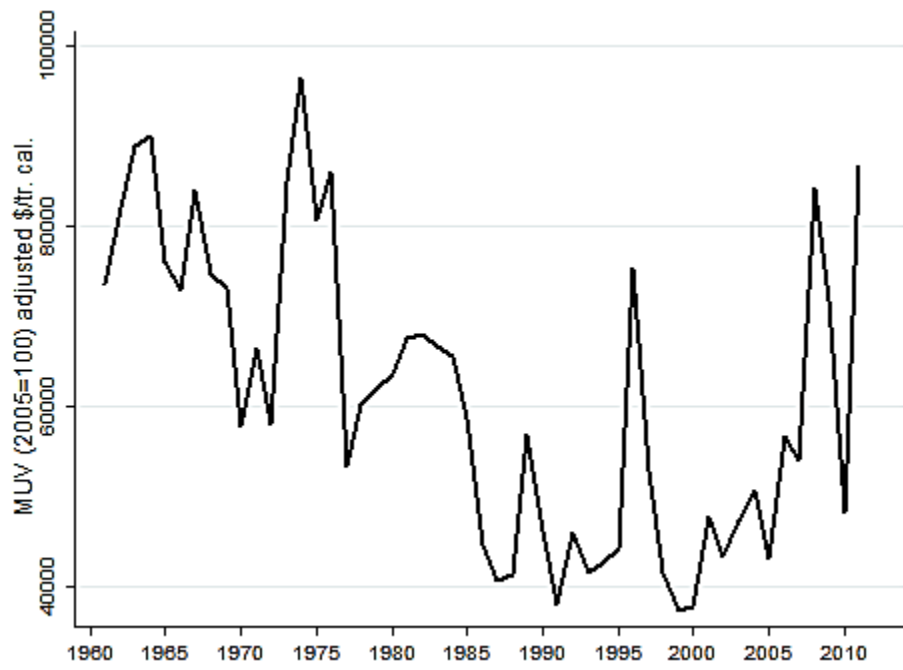


**STOCKS-TO-USE RATIOS AND PRICES
AS INDICATORS OF
VULNERABILITY TO SPIKES IN GLOBAL CEREAL MARKETS**

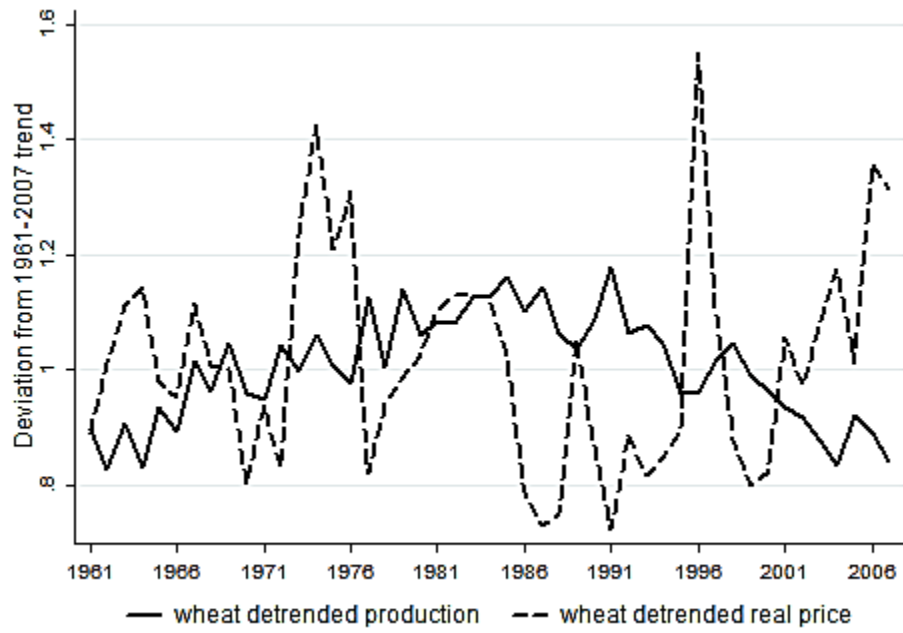
Eugenio Bobenrieth
Pontificia Universidad Católica de Chile

