



# **Governance & Development: Views from G20 Countries**

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**Session 2**

**Presentation**

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**Correlates of Food Insecurity: How can the G 20 help?**

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**SIMRIT KAUR**

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# **Correlates of Food Insecurity: How can the G 20 help?**

Presented by

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## **Format of Presentation**

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**I. Food Security and Its Global Dimension**

**II. Correlates of Food Insecurity:  
Econometric analysis**

**III. Implications for G 20 Countries**

# I.

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## Food Security and Its Global Dimension

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### Food Security: Its 4 Dimensions

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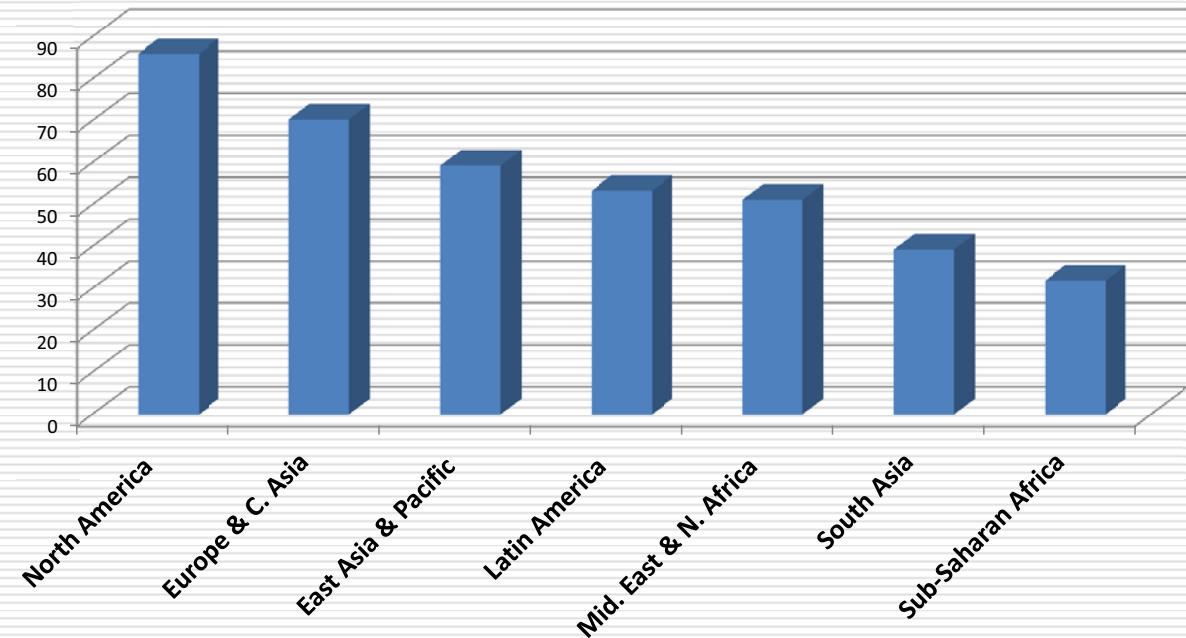
- Availability
- Accessibility
  - Economic Access
  - Physical Access
- Utilization
- Stability/Vulnerability

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# Food Security Index in Regions of the World

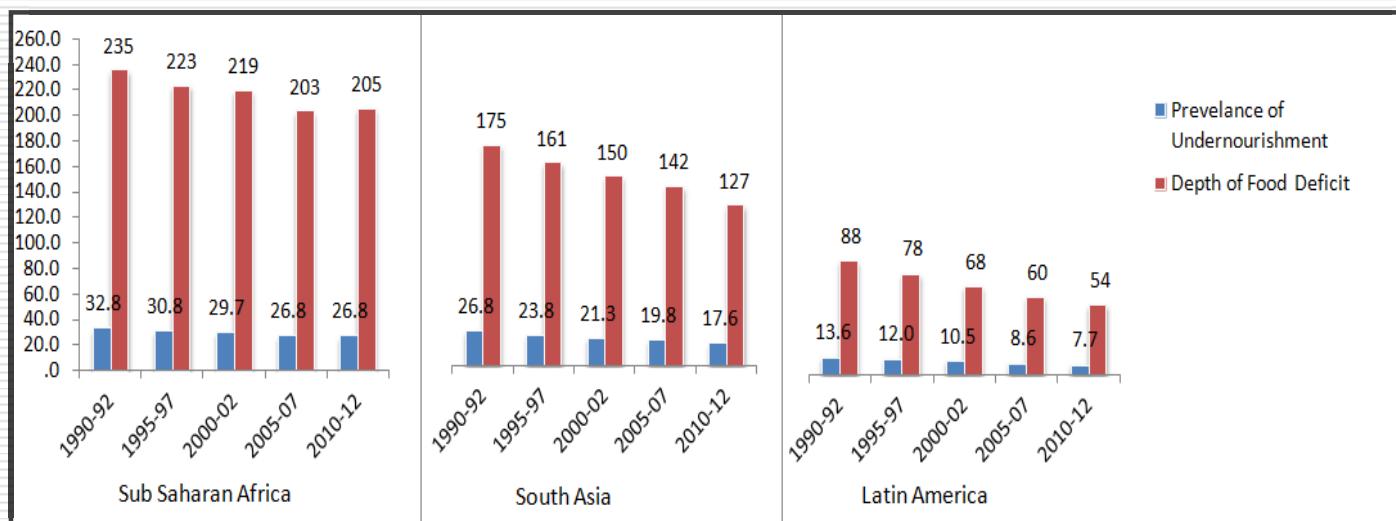
(Score out of 100)



