World Food Prices and Monetary Policy

Luis A. V. Catão
IMF

Roberto Chang
Rutgers and NBER

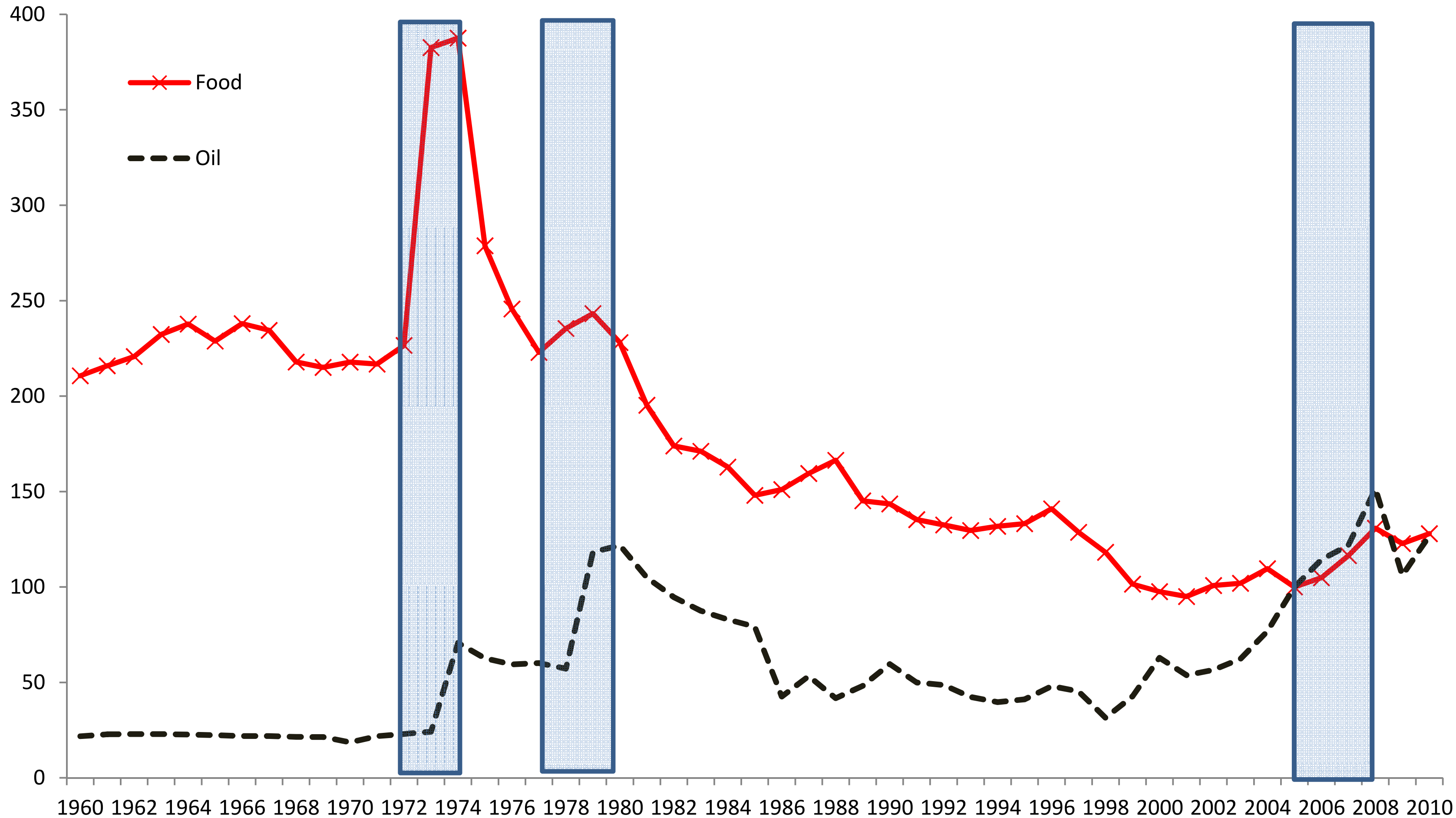
April 2016

Questions We Address:

- Why global food price shocks matter for monetary policy and (arguably) the more so than oil price shocks?
- How far should monetary policy accommodate such shocks?
- In particular, which *implementable* monetary policy rule gets closer to optimal policy in those circumstances?
- How does that change with financial market incompleteness and the economy's "size"?

