Commodity Market Instability and Development Policies

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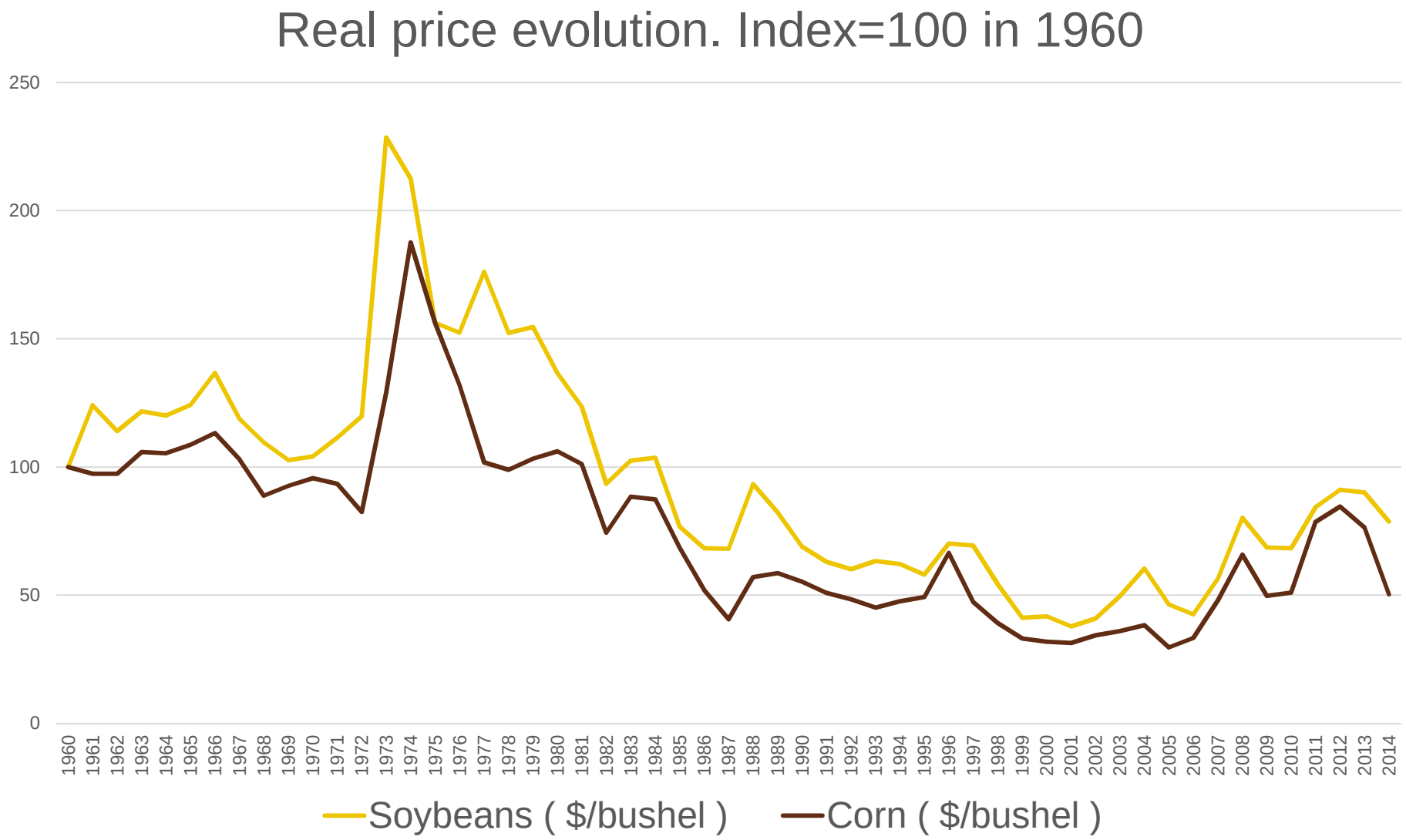
What we learned from 2007-08?