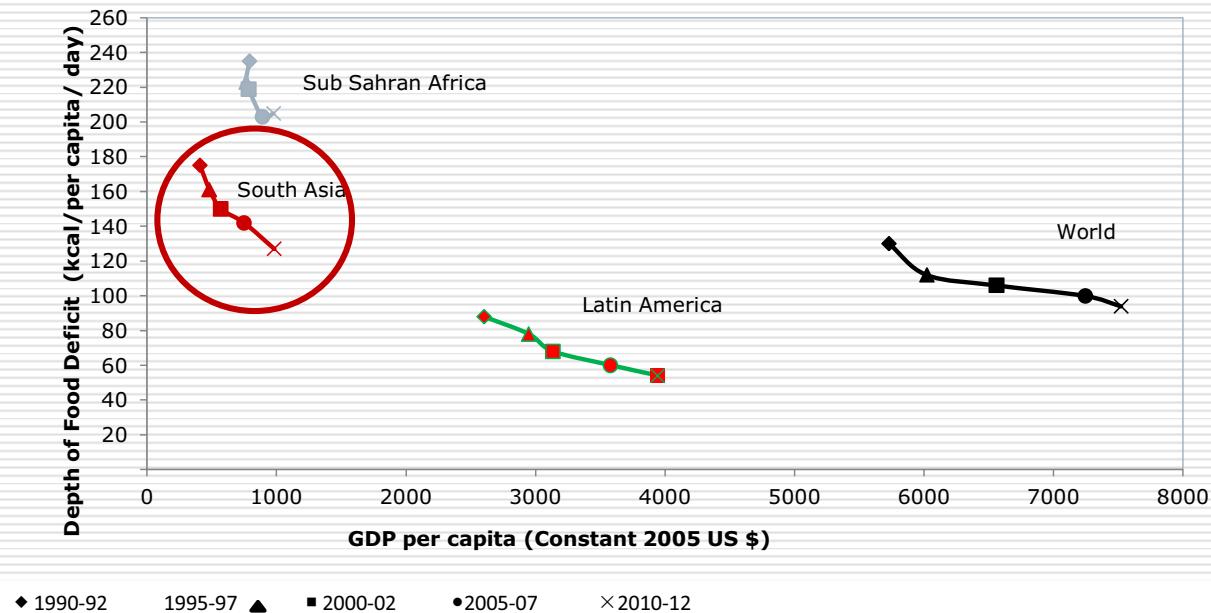
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## Estimates of Food Insecurity