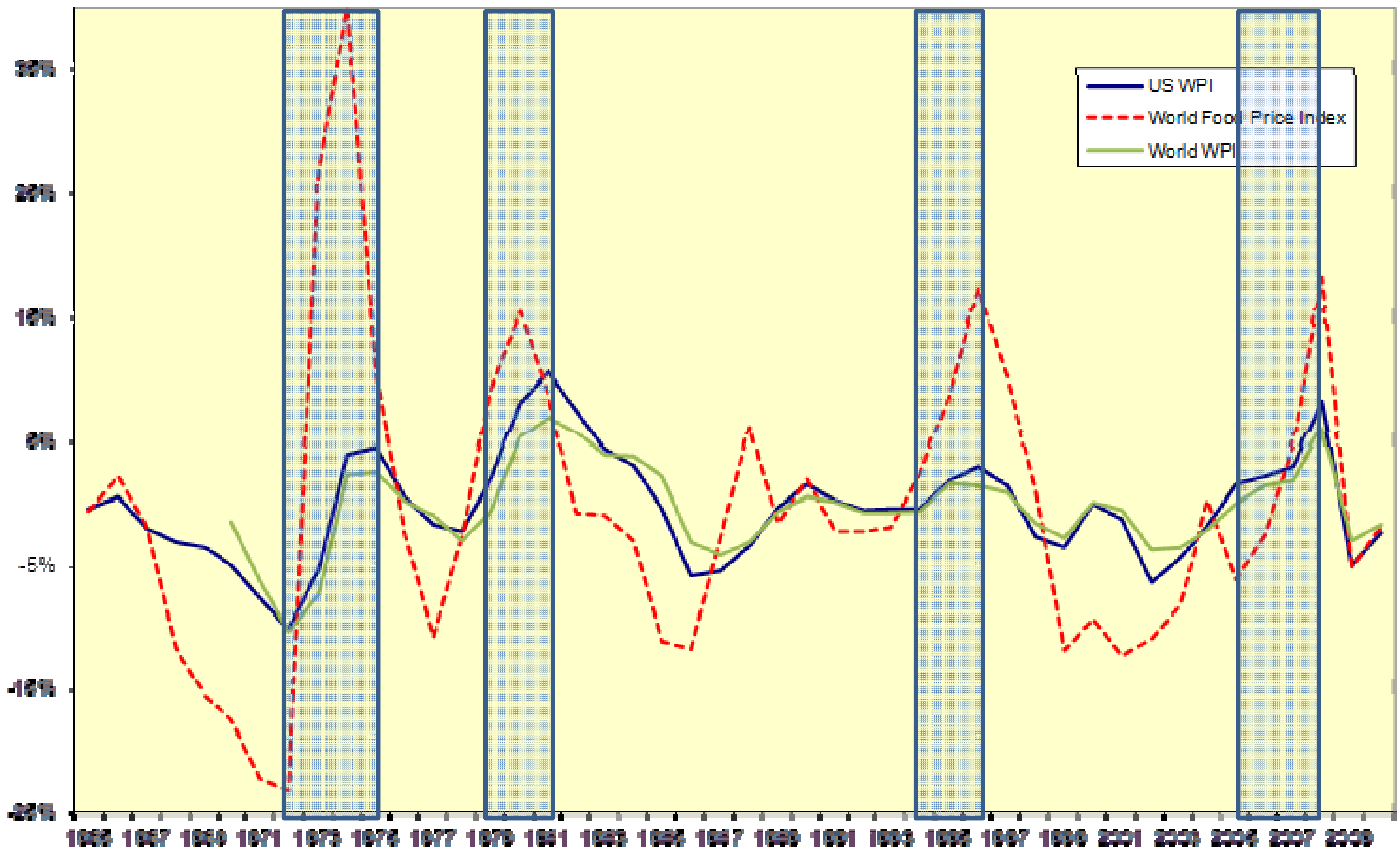
SF 1: Food and Oil Prices Co-Move and the More so around Global Inflation Run-Ups