Brian Wright
University of California, Berkeley

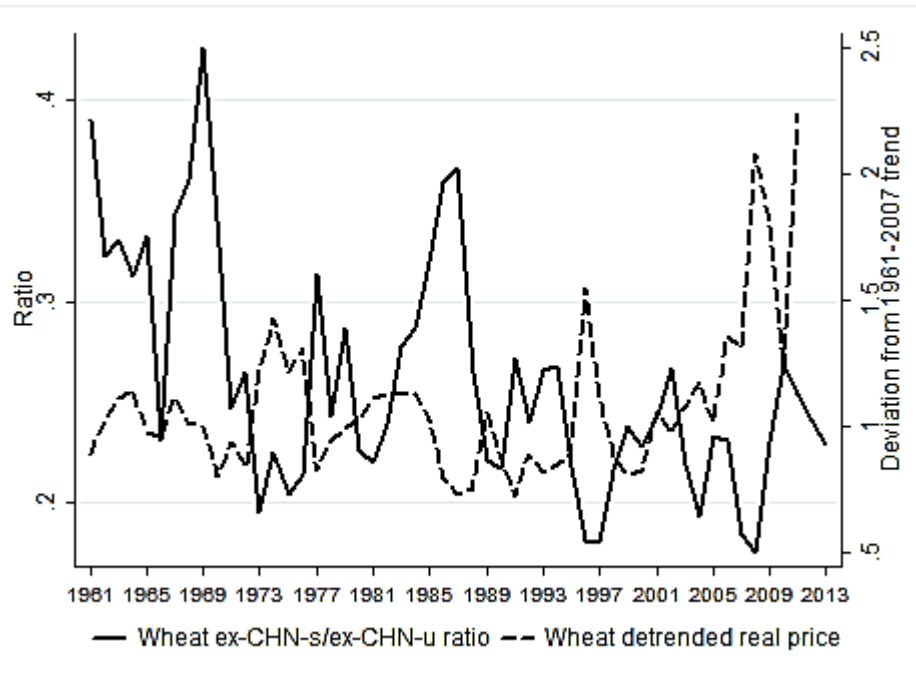
Di Zeng
University of California, Berkeley



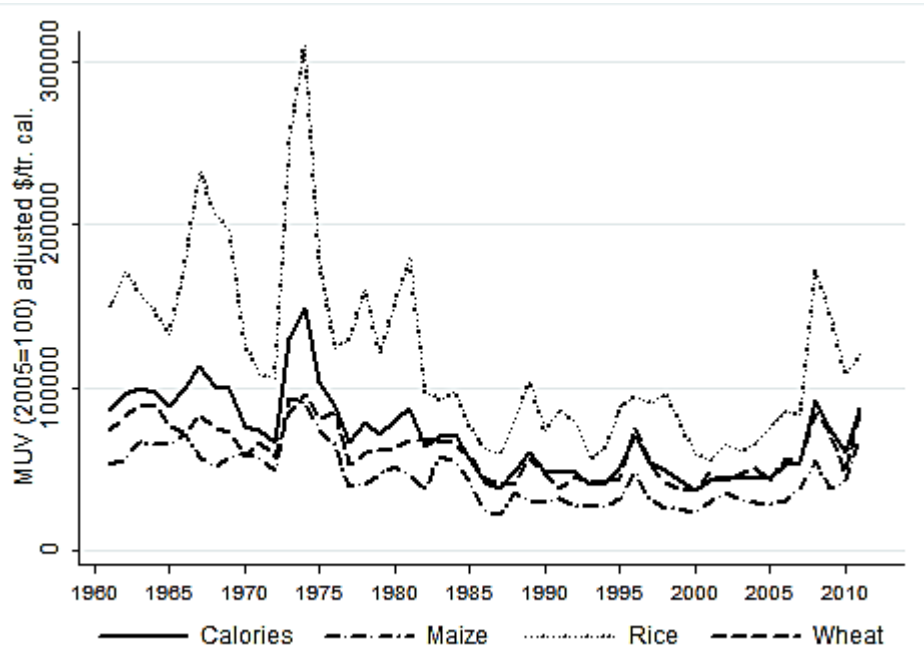
Wheat real price



Wheat de-trended production and de-trended real price in log scale



Wheat SUR (excluding China) vs. de-trended real price



Wheat, rice, maize and calories real prices

**Correlation coefficients between wheat, maize, rice, and calories detrended real price,
1961-2007**

	Wheat	Maize	Rice	Calories
Wheat	1.0000			
Maize	0.7875	1.0000		
Rice	0.5803	0.6280	1.0000	
Calories	0.8318	0.8598	0.9133	1.0000