- Prevalence of undernourishment (percentage)
- Depth of Food Deficit

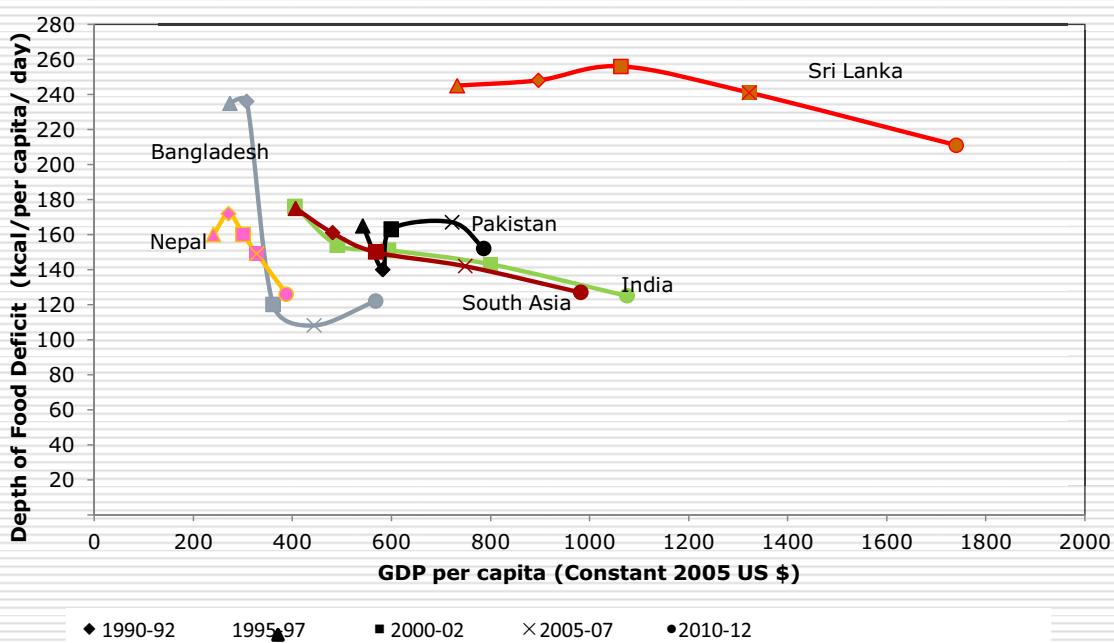


# GDP Per Capita and Depth of Food Deficit Global



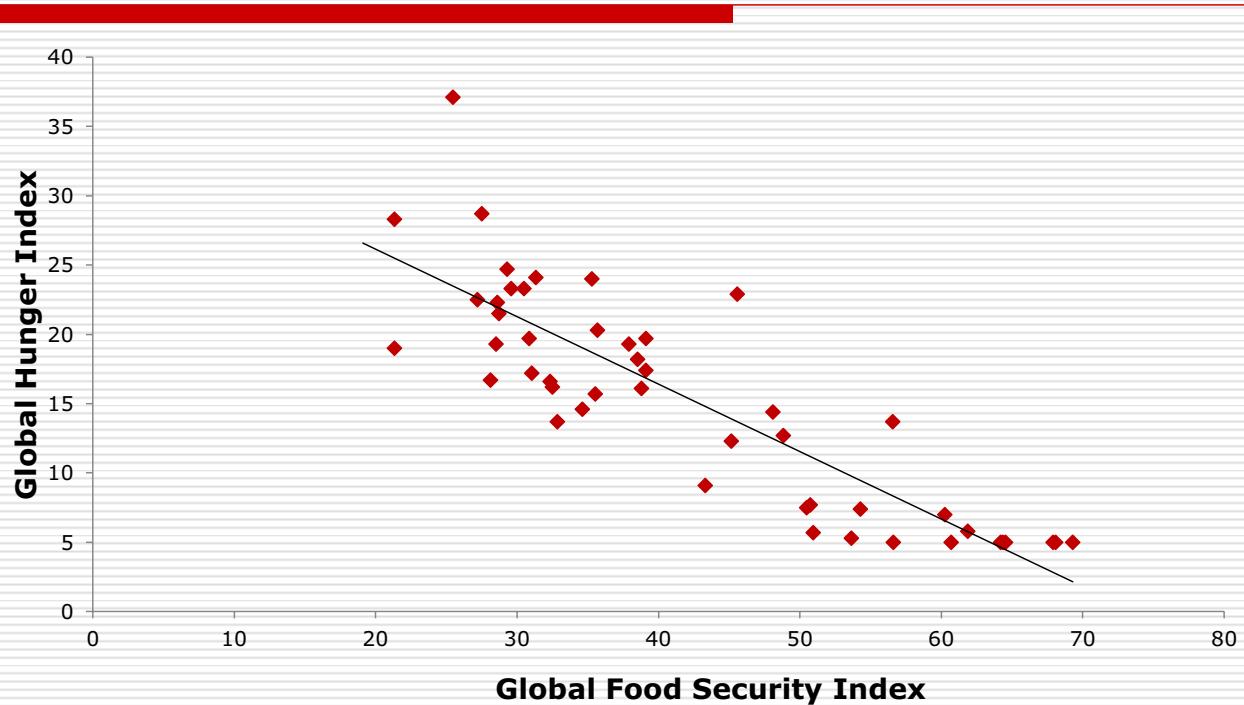
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# GDP Per Capita and Depth of Food Deficit South Asian Countries



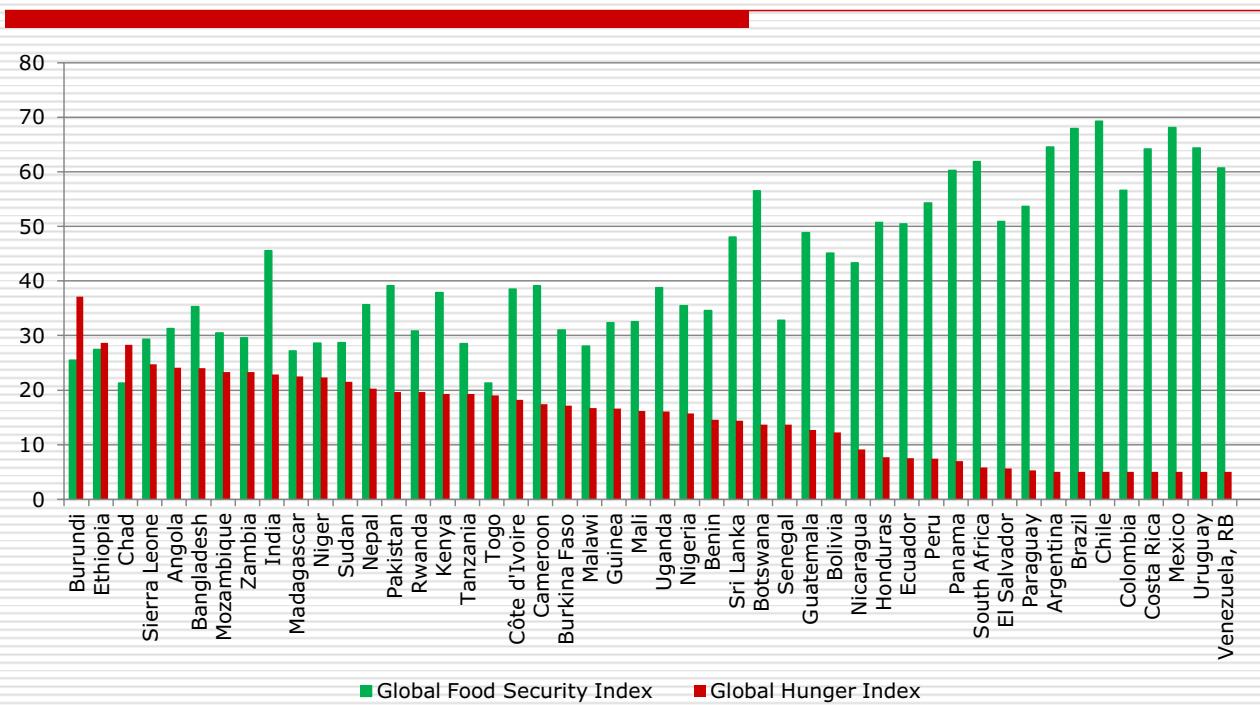
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# Correlation Between Global Food Security Index and Global Hunger Index



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# Correlation Between Global Food Security Index and Global Hunger Index



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## II.

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# Econometric Analysis

## Econometric Analysis:

Methodology, Data Sources and Results

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$$Y_{it} = \alpha_0 + \beta_1 FoodP_{av,i,t-1} + \beta_2 \Delta GDP/GDP_{pc,i,t-1} + \beta_3 \Delta FPI/Volatility_{i,t} + \beta_4 RailD_{i,t} \\ + \beta_5 RoadD_{i,t} + \beta_6 Water_{i,t} + \beta_7 FoodM/TotX_{i,t} + \varepsilon_{i,t}$$

Where  $Y_{it}$  represents two aspects of food insecurity:

- ❖ prevalence of under nutrition, and
- ❖ depth of food deficit

# Methodology....Continued

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- Regressions run for **South Asia**, **Sub Saharan Africa**, **Latin America**, as well as, **pooled**.

Run on three year averages from 1990-1992 to 2010-12.