Figure 1. Food and Oil Commodity Price Indices
(deflated by US manufacturing price index, 2005=100)



SF 2.a: Global food prices mostly lead global inflation

Figure 1. World WPI and World Food Price Index
(In deviations from HP-trend)



SF 2.b: Food Prices Granger-Causes Global CPI Cycles

Ordinary Least Squares Estimation
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Dependent variable is CPIWOGAP
42 observations used for estimation from 1970 to 2011
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Regressor	Coefficient	Standard Error	T-Ratio[Prob]
INPT	.2414E-3	.0014775	.16336[.871]
FOODGAP(-1)	.060204	.017416	3.4568[.001]
FOODGAP(-2)	-.031290	.017770	-1.7608[.087]
OILGAP(-1)	.0078578	.011915	.65949[.514]
OILGAP(-2)	.0028691	.0096563	.29712[.768]
CPIWOGAP(-1)	.91755	.29050	3.1585[.003]
CPIWOGAP(-2)	-.22695	.20417	-1.1116[.274]

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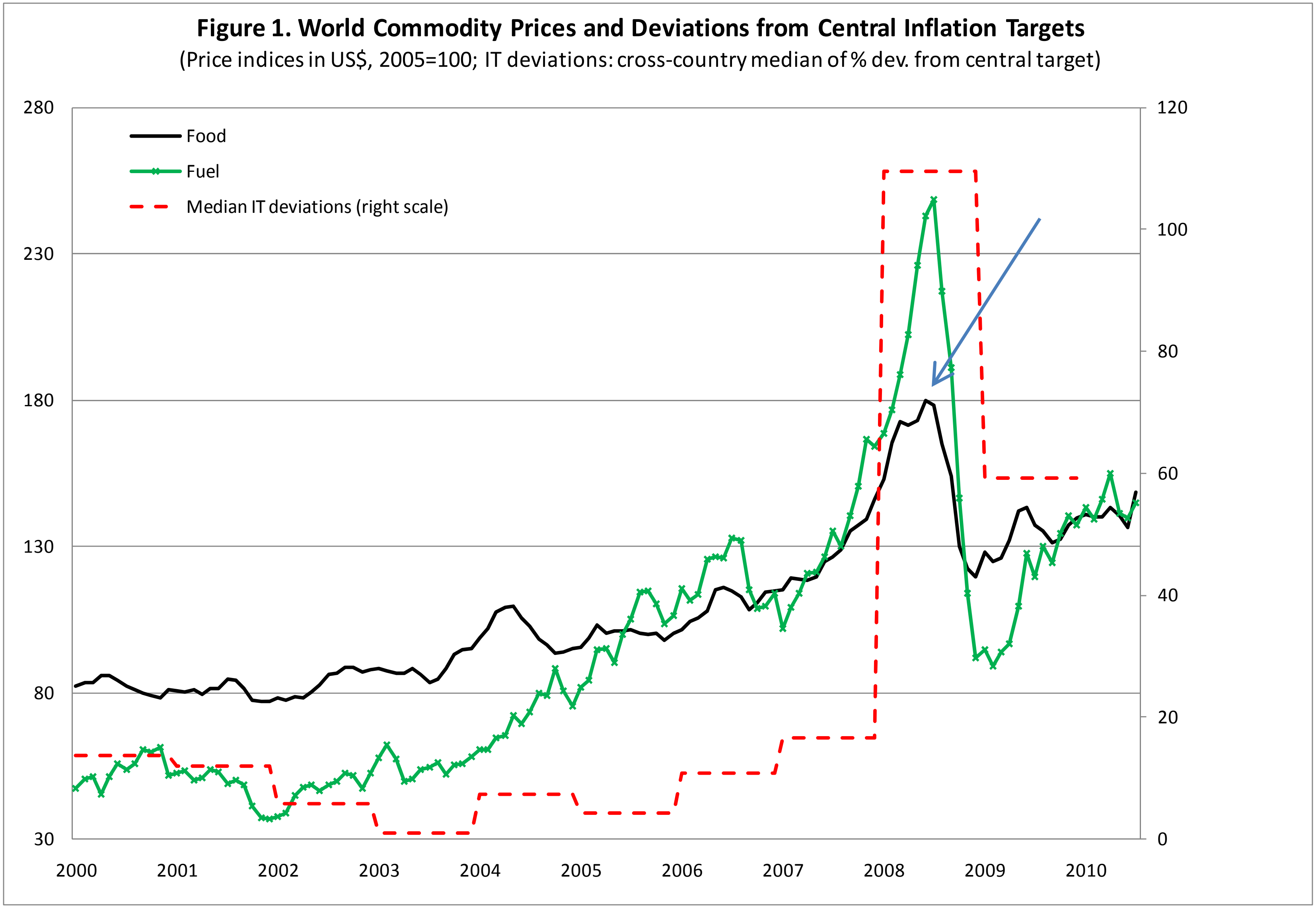
R-Squared	.83017	R-Bar-Squared	.80105
S.E. of Regression	.0095279	F-Stat. F(6,35)	28.5138[.000]
Mean of Dependent Variable	-.6164E-3	S.D. of Dependent Variable	.021361
Residual Sum of Squares	.0031773	Equation Log-likelihood	139.6816
Akaike Info. Criterion	132.6816	Schwarz Bayesian Criterion	126.5997
DW-statistic	1.8928		