Real price evolution. Index=100 in 1960
250
200
150
100
50
0
1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014
Soybeans ($/bushel)
Corn ($/bushel)

Measuring Excessive Price Volatility

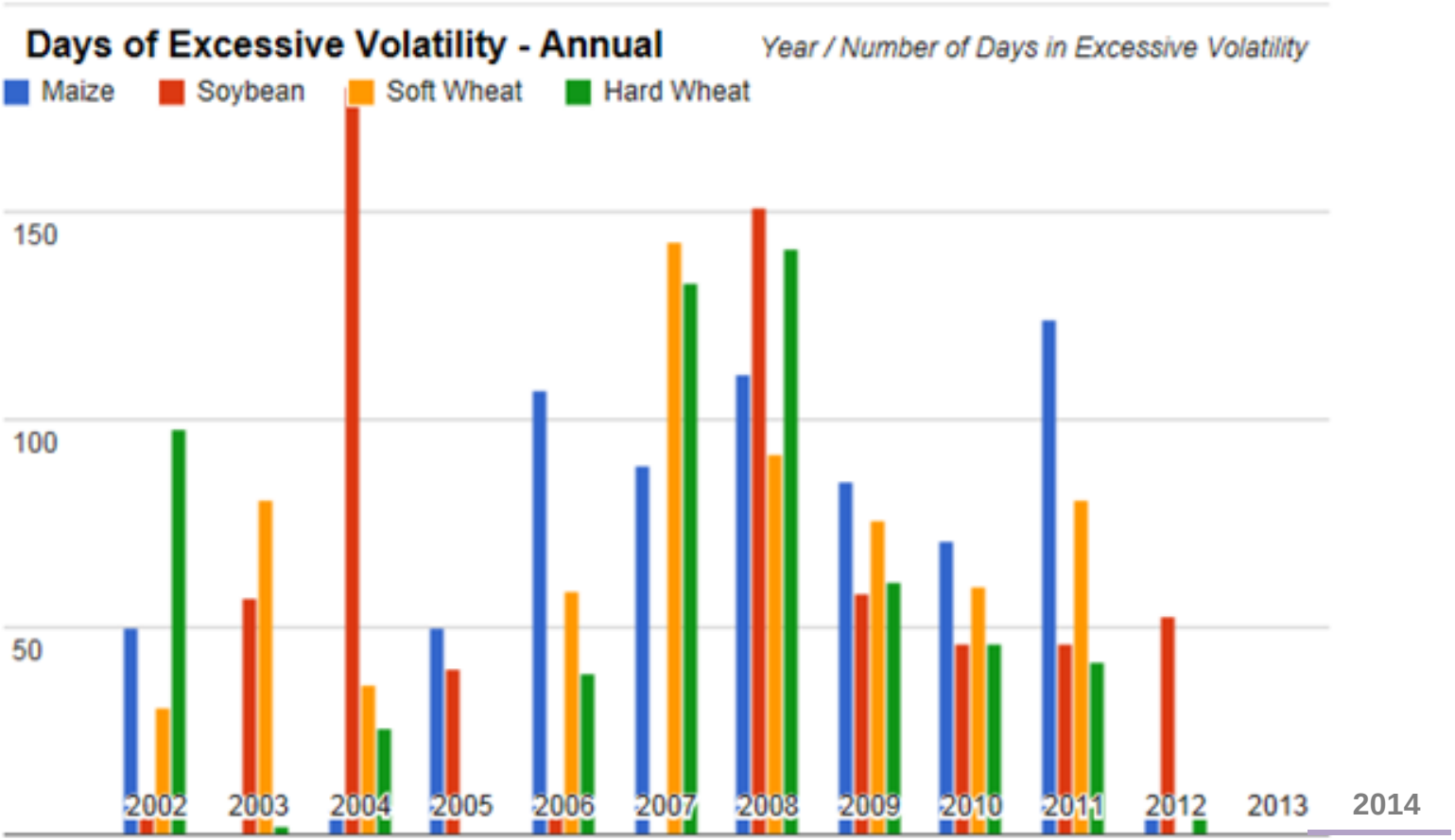
- NEXQ (Nonparametric Extreme Quantile Model) is used to identify periods of excessive volatility [www.foodsecurityportal.org/excessive-food-price-variability-early-warning-system-launched]

- First we estimate a dynamic model of the daily evolution of returns using historic information of prices since 1954. The model is a fully *nonparametric location scale model (mean and variance through time can vary with time)¨*

- Second we combine the model with the extreme value theory to estimate quantiles of higher order of the series of returns allowing us to classify each return as extremely high or not.