- Countries Per Region

- ❖ South Asia:5
- ❖ Sub Saharan Africa:38
- ❖ Latin America:11

- Data Sources: FAO and WDI

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## Econometric Results: GDP per capita and **Food Inflation**

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	South Asia		Sub Saharan Africa		Pooled (SA + SSA + LA)	
	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>
Food Prod <sup>n</sup>	-0.864 (-1.51)	-1.182** (-2.01)	-0.553*** (-3.50)	-0.746*** (-4.42)	-0.781*** (-6.47)	-1.172*** (-4.03)
GDP <sub>pc, t-1</sub>	-1.156** (-2.16)	-0.799 (-1.46)	-1.027*** (-5.21)	-1.175*** (-5.64)	-0.350*** (-3.86)	-0.198 (-0.93)
Food Inflation	3.162* (1.84)	3.379* (1.92)	0.345*** (4.34)	0.367*** (4.32)	0.331*** (4.03)	0.304 (1.52)
Rail Density	-1.526** (-2.46)	-2.764*** (-4.34)	-0.425*** (-3.67)	-0.488*** (-3.97)	-0.163*** (-3.24)	-0.207* (-1.70)
Road Density	0.159 (0.90)	0.0941 (0.52)	-0.335*** (-5.09)	-0.419*** (-6.27)	-0.286*** (-4.69)	-0.509*** (-3.63)
Water Access	2.263* (1.75)	2.058 (1.55)	-0.320** (-2.62)	-0.331** (-2.53)	-0.169 (-1.41)	-0.253 (-0.87)
Food M/TotX	-0.00992 (-0.13)	-0.0768 (-0.96)	-0.0363 (-0.91)	-0.0157 (-0.37)	-0.0763** (-2.24)	-0.00636 (-0.08)
Constant	4.861	8.121	14.13	18.12	10.89	14.42
N	72	72	152	161	262	295

t statistics in parentheses \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

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# Econometric Results:

## GDP per capita Growth and Food Inflation

	South Asia		Sub Saharan Africa		Pooled (SA + SSA + LA)	
	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>
Food Prod <sup>n</sup>	-1.825*** (-6.99)	-1.807*** (-6.96)	-0.626*** (-3.54)	-0.885*** (-4.60)	-0.889*** (-7.74)	-1.199*** (-4.23)
GDP <sub>pc</sub> Growth <sub>t-1</sub>	-1.198 (-0.63)	-0.708 (-0.38)	-0.742 (-1.36)	-0.531 (-0.90)	-0.973** (-2.07)	-1.262 (-1.14)
Food Inflation	2.461 (1.22)	3.273 (1.63)	0.227** (2.61)	0.259*** (2.73)	0.203** (2.44)	0.193 (0.93)
Rail Density	-2.118*** (-3.40)	-3.330*** (-5.38)	-0.301** (-2.40)	-0.347** (-2.54)	-0.162** (-3.23)	-0.212* (-1.70)
Road Density	-0.0506 (-0.28)	-0.0531 (-0.30)	-0.336*** (-4.53)	-0.470*** (-6.23)	-0.341*** (-5.60)	-0.503*** (-3.46)
Water Access	-0.379 (-0.98)	0.128 (0.33)	-0.885*** (-4.01)	-0.881*** (-3.64)	-0.570** (-3.25)	-0.629 (-1.44)
Food M/TotX	-0.0391 (-0.43)	-0.116 (-1.29)	-0.0435 (-1.03)	-0.0196 (-0.43)	-0.0944** (-2.72)	-0.0424 (-0.50)
Constant	15.13	15.63	10.20	13.51	10.97	14.87
N	68	68	143	152	246	278

t statistics in parentheses \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

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# Econometric Results:

## GDP per capita and Food Price Volatility

	Latin America		South Asia		Sub Saharan Africa		Pooled (LA + SA + SSA)	
	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>
Food Prod <sup>n</sup>	0.331 (1.29)	1.827 (1.78)	-1.896*** (-4.97)	-2.204*** (-5.17)	-0.459*** (-4.79)	-0.637*** (-5.83)	-0.507*** (-6.46)	-0.848*** (-5.35)
GDP <sub>pc, t-1</sub>	-0.300 (-1.44)	-1.590** (-2.26)	0.448 (1.37)	0.715* (1.96)	-0.437*** (-5.11)	-0.456*** (-4.67)	-0.303*** (-4.81)	-0.385*** (-3.06)
FPI Volatility <sub>t-1</sub>	0.143*** (4.18)	0.581*** (4.69)	-0.0114 (-0.37)	-0.0280 (-0.81)	-0.0166 (-1.03)	-0.0219 (-1.19)	0.0141 (1.07)	0.0758*** (2.85)
Road Density	-0.377** (-2.47)	-1.045* (-1.74)	-0.228** (-2.58)	-0.156 (-1.58)	-0.314*** (-6.45)	-0.406*** (-7.57)	-0.277*** (-6.43)	-0.332*** (-3.87)
Water Access	-0.00707 (-0.02)	-3.572** (-2.70)	-1.246 (-1.44)	-1.462 (-1.51)	-0.728*** (-6.67)	-0.714*** (-5.75)	-0.669*** (-7.00)	-0.657*** (-3.36)
Food M/TotX	0.100** (2.03)	-0.215 (-1.21)	-0.0352 (-0.68)	-0.0921 (-1.58)	-0.0803*** (-3.80)	-0.0783** (-3.25)	-0.0664*** (-3.83)	-0.0839** (-2.43)
Constant	3.443	23.27	16.14	18.81	12.18	15.24	11.30	15.34
N	91	125	74	74	345	353	510	552

t statistics in parentheses \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

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# Econometric Results:

## GDP per capita Growth and Food Price Volatility

	Latin America		South Asia		Sub Saharan Africa		Pooled (LA + SA + SSA)	
	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>	UnderN	Food Deficit <sub>D</sub>
Food Prod <sup>n</sup>	0.140 (0.61)	0.656 (0.73)	-1.433*** (-6.90)	-1.538*** (-6.56)	-0.480*** (-4.82)	-0.660*** (-5.84)	-0.552*** (-6.92)	-0.924*** (-5.84)
GDP Growth <sub>t-1</sub>	0.620 (1.25)	-1.077 (-0.58)	-0.0783 (-0.07)	0.766 (0.65)	-0.0531 (-0.20)	0.0476 (0.16)	-0.0222 (-0.09)	-0.0347 (-0.07)
FPI Volatility	0.143*** (4.15)	0.630*** (4.98)	-0.00669 (-0.21)	-0.0128 (-0.35)	-0.0150 (-0.90)	-0.0201 (-1.06)	0.0150 (1.11)	0.0794*** (2.96)
Road Density	-0.512*** (-3.89)	-1.527** (-2.67)	-0.219** (-2.43)	-0.134 (-1.32)	-0.325*** (-6.39)	-0.424*** (-7.62)	-0.316*** (-7.26)	-0.379*** (-4.43)
Water Access	0.127 (0.38)	-3.081** (-2.32)	-0.127 (-0.40)	0.250 (0.70)	-0.977*** (-9.56)	-0.977*** (-8.43)	-0.822*** (-8.87)	-0.850*** (-4.54)
Food M/TotX	0.0892* (1.84)	-0.335* (-1.94)	-0.0559 (-1.02)	-0.108* (-1.74)	-0.0321 (-1.57)	-0.0261 (-1.13)	-0.0399* (-2.30)	-0.0523 (-1.54)
Constant	1.925	16.28	11.75	12.36	10.36	13.35	10.17	13.94
N	91	125	74	74	344	352	509	551

t statistics in parentheses \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001

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## Main Findings

- Higher Food Inflation/Food Price Volatility enhances food insecurity (Economic Access)
- Higher agricultural production per capita reduces food insecurity (Availability)
- Larger Food Imports lower food insecurity (Stability)
- Higher GDP levels/growth reduce food insecurity (Economic Access)
- Better physical infrastructure lowers food insecurity (Physical Access)

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### III. Policy Recommendations

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#### How Can the G-20 Help?

- ❖ Smoothing Measures
  - ❖ Coping Mechanisms, and
  - ❖ Structural/Regulatory Reforms
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#### **Smoothing Measures**

(sought to calm markets so as to avert further price volatility and crisis)

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- increase agricultural productivity
  - institute an agricultural market transparency and information system
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# Coping Mechanisms

(sought to mitigate the damage from price volatility)

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- exempt food aid from export restrictions
  - consider a pilot project for emergency food reserves
  - promote risk management tools, such as weather insurance, hedging, etc.
  - make financing available to poor countries to maintain imports in times of price volatility
  - strengthen policy coordination across international organizations in the face of crisis
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# Structural/Regulatory reforms

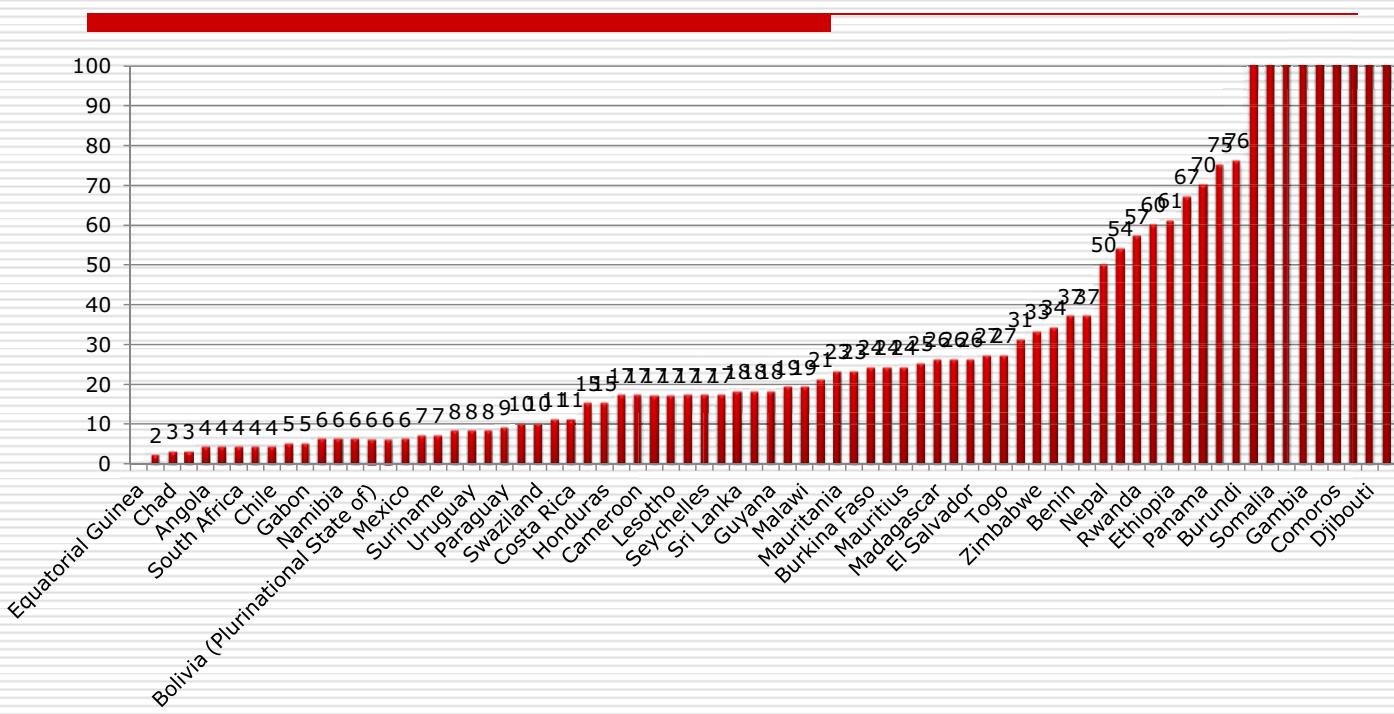
(sought to effect changes in the rules and norms governing markets in a way that would reduce both volatility itself and vulnerability to volatility for the world's poorest countries)