F Statistic on food exclusion: F(2,35)= 6.1187[.005]

F Statistic on oil exclusion: F(2,35)= .23038[.795]

SF 3: Global Food Inflation → Larger Deviations from IT

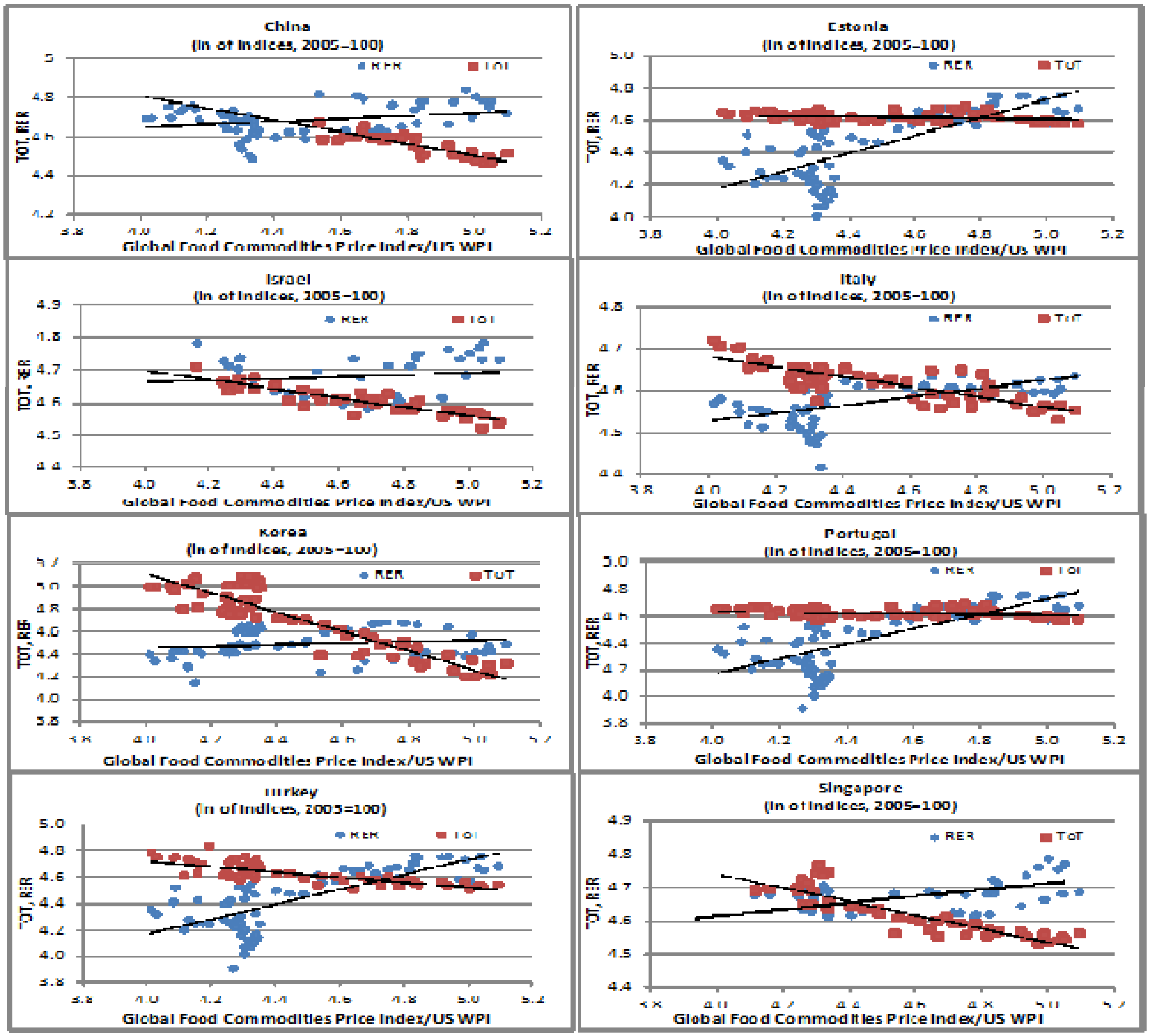


SF4: Very Distinct Food Shares in CPI across ACs and EMs

Table 1. Food Expenditure Shares in National Consumption Baskets

Austria	15.5%	Latvia	40.4%
Belgium	16.1%	Lithuania	45.5%
Bulgaria	43.4%	Luxemburg	13.6%
Chile	18.9%	Malta	34.2%
Cyprus	26.4%	Mexico	32.7%
Czech Republic	24.2%	Netherlands	11.9%
Denmark	14.0%	Panama	34.9%
Estonia	30.8%	Poland	30.4%
Finland	15.6%	Portugal	22.2%
France	15.1%	Romania	58.7%
Germany	15.6%	Slovakia	33.3%
Greece	21.3%	Slovenia	22.9%
Hungary	29.4%	Spain	25.4%
Ireland	18.0%	Sweden	12.1%
Italy	28.3%	United Kingdom	12.9%
Overall Median	**23.6%**		
Overall Mean	**25.5%**		
EM Median	**32.7%**	**EU periphery Median**	**30.4%**
EM Mean	**33.7%**	**EU periphery Mean**	**32.8%**
Advanced Median	**15.5%**	**EU core Median**	**15.3%**
Advanced Mean	**16.3%**	**EU core Mean**	**14.6%**

SF5a: Fluctuations in Pf* is associated with Negative Covariance of the Terms of Trade and the Real Exchange Rate for net food importers with high share of food in CPI