- Finally, the periods of excessive volatility are identified using a binomial statistic test that is applied to the frequency in which the extreme values occur within a 60 days window

Periods of Excessive Volatility



Note: This figure shows the results of a model of the dynamic evolution of daily returns based on historical data going back to 1954 (known as the Nonparametric Extreme Quantile (NEXQ) Model). This model is then combined with extreme value theory to estimate higher-order quantiles of the return series, allowing for classification of any particular realized return (that is, effective return in the futures market) as extremely high or not. A period of time characterized by extreme price variation (volatility) is a period of time in which we observe a large number of extreme positive returns. An extreme positive return is defined to be a return that exceeds a certain pre-established threshold. This threshold is taken to be a high order (95%) conditional quantile, (i.e. a value of return that is exceeded with low probability: 5 %). One or two such returns do not necessarily indicate a period of excessive volatility. Periods of excessive volatility are identified based a statistical test applied to the number of times the extreme value occurs in a window of consecutive 60 days.

Source: Martins-Filho, Torero, and Yao 2010. See details at http://www.foodsecurityportal.org/soft-wheat-price-volatility-alert-mechanism

Two explanations for exacerbation of prices

Explanation 1: Wrong policies

Export bans and restrictions

- Because of highly concentrated markets
- Simulations based on MIRAGE model showed that this explains around 30% of the increase of prices in basic cereals