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- coordinate regulation of commodity futures markets
  - rebalance global trade policies by reducing agricultural subsidies in rich countries and providing more policy space for poor countries
  - remove subsidies/mandates for bio-fuels
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## Value of Food Imports to Merchandise Exports



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## Specific Areas of Concern for G20

- Bio-fuel Policy
- Maintaining Adequate Stock-to-Use Ratio for Grains

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# Rising Bio-fuel Demand

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- The most obvious large exogenous shock to grain markets in recent years is clearly the surge in biofuels demand; diversion of oilseeds into biodiesel in Europe, the United States, and elsewhere and conversion of corn into ethanol in the United States.
  - The diversion of corn and soybeans to biofuel is now very substantial (more than 30% for corn and 20% for soy) and will continue to increase under current policies using subsidies and mandates
  - The mandates for diversion of United States corn for biofuel, are quasi-permanent, and indeed slated to increase. This they have had much more serious implications for supplies of corn for feed and food, relative to equivalent yield drops due to transitory, weather or disease related shocks.
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# Low Stocks-to-Use Ratio

(Eugenio Bobenrieth, Brian Wright, and Di Zeng, 2012)

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- Price spikes tend to occur when world stock-to-use ratios are low.
- For the market to function effectively, a virtually irreducible minimum amount of grain must be held in the system to transport, market, and process grains.

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# Correlation matrix between de-trended real price (excluding China) and Stock-to-Use Ratio (SUR) 1961-2007

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	Wheat de-trended real price	Maize de-trended real price	Rice de-trended real price	Calories de-trended real price
Wheat excluding-China stock to use ratio	-0.4018	-0.4413	-0.3438	-0.4344
Maize excluding-China stock to use ratio	-0.3971	-0.5034	-0.4356	-0.5156
Rice excluding-China stock to use ratio	-0.2286	-0.2048	-0.1731	-0.2136
Calories excluding-China stock to use ratio	-0.4996	-0.5723	-0.4729	-0.5792

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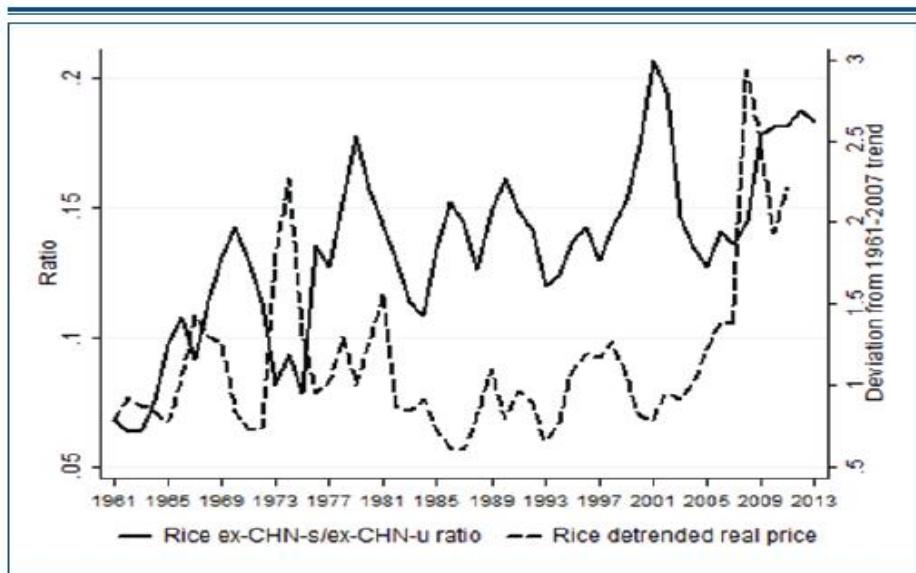
## Rice: Stock-to-Use Ratio (with and without China)

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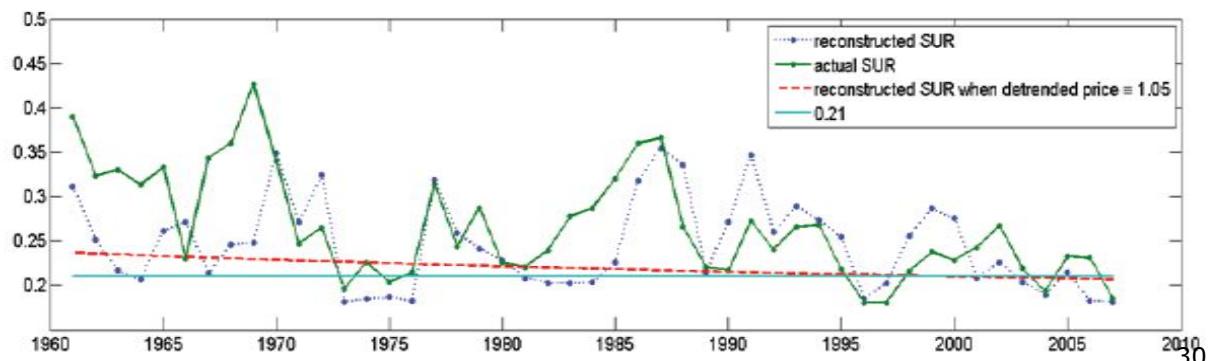
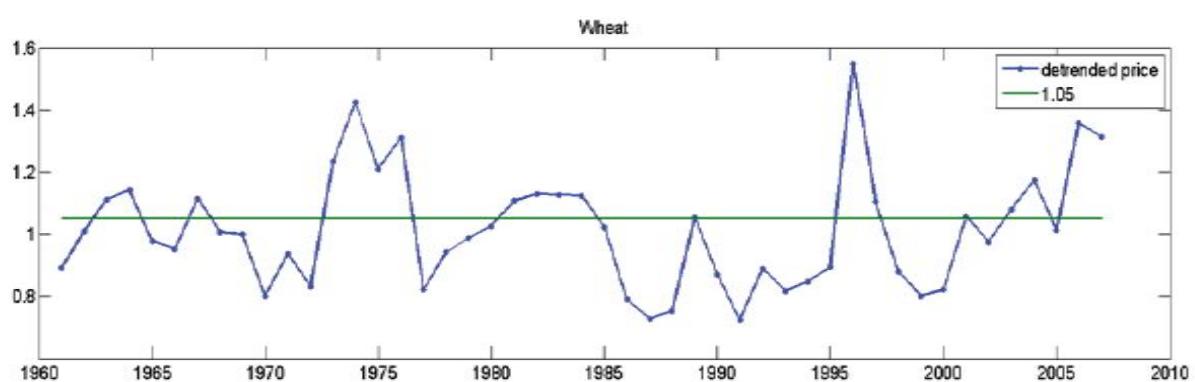
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# Rice: Stock-to-Use Ratio Versus De-trended Price Line (without China)