SF 5b: Negative TOT-RER Correlations due to Pf* shocks can be pervasive, as many are net food importers and higher food consumers

Table 2: Net Food Trade Balance, 2005-08
(% of imports)

Advanced Countries		Emerging Markets		LDCs	
Italy	-2%	Hong-Kong, I	-12%	Afghanistan	-56%
Korea	-4%	Colombia	-28%	Albania	-36%
Norway	-10%	Egypt	-39%	Benin	-52%
Portugal	-4%	Mexico	-20%	Egypt	-39%
Sweden	-6%	Peru	-16%	Guinea-Bissau	-45%
UK	-8%	Russia	-60%	Liberia	-37%
		Venezuela	-67%	Mozambique	-37%
				Nigeria	-34%
				Oman	-33%
				Somalia	-32%
				Tajikistan	-27%
				Turkmenistan	-58%
				Uzbekistan	-46%

Our Model Economy

Our models focuses on the “worst-sufferer” SOE case:

1. The net food importer that produces and exports a sticky price (non-commodity) good

2. The country where food weighs heavily on CPI and more so than in trading partners

➔(1)+(2) = REER and TOT will “automatically” co-move negatively!

➔ New: not a feature of the canonical SOE model!

➔ Yet, observed in quite a few countries as shown above

Literature

- Lots of work on oil – little on Food!

