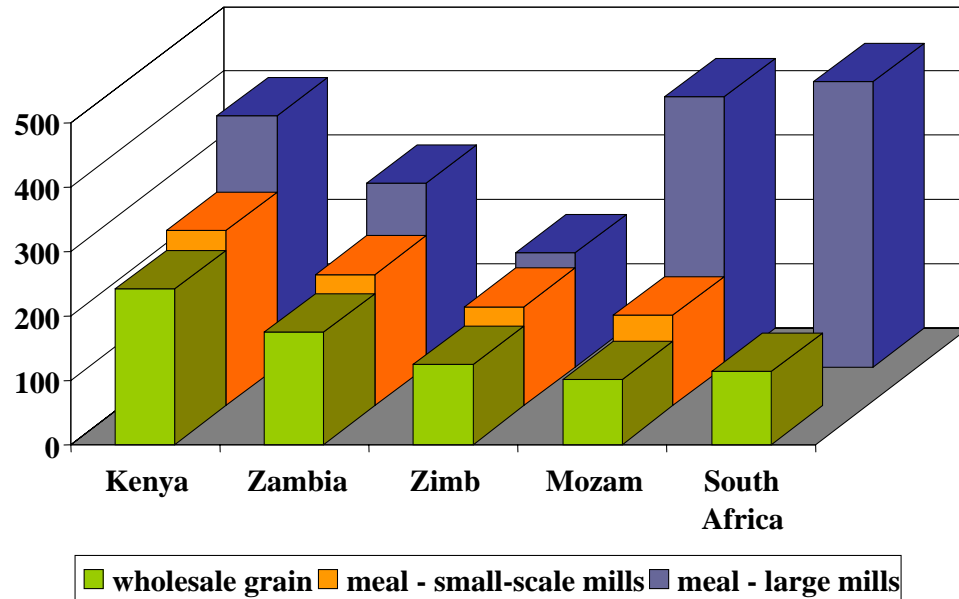
## *Presentation Outline*

- Study Objectives
- Methodology
- Results
- Conclusions



## Study Objective

*Maize grain and maize meal prices, 1996-1999, informal vs. formal channels*



## Methodology: Data Generating Process

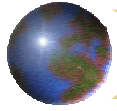
$$MM_t = X_t^* \beta_i^* + U_t \quad (1)$$

$$MM_t = P_{rt} - P_{wt} * z + [(z-1) * P_{bt}] \quad (2)$$

$$X_t^* \beta_i^* = X_t \beta_i + H_t \alpha_i \quad (3)$$

$$MM_t = X_t \beta_i + V_t \quad (4)$$

$$V_t = H_t \alpha_i + U_t \quad (5)$$



## Methodology: Linear Relationship

$$MM_t = \delta_0 + \mathbf{X}_t\beta_i + \delta_1\text{REFORM}_t + \delta_2T_t + \sum_{m=1}^{11} \gamma_i \mathbf{D}_{mt} + V_t \quad (6)$$

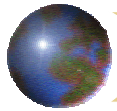
$\mathbf{X}_t = (\text{Wages}_{t-1}, \text{RER}_{t-1}, \text{ER Volatility}_{t-1}, \text{Rainfall index})$

$T_t = \text{time trend}$

$\mathbf{D}_{mt} = \text{Seasonal dummy variables}$

$\text{REFORM} = \text{categorical variable}$

$\delta_1 = \text{measures the difference in mean milling/retailing margins}$



## Methodology: Piece-Wise

$$MM_t = \delta_0 + \mathbf{X}_t\beta_i + \delta_1\text{REFORM}_t + \delta_2T_t + \delta_3\text{REFORM}(T_t - T_d) + \sum_{m=1}^{11} \gamma_i \mathbf{D}_{mt} + V_t \quad (7)$$

Prior to deregulation

$$E(MM_t) = \delta_0 + \mathbf{X}_t\beta_i + \delta_2T_t + \sum_{m=1}^{11} \gamma_i \mathbf{D}_{mt} \quad (8)$$