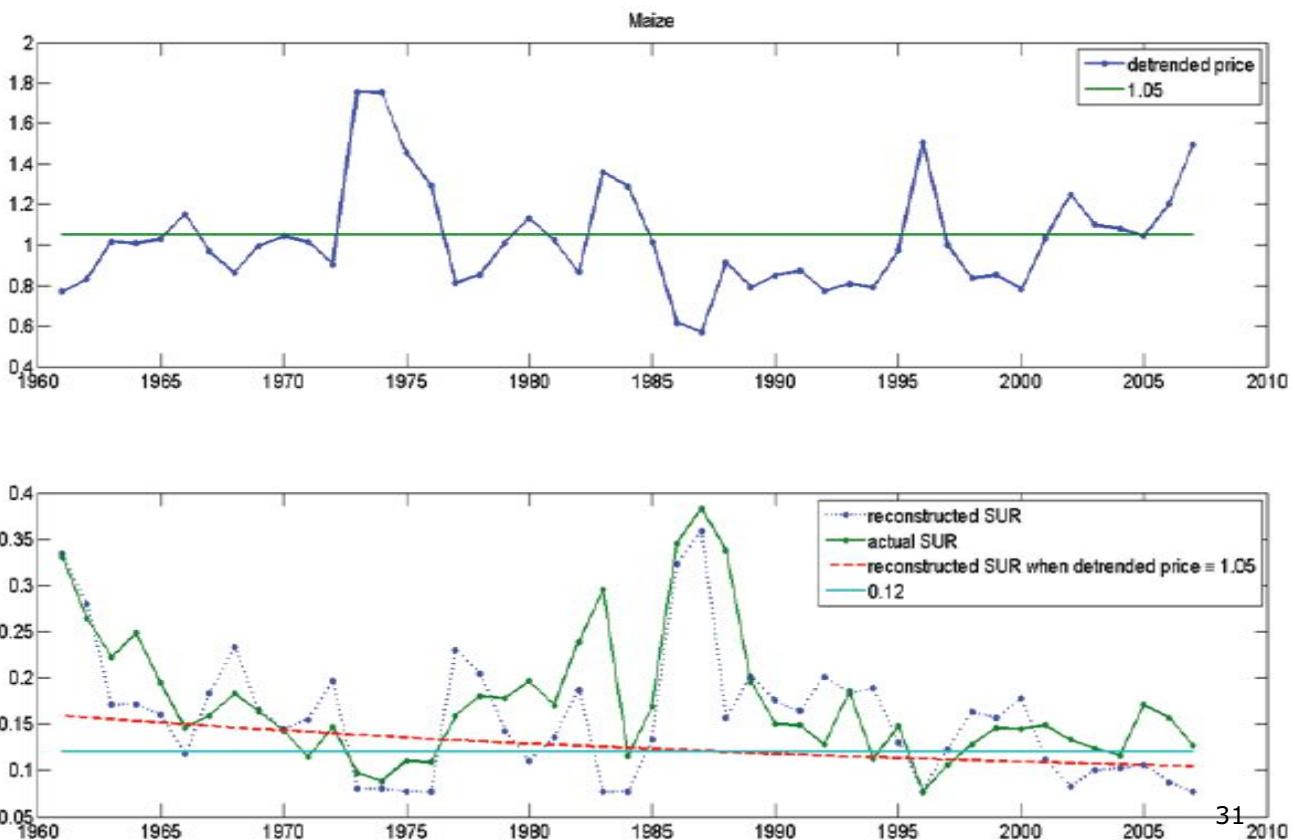
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De-trended real price (excluding China) and Stock to Use Ratio (SUR) for **Wheat**  
1961-2007