- Workhorse” NK **Closed** Economy Model

    (Goodfriend & King, 1999; Woodford, 2003; Gali, 2008)

- Main prescription: mitigate the sticky price (Calvo) distortion by stabilizing PPI
- Prescription stands if food/commodities are flex price goods (Aoki, 2001)
- Absent cost-push shocks and/or wage rigidities, stabilizing PPI = close the output gap, a “***divine coincidence***” (Blanchard and Gali, 2007)

- **Open** Economy: New Distortions come in

- National planner’s incentive to manipulate the NER to affect TOT (“TOT externality”) (Corsetti & Pesenti, 2001)
- Incomplete international financial markets
- And others (e.g. pricing to market)

→ Yet, it is often found that stabilizing “core” or PPI inflation is still optimal

What's new in our Model

We extend the canonical SOE model **in five directions**:

i. Food is different! We separate it from the Dixit-Stiglitz composite

ii. Global food prices (Pf*) can vary widely relative to the world CPI.

iii. Food share in domestic CPI can differ from that in world CPI;

iv. The trade price elasticity between non-food items # price substitution elasticity between food and non-food;

v. International risk sharing can be incomplete.

Preview of Findings

- Under Pf*shocks, no divine coincidence for the central banker:

  - ➢ The weight on home inflation vs. output stabilization under **optimal** policy varies on risk sharing and export elasticities → **So, no rule fits all**

- Under *full risk sharing* and *high trade elasticities*, targeting broad CPI (hence being "hawkish" to imported inflation) is welfare-superior

- But *if international risk sharing is incomplete*, targeting "core" (or PPI) inflation is often superior and a higher weight on the output gap justified

Remaining of the Talk

II. Model Outline

III. Macro Transmission of Imported Food Shocks

IV. Optimal Feasible Policy

V. Final Remarks

II. Model Outline

Preferences

$$\sum_{t=0}^{\infty}\beta^t\left[\frac{C_t^{1-\sigma}}{(1-\sigma)}-\varsigma\int_0^1\frac{N_t(j)^{1+\varphi}}{1+\varphi}dj\right]$$

where $$C_t=\left[(1-\alpha)^{1/\eta}C_{ht}^{(\eta-1)/\eta}+\alpha^{1/\eta}C_{ft}^{(\eta-1)/\eta}\right]^{\eta/(\eta-1)}$$

Prices

Domestic CPI: $$P_t=\left[(1-\alpha)P_{ht}^{1-\eta}+\alpha P_{ft}^{1-\eta}\right]^{1/(1-\eta)}$$

Food separated from home aggregate

Linearized TOT-RER relationship: $$rer_t=(1-\alpha)tot_t-p_{f_t}^{*}$$ (NEW)

→ Because of pf*, rer and tot no longer co-move in tandem necessarily!

Production side is Standard: Cobb-Douglas, no K, and Calvo Pricing

Asset Market Side:

Schumlhofer-Wohl's (2011) risk sharing specification:

$$C_t^{\sigma}[1+\varpi\Phi_{Ct}] = \kappa RER_t (C_t^*)^{\sigma}$$

where $\Phi(C,H) = \frac{C}{2}\left(\log\left(\frac{C}{YP_h/P}\right)\right)^2$

Linearizing yields:

$$c_t = \psi[\tfrac{1}{\sigma} rer_t + c_t^*] + (1-\psi)[p_{ht} + y_{ht}]$$

NEW

$\psi = 1$ ➔ Frictionless asset market i.e., full international risk sharing

$\psi = 0$ ➔ Financial autarky: consumption is a sole function of domestic income adjusted for GDP/CPI ratio

Overall Model Linearizes Neatly into 4 Equations:

$$c_t = \psi[\tfrac{1}{\sigma} rer_t + c_t^*] + (1-\psi)[p_{ht} + y_{ht}]$$ Risk sharing

$$(1-\alpha)p_{ht} = -\alpha(rer_t + p_{ft}^*)$$ Price index

$$y_{ht} = \omega c_t + (1-\omega)c_t^* - [\eta\omega + \gamma(1-\omega)]p_{ht} + \gamma(1-\omega)rer_t$$ Market clearing

$$\pi_{ht} = \beta E_t \pi_{ht+1} + \lambda[\sigma c_t + \varphi y_{ht} - p_{ht} - (1+\varphi)a_t]$$ NKPC