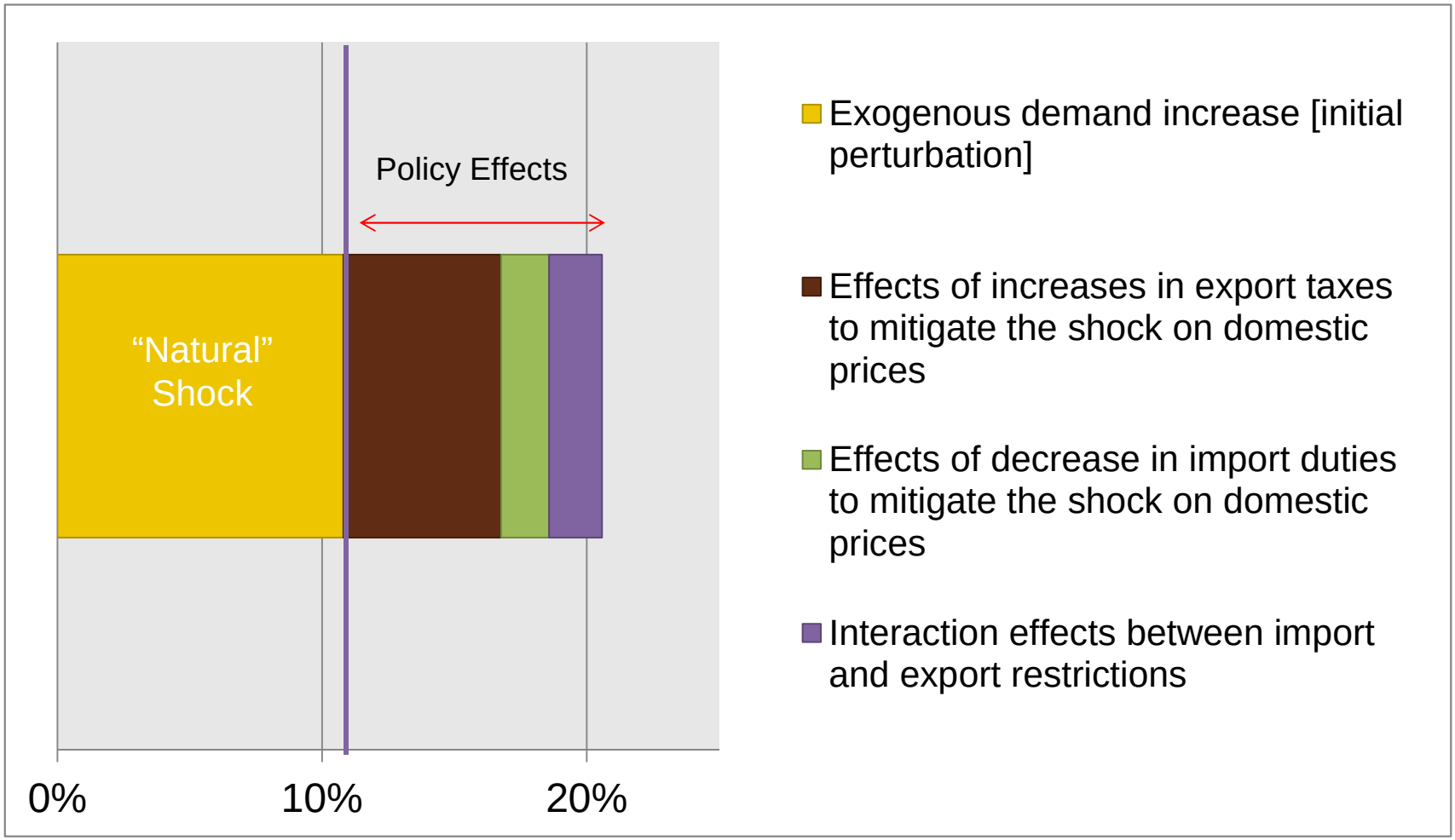
Other government policies

- National reserves
- Price stabilization
- Input subsidies
- Food subsidies

Explanation 2: Speculation in the futures markets

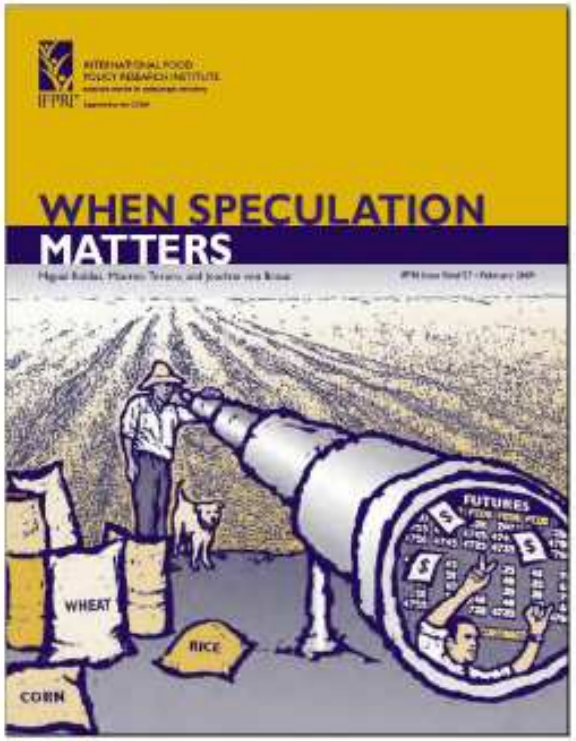
- Significant increase of volume of globally traded grain futures & options
- Governments increasingly curb hoarding (e.g. India, Pakistan, Philippines)
- Non-commercial share in future transactions increase
- etc