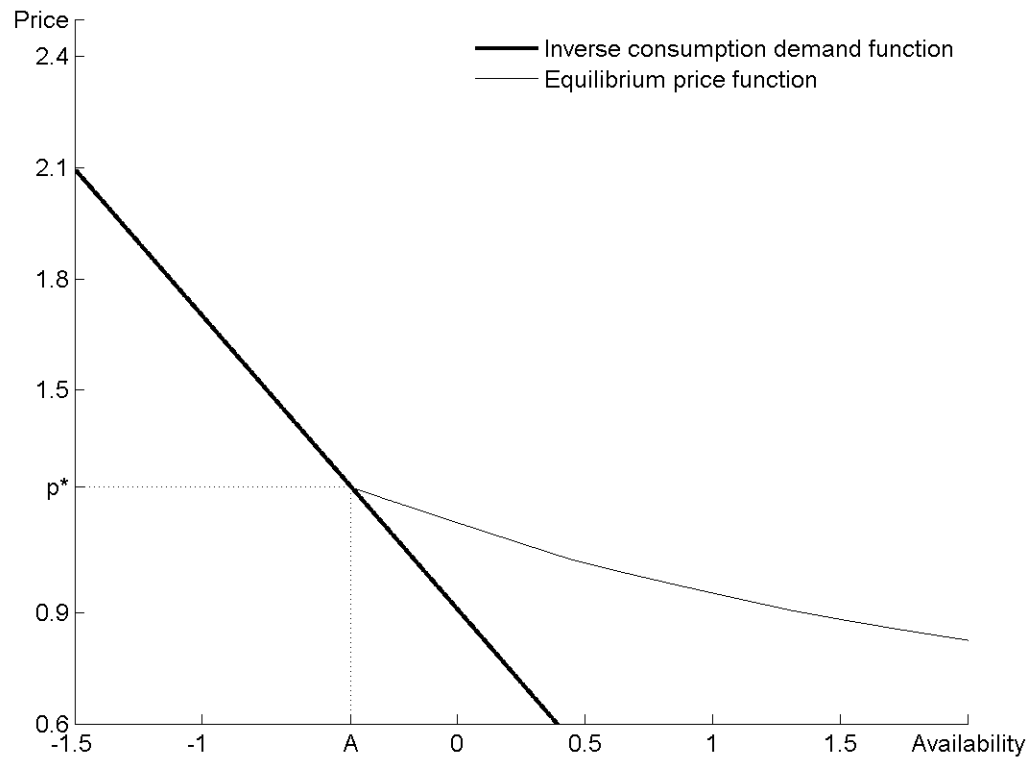
**Correlation Coefficient Matrix between De-trended Real Price,
excluding-China SUR**

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

$$\frac{1}{1+r} E_t[p_{t+1} x_t] - p_t x_t$$

$$p_t = F(c_t) = F(z_t - x_t)$$

$$p_t = p(z_t) = \max \left[F(z_t), \frac{1}{1+r} E_t p(\omega_{t+1} + x_t) \right]$$



ML Estimates

	<i>a</i>	<i>b</i>	Log- Likelihood	Threshold Price p^*	Number of Stockouts
Wheat	0.9085 (0.0398)	0.7912 (0.0263)	14.1718	1.2360	5
Maize	0.8917 (0.0312)	0.9729 (0.0278)	3.1982	1.2977	6
Rice	0.9132 (0.0230)	0.9747 (0.0395)	0.3474	1.3053	6
Calories	1.0072 (0.0339)	0.9748 (0.0187)	14.7095	1.4005	2