The model closes with a specification for the shocks and a monetary policy rule. E.g.:

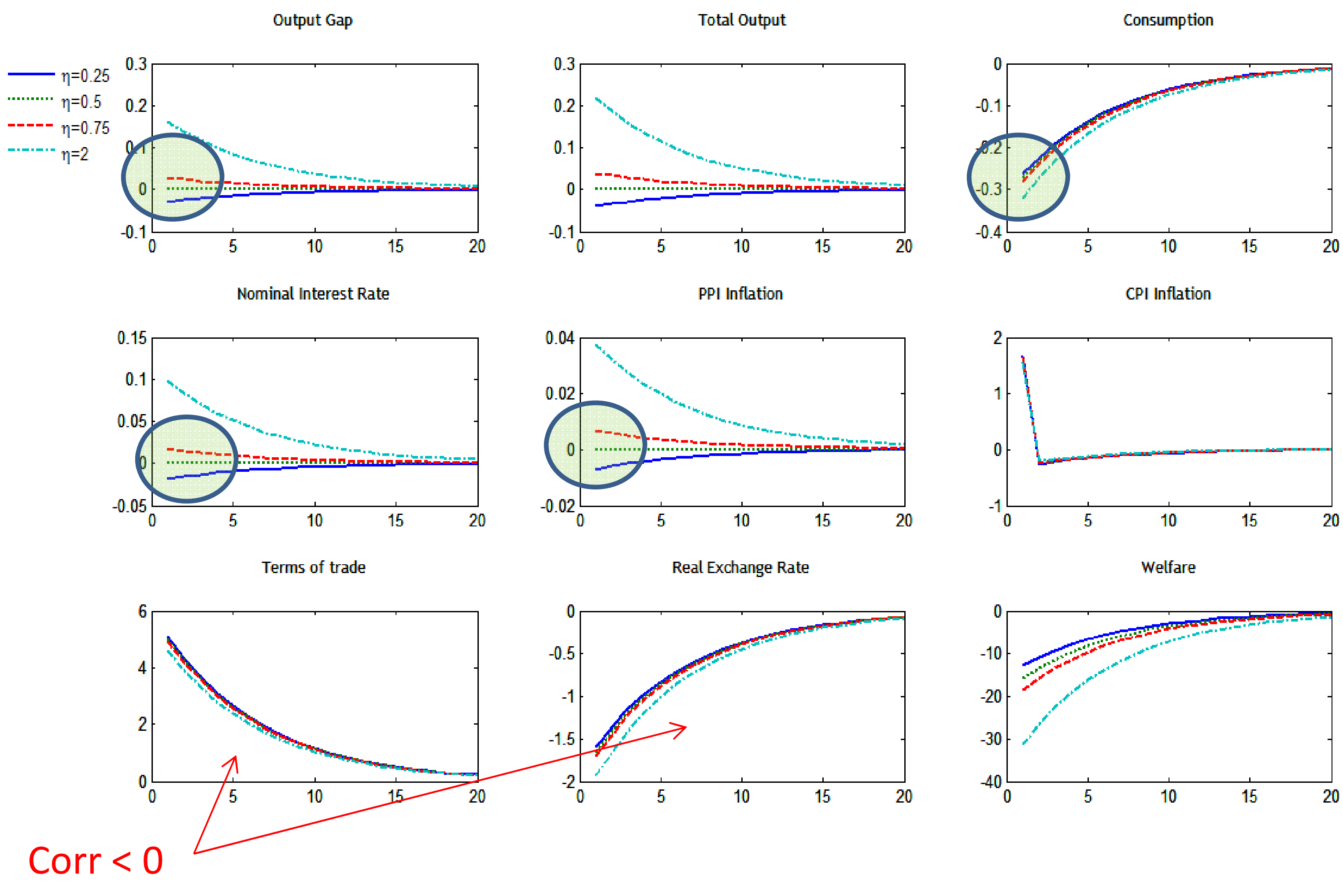
$$p_{f_t}^* = \rho_z p_{f_{t-1}}^* + \epsilon_t$$