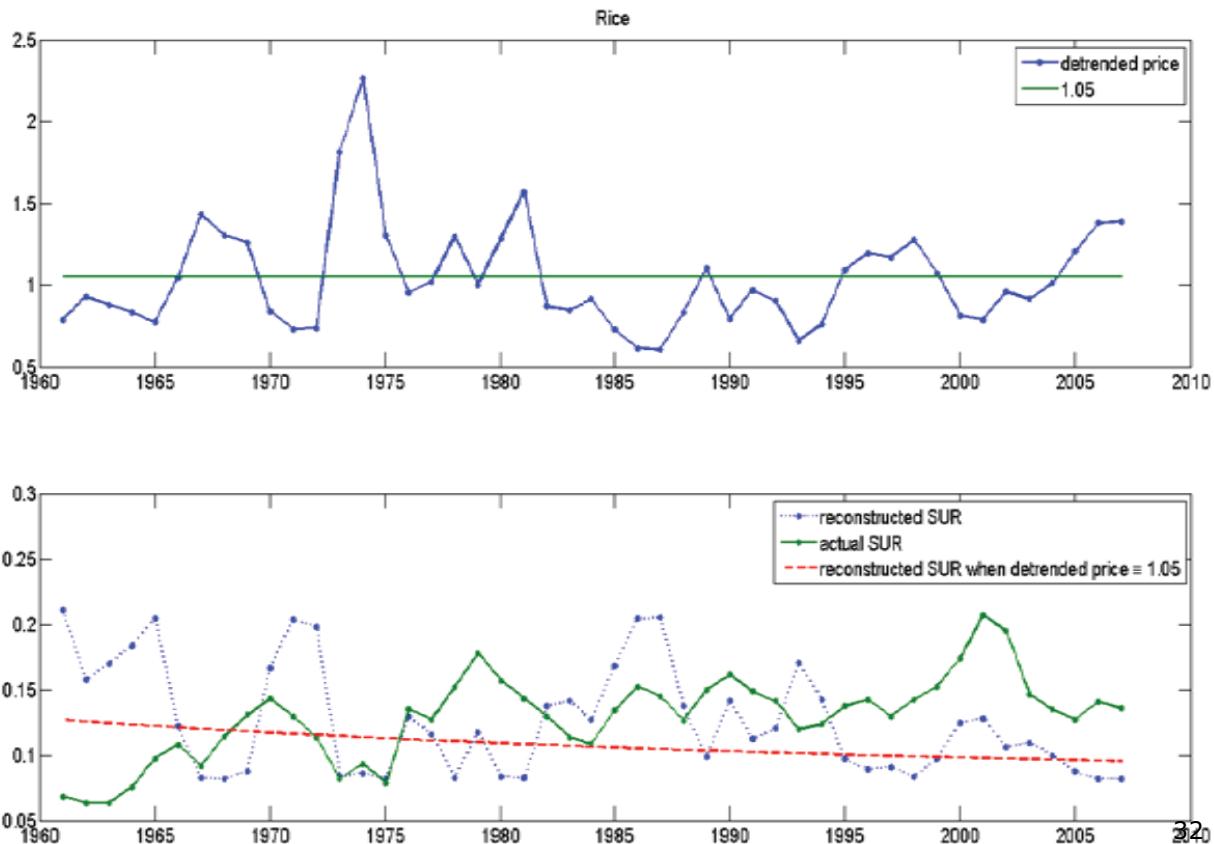


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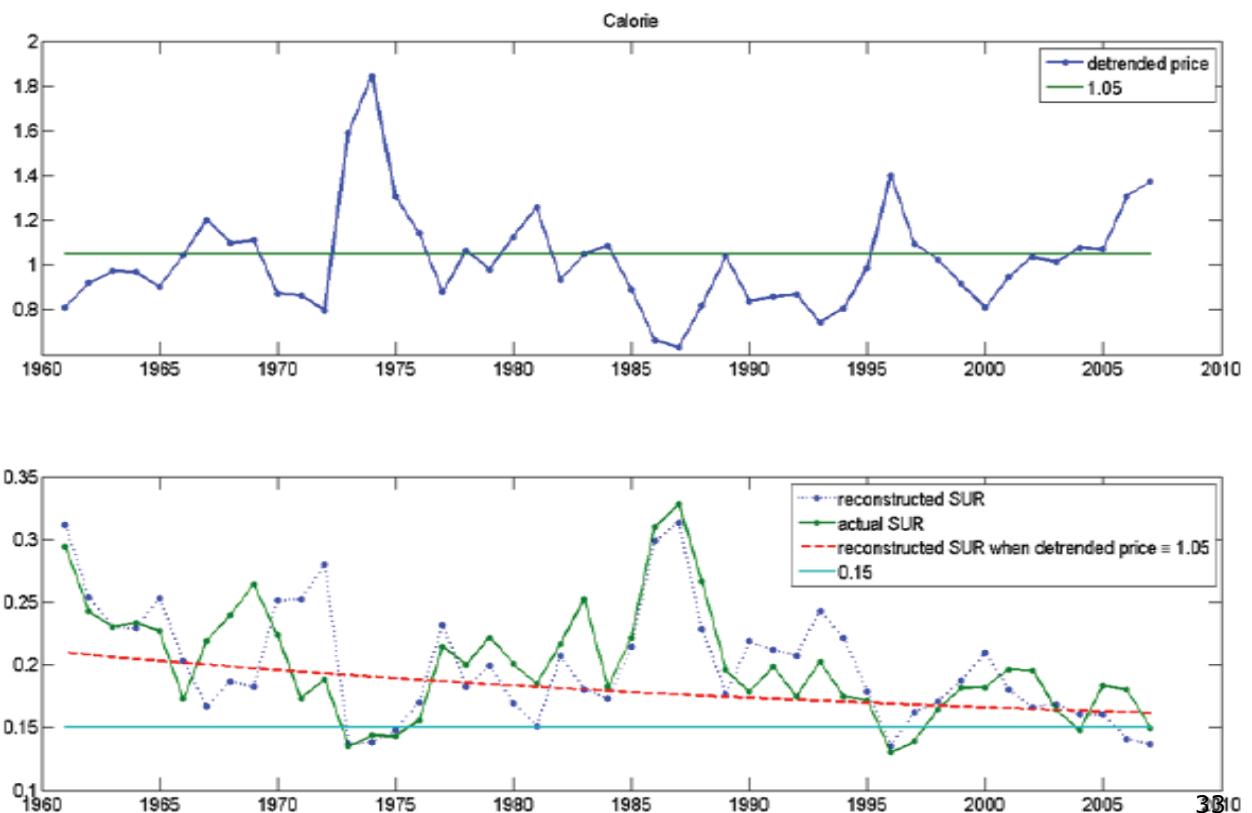
## De-trended real price (excluding China) and Stock to Use Ratio (SUR) for **Maize**



## De-trended real price (excluding China) and Stock to Use Ratio (SUR) for **Rice** 1961-2007



# De-trended real price (excluding China) and Stock to Use Ratio (SUR) for **Calories**



Thank You

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