Transition Matrix for De-trended Calorie Price

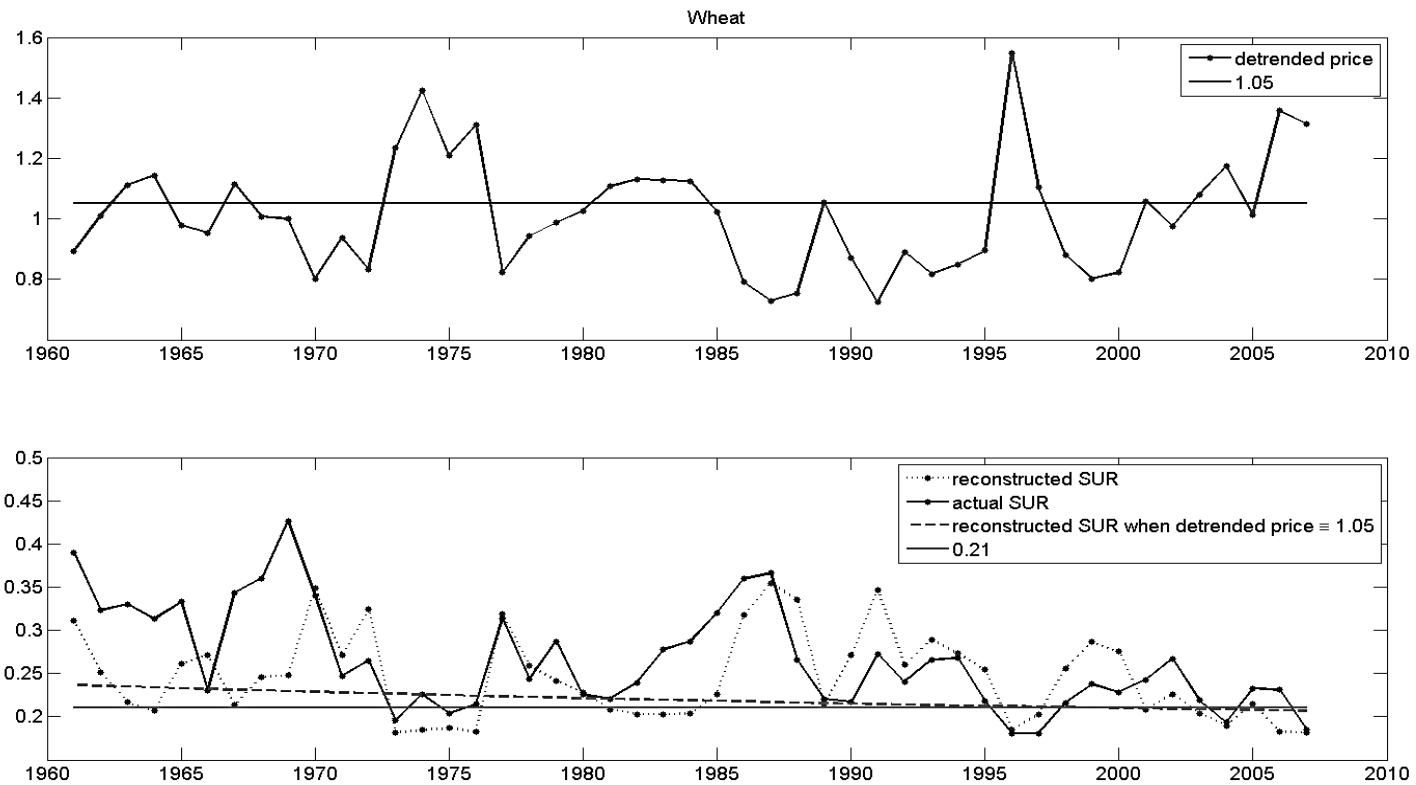
		To				
		80-100	60-80	40-60	20-40	0-20
From	80-100	0.500	0.250	0.000	0.250	0.000
	60-80	0.300	0.300	0.200	0.200	0.000
	40-60	0.111	0.222	0.333	0.222	0.111
	20-40	0.000	0.300	0.100	0.200	0.400
	0-20	0.111	0.000	0.333	0.222	0.333

Note: 80-100 stands for the bin from 80 percentile to 100 percentile.