E1: Effects on world prices of trade policy reactions for selected countries

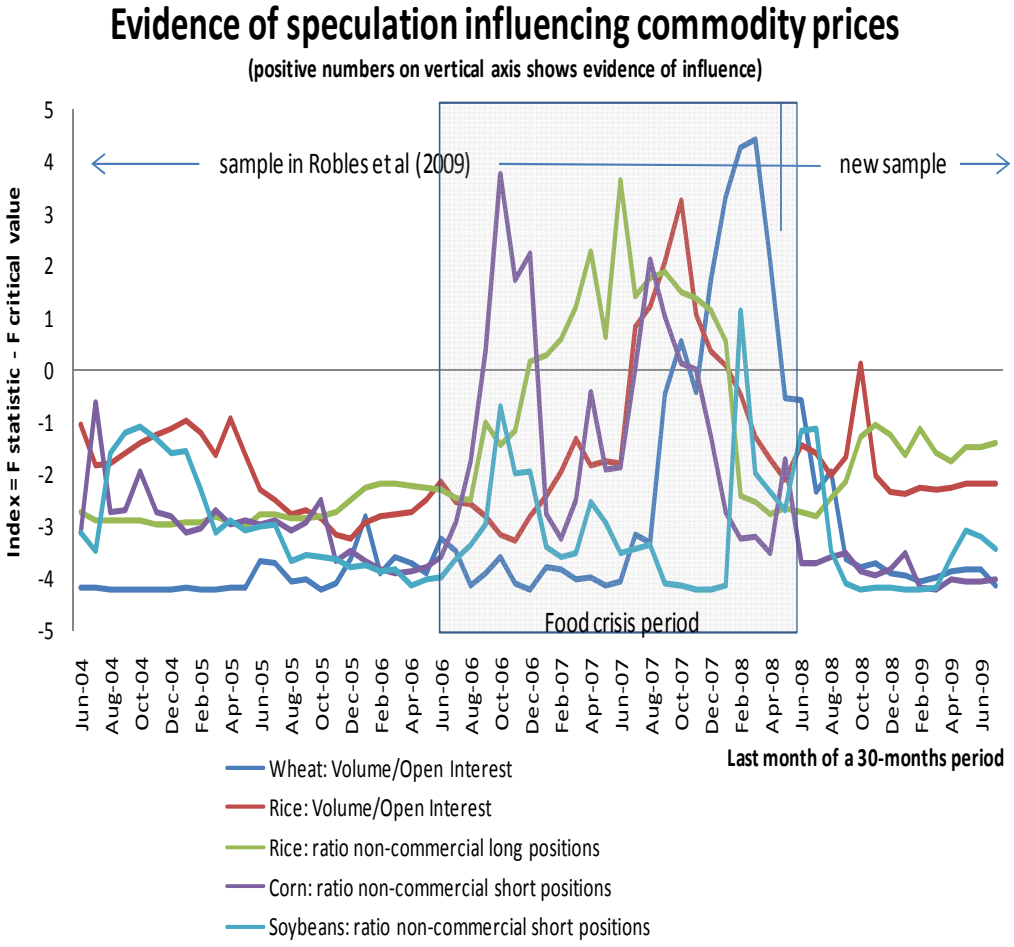


Source: Bouet and Laborde, 2009. MIRAGE simulations

Evidence of Granger causality

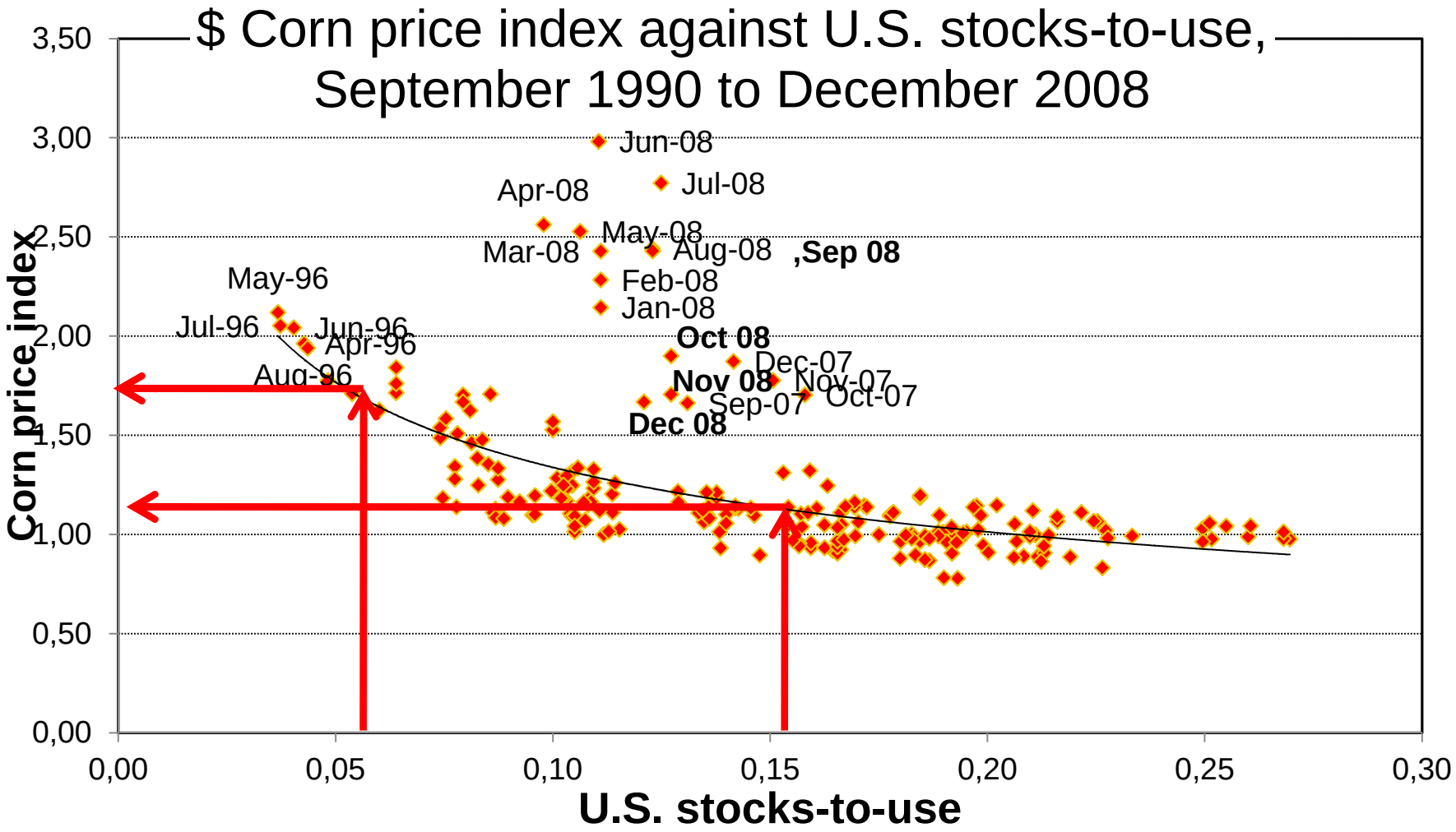


"Changes in supply and demand fundamentals cannot fully explain the recent drastic increase in food prices."



Source: Robles, Torero, and von Braun (2009)

More on financial activity and/or speculation in futures markets…



Source: Phillip Abbott (2009)

Potential impacts of financial activity and speculation on agricultural commodities prices

- Masters and White (2008)
  - “Commodity index replication trading strategies have grown from $13 billion in 2003 to $317 billion in July 2008 “at the same time, the prices for the 25 commodities that make up these indices have risen by an average of over 200%”.

- Papers that support evidence of speculation
  - Marco Lagi et al. (2011)
  - Cook and Robles (2009)
  - Mayer, 2009, Timmer, 2009, Trostle, 2008, FAO, 2010, IFPRI et al., 2011
  - David Frenk (2010) – criticizes all work of Irwin and Sanders
  - However, the econometric tests results may not lead to identify a significant effect for long periods of time (Rapsomanikis, 2009)

- Papers against evidence of speculation
  - Irwin and Sanders (2010), Irwin, S. H., Sanders, D. R., Merrin, R., P., 2009, Irwin, S., H., 2013
  - Georg Valentin Lehecka (2013)
  - Irwin, Sanders and Merrin (2009)

Effects of excessive volatility

Excessive price volatility is bad for producers

- High price volatility increase expected producer losses
- High price volatility increases misallocation of resources
- Increased price volatility through time generates the possibility of larger net returns in the short term

Effects over Consumers

Is there empirical evidence of a link between volatility of major agricultural commodities and consumer welfare?