$\delta_2 = \text{monthly trend in the level of the margin}$

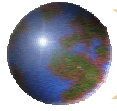
$\delta_0 = \text{intercept}$

After deregulation

$$E(MM_t) = (\delta_0 + \delta_1 - \delta_3T_d) + \mathbf{X}_t\beta_i + (\delta_2 + \delta_3)T_t + \sum_{m=1}^{11} \gamma_i \mathbf{D}_{mt} \quad (9)$$

$\delta_3 = \text{measures the difference between the monthly trend of the margin}$

$\delta_1 = \text{margin differential at the point immediately following reform}$



## Methodology: Estimation Procedure

- ⊕ Ordinary Least Squared (OLS)
  - Serial Correlation
  - Heteroskedasticity
- ⊕ Feasible General Least Squared (FGLS)
  - Estimators asymptotically efficient
  - Standard errors/test statistics asymptotically valid
- ⊕ Newey-West
  - Standard errors robust to arbitrary forms of serial correlation & heteroskedasticity

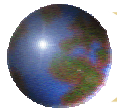
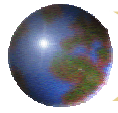
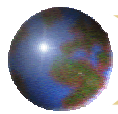
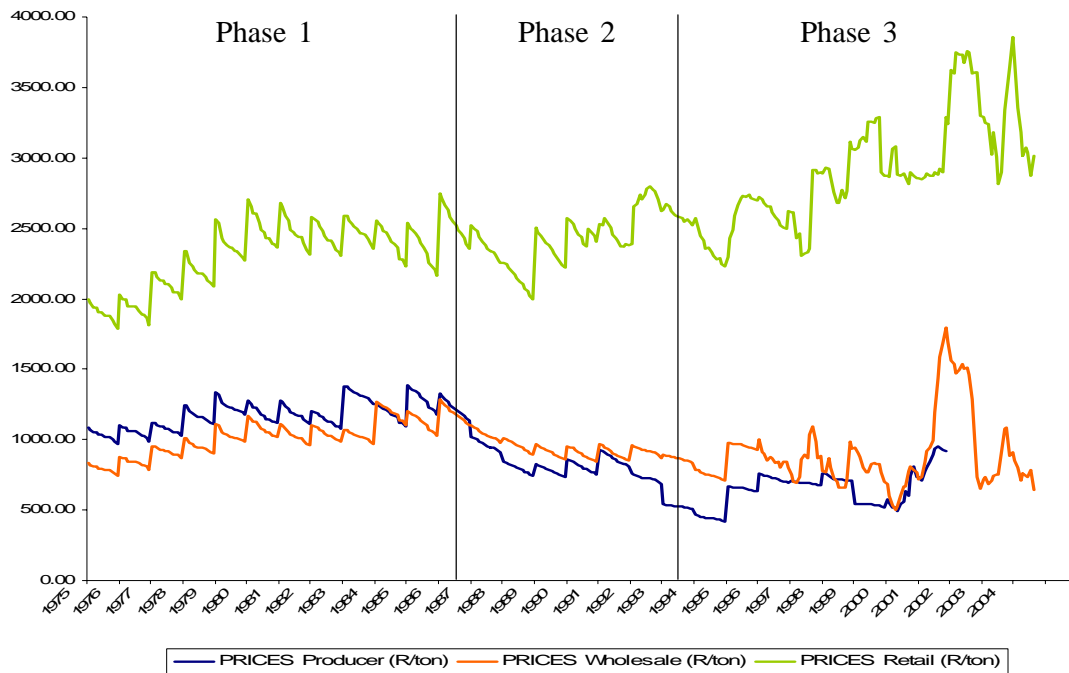