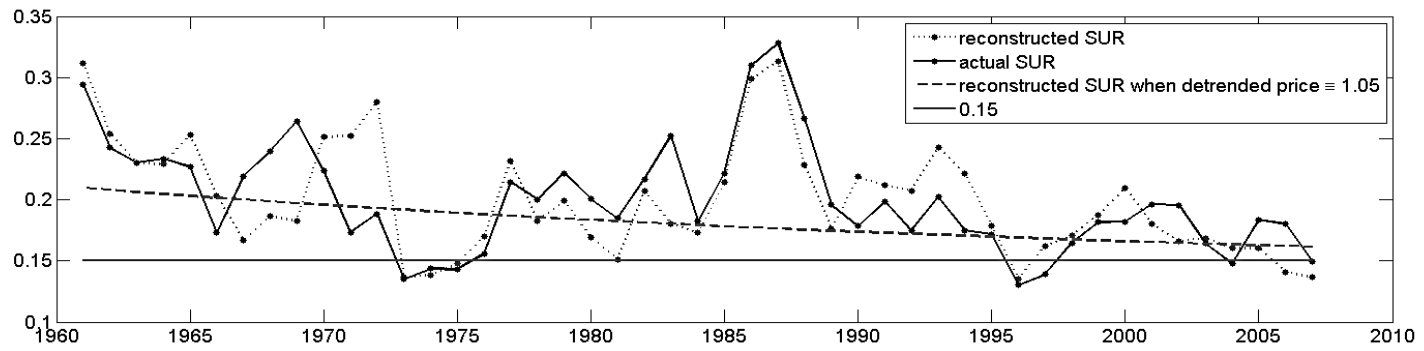
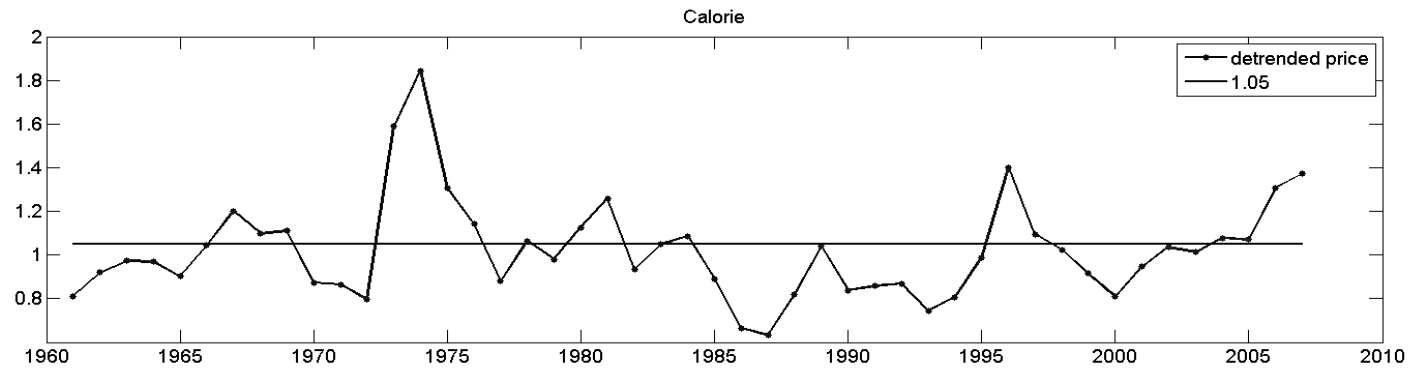
Transition matrix for calorie SUR

		To				
		0-20	20-40	40-60	60-80	80-100
From	0-20	0.625	0.125	0.125	0.125	0.000
	20-40	0.200	0.300	0.300	0.200	0.000
	40-60	0.222	0.333	0.111	0.333	0.000
	60-80	0.000	0.300	0.200	0.100	0.400
	80-100	0.000	0.000	0.222	0.333	0.444

Note: 0 - 20 stands for the bin from 0 percentile to 20 percentile.



De-trended price vs. SUR for wheat



De-trended price vs. SUR for calorie

CONCLUSIONS

1. We provide a methodological approach to identify critical stocks-to-use ratios (SURs) for major grains and total cereals.
2. We show evidence of strong substitution between major grains as sources of calories.
3. Our critical values for SURs for aggregate grain can be useful indicators of vulnerability to spikes when the associated price shows no cause for concern.
4. Our results hint that stocks data, though no doubt unreliable, can be valuable complements to price data as indicators of vulnerability to shortages and price spikes.