Problems:

- Consumer welfare is notoriously difficult to measure due to income effects associated with price changes.
- It is not uncommon in developing countries for consumers to be producers of agricultural commodities.
- Models for the dynamic evolution of conditional volatility are often based on restrictive stochastic models

Measuring effects over relative prices

We then consider the following generalized nonparametric model:

$$Y_{tjF} = G\left(\mathrm{h}^{\frac{1}{2}}\left(\mathrm{r}_{\mathrm{t}-1,\ldots,}\mathrm{r}_{\mathrm{t}-\mathrm{p}}\right), \mathrm{W}_{\mathrm{tj}}\right) + \alpha_{\mathrm{j}} + \mathrm{U}_{\mathrm{tj}}$$

for $\mathrm{t} = \mathrm{p} + 1, \ldots, \mathrm{T}, \mathrm{j} = 1, \ldots, \mathrm{J}$

Where

Y_{tjF} is the relative share of the price index associated with element F of the consumption basket j,

$G(.): R \rightarrow (0,1)$ is an unknown link function,

$\mathrm{h}^{\frac{1}{2}}(.)$ *is the conditional volatility* of the commodity return process and $\{e_t\}$ is an independent identically distributed process with mean zero and variance one

$\mathrm{W}_{\mathrm{ti}} = (\mathrm{X}_{\mathrm{j}}\ \mathrm{Z}_{\mathrm{t}}\ \mathrm{V}_{\mathrm{tj}})$ is a vector containing covariates that may vary with time, with country or both (oil prices, monthly index of economic activity, imports, M1),

α_{j} are country specific fixed effects and

U_{tj} represent realizations of an independent and identically distributed stochastic process which

Impact of Wheat Volatility on Breads and Cereals

Country	Model	Result
India	Model 1	$\Theta_{VOLWCBOT}>0^*$, $\Theta_{VOLWKCBT}>0^*$
	Model 2	$\Theta_{LVOLWCBOT}<0$, $\Theta_{LVOLWKCBT}>0^*$
El Salvador	Model 1	$\Theta_{VOLWCBOT}>0$, $\Theta_{VOLWKCBT}>0$ *
	Model 2	$\Theta_{LVOLWCBOT}<0^*$, $\Theta_{LVOLWKCBT}>0^*$
Guatemala	Model 1	$\Theta_{VOLWCBOT}<0$, $\Theta_{VOLWKCBT}>0$
	Model 2	$\Theta_{LVOLWCBOT}<0^*$, $\Theta_{LVOLWKCBT}>0^*$
Honduras	Model 1	$\Theta_{VOLWCBOT}>0^*$, $\Theta_{VOLWKCBT}>0^*$
	Model 2	$\Theta_{LVOLWCBOT}>0^*$, $\Theta_{LVOLWKCBT}>0^*$
Nicaragua	Model 1	$\Theta_{VOLWCBOT}>0$, $\Theta_{VOLWKCBT}>0^*$
	Model 2	$\Theta_{LVOLWCBOT}<0$, $\Theta_{LVOLWKCBT}>0$
Panama	Model 1	$\Theta_{VOLWCBOT}>0$, $\Theta_{VOLWKCBT}>0$
	Model 2	$\Theta_{LVOLWCBOT}>0^*$, $\Theta_{LVOLWKCBT}>0$
Peru	Model 1	$\Theta_{VOLWCBOT}<0$, $\Theta_{VOLWKCBT}>0^*$
	Model 2	$\Theta_{LVOLWCBOT}<0$, $\Theta_{LVOLWKCBT}>0^*$

* Indicates significant at the 0.95 level

What to do?