Table 1. Descriptive Statistics of Real Maize Grain and Maize Meal Prices

	Phase 1: Control Period		Phase 2: Partial Reform		Phase 3: Full Market Reform		
	5/1976-4/1987 (n=132)		5/1987-4/1994 (n=84)		5/1994-4/2001 (n=72)	5/2001-12/2004 (n=44)	
<b>Producer price, maize grain (Rmt)</b>							
Mean	1188		780		626		859
CV(%)	7.7	(-34%)	166	(-20%)	169	(+37%)	105
<b>Wholesale price, maize grain (Rmt)</b>							
Mean	1089		928		813		1050
CV(%)	109	(-11%)	66	(-12%)	148	(+29%)	346
<b>Retail price, maize meal (Rmt)</b>							
Mean	2351		2441		2724		3256
CV(%)	88	(+4%)	7.6	(+12%)	10.1	(+19%)	10.4

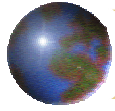


*Figure 1. Inflation-adjusted maize and maize meal prices, South Africa, May 1975 to December 2004*



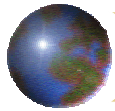
*Table 2. Maize Milling/Retailing Margins, Equation (6), OLS and Newey-West Serial Correlation-Robust Standard Errors*

Variables	----- Sample period -----					
	May 1976 – April 2001			May 1976 – December 2004		
	OLS	NW lag(1)	NW lag(2)	OLS	NW lag(1)	NW lag(2)
Rainfall Index	-0.281 (-2.868)**	-0.281 (-2.208)*	-0.281 (-1.889)*	-0.131 (-1.215)	-0.131 (-0.864)	-0.131 (-0.738)
Wages <sub>t-1</sub>	0.267 (5.737)**	0.267 (3.620)**	0.267 (3.208)**	0.320 (6.111)**	0.320 (4.219)**	0.320 (3.794)**
ER Volatility <sub>t-1</sub>	-120.256 (-3.723)**	-120.256 (-4.684)**	-120.256 (-4.244)**	-122.123 (-3.481)**	-122.123 (-3.185)**	-122.123 (-3.217)**
RER <sub>t-1</sub>	10.968 (1.299)	10.968 (0.907)	10.968 (0.768)	-15.459 (-1.909)	-15.459 (-0.955)	-15.459 (-0.811)
Trend	1.998 (6.836)**	1.998 (5.311)**	1.998 (4.566)**	1.529 (4.874)**	1.529 (3.528)**	1.529 (3.035)**
REFORM	165.176 (4.140)**	165.176 (2.876)**	165.176 (2.411)*	158.907 (3.254)**	158.907 (2.658)**	158.907 (2.31)*
Constant	94.703 (0.527)	94.703 (0.301)	94.703 (0.261)	103.893 (0.512)	103.893 (0.340)	103.893 (0.300)
DW	0.362429			0.385138		
R <sup>2</sup>	0.7551			0.7450		
Observations	299	299	299	343	343	343