At the global level

Option 1: Physical reserves

- **Determination of optimum stock, which is politically loaded**,
  - Predicting supply and demand and where the potential shortfalls in the market may be can be extremely difficult
  - Reserves are dependent on transparent and accountable governance

- **Level of costs / losses**
  - Reserves cost money and stocks must be rotated regularly
  - The countries that most need reserves are generally those least able to afford the costs and oversight necessary for maintaining them
  - The private sector is better financed, better informed, and politically powerful, putting them in a much better position to compete

- **Uncertainties that strategic reserves can bring about in the market place**.
  - Reserves distort markets and mismanagement and corruption can exacerbate hunger rather than resolving problems

Option 2: Regulation of Future exchanges

Should we reform commodity exchanges by:

- limiting the volume of speculation relative to hedging through regulation;
- making delivery on contracts or portions of contracts compulsory; and/or
- imposing additional capital deposit requirements on futures transactions.

Answer: Requires several conditions to be effective

Problem 1: not binding regulation - we have seen triggers were not activated and also not clear incentives. On option is to use the excessive volatility measure as a trigger.

Problem 2: Inter-linkages between exchanges

Option 2: Regulation of Future exchanges

Methodology: We use three MGARCH models: the interrelations between markets are captured through a conditional variance matrix *H*, whose specification may result in a tradeoff between flexibility and parsimony. We use three different specifications for robustness checks:

- Full T-BEKK models (BEKK stands for Baba, Engle, Kraft and Kroner), are flexible but require many parameters for more than four series.
- Diagonal T-BEKK models are much more parsimonious but very restrictive for the cross-dynamics.
- Constant Conditional Correlation Model (CCC) models allow, in turn, to separately specify variances and correlations but imposing a time-invariant correlation matrix across markets.

Data:

- In the case of corn, we examine market interdependence and volatility transmission between USA (CBOT), Europe/France (MATIF) and China (Dalian-DCE);
- for wheat, between USA, Europe/London (LIFFE) and China (Zhengzhou-ZCE); and for soybeans, between USA, China (DCE) and Japan (Tokyo-TGE).
- We focus on the nearby futures contract in each market and account for the potential impact of exchange rates on the futures returns and for the difference in trading hours across markets.

Source: Hernandez, Ibarra and Trupkin (2011)

Option 2: Regulation of Future exchanges

- The results show that the correlations between exchanges are positive and clearly significant for the three agricultural commodities, which implies that there is volatility transmission across markets.

- In general, we observe that the interaction between USA (CBOT) and the rest of the markets considered (Europe and Asia) is higher compared with the interaction within the latter.

Source: Hernandez, Ibarra and Trupkin (2011)

Pope says food commodity speculation hurts fight against hunger

BY PHILIP PULLELLA

ROME | Thu Nov 20, 2014 7:19am EST

1 OF 2. Pope Francis walks with U.N. Food and Agriculture Organization (FAO) Director-General Jose Graziano da Silva as he leaves at the end of a meeting at the FAO headquarters in Rome November 20, 2014.

CREDIT: REUTERS/ANDREAS SOLARO/POOL

Option 3: AMIS

- Better information of reserves for key staples
- Early warning system of prices and excessive volatility
- Modeling and better forecasting prices and volatility
- Understanding price transmission to consumers and producers

At the country level

What to do?

- **In the short and medium term**: Market-Based Hedging Strategies for coping with excessive volatility

- **In the short term** – Targeted cash transfers (conditional or unconditional) for the most vulnerable groups

- **In the medium and long term**: Measures to access to trade, increase productivity, sustainability and resilience of agriculture

Market-Based Hedging Strategies

- In countries with well-integrated commodity exchanges: mechanisms of financial hedges and physical commodity hedges, which integrate price protection into a physical import or export agreement, may be more feasible
- In countries that don't have this: it is important first to build the necessary institutional arrangements to advocate for financial risk management instruments
- Use of weather or catastrophe risk transfer instruments should be specially considered

Final Remarks

- Volatility is normal in agriculture the problem is excessive volatility
- NEXQ provided an statistical consistent measure of excessive volatility
- **Since 2013 we don’t face periods of excessive volatility**
- Excessive volatility affect consumers through prices
- Excessive volatility affect producers, there is a monotonically increasing relationship between volatility and producer losses
- Excessive volatility increases possibility of larger net returns and can let to increase potentially speculative trading

Thanks