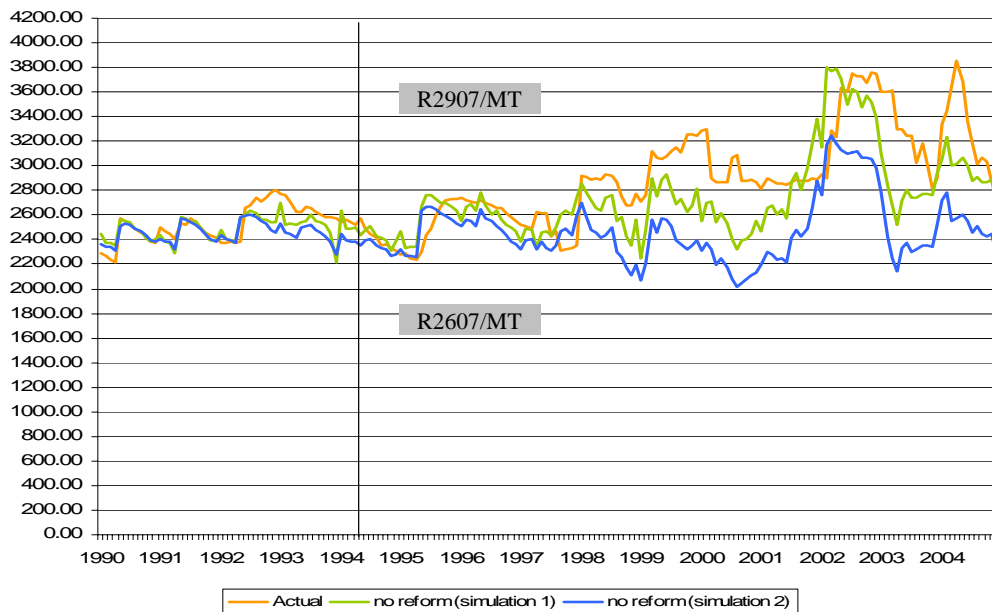


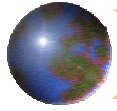
*Table 3. Maize Milling/Retailing Margins, Equation (7), OLS with NW Serial Correlation-Robust Standard Errors and FGLS Estimation*

Variables	Sample period					
	May 1976 – April 2001			May 1976 – December 2004		
	OLS	NW lag(1)	FGLS	OLS	NW lag(1)	NW lag(2)
Rainfall Index	-0.354 (-4.732)**	-0.354 (-3.990)**	-0.098 (-0.978)	0.045 (0.464)	0.045 (0.315)	0.045 (0.241)
Wages <sub>t-1</sub>	0.059 (1.532)	0.059 (1.291)	0.035 (1.773)	0.122 (2.432)*	0.122 (2.241)*	0.122 (1.931)
ER Volatility <sub>t-1</sub>	-52.054 (-2.074)*	-52.054 (-3.060)**	-0.077 (-0.011)	-69.530 (-2.226)*	-69.530 (-1.710)	-69.530 (-1.989)*
RER <sub>t-1</sub>	-42.344 (-5.683)**	-42.344 (-6.710)**	-30.750 (-3.766)**	-67.888 (-7.661)**	-67.888 (-4.089)**	-67.888 (-3.215)**
Trend	0.717 (2.983)**	0.717 (3.169)**	0.986 (2.138)*	0.125 (0.405)	0.125 (0.291)	0.125 (0.227)
REFORM	-97.330 (-2.736)**	-97.330 (-1.834)	14.100 (0.226)	9.570 (0.211)	9.570 (0.174)	9.570 (0.133)
REFORM*(T <sub>t</sub> -T <sub>217</sub> )	11.233 (14.246)**	11.233 (10.202)**	8.418 (3.488)**	6.795 (9.903)**	6.795 (7.011)**	6.795 (5.750)**
Constant	1428.33 (8.609)**	1428.33 (7.606)**	1236.552 (9.207)**	1267.183 (5.942)**	1267.183 (5.004)**	1267.183 (4.218)**
DW	0.358911			0.318987		
R <sup>2</sup>	0.8580			0.8042		
Observations	299		299	343		343



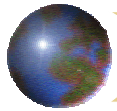
*Figure 2. Maize Meal Retail Prices: Actual vs. Simulated Under No Reform Scenario: January 1990 to December 2004*





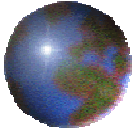
## *Conclusion: Summary*

- ⊕ Rising Milling/Retailing Margins
  - Linear Regression: 13% to 14%
  - Piece-Wise Linear Regression: 20% - 33%
- ⊕ Transfer of Consumer Surplus
- ⊕ Findings are robust to alternative model specification and estimation method



## *Conclusion: Policy Implications*

- ⊕ Need to address the why?
- ⊕ Market Structure?
  - Widespread dissemination of maize meal prices
  - Market Barriers – Food Fortification Legislation
  - Alternative Milling/Retailing Channels



*Thank You*