$$i_t = \phi_y \tilde{y}_t + \phi_\pi \pi_{xt}$$

III. Business Cycle Transmission

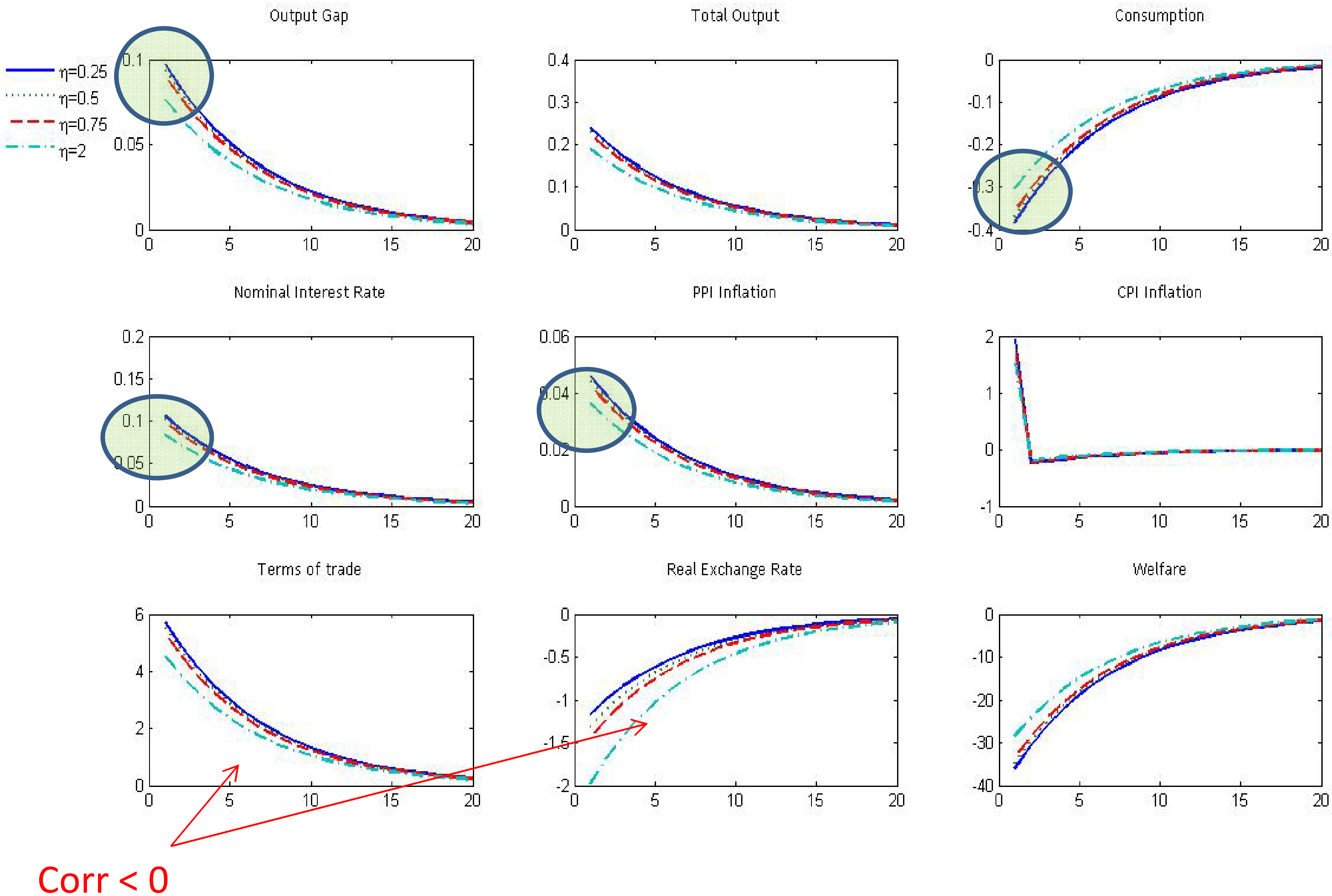
Impulse-Response to a standard deviation of food price shocks under **complete markets** and **“core” IT**

(σ=2; γ=5; φ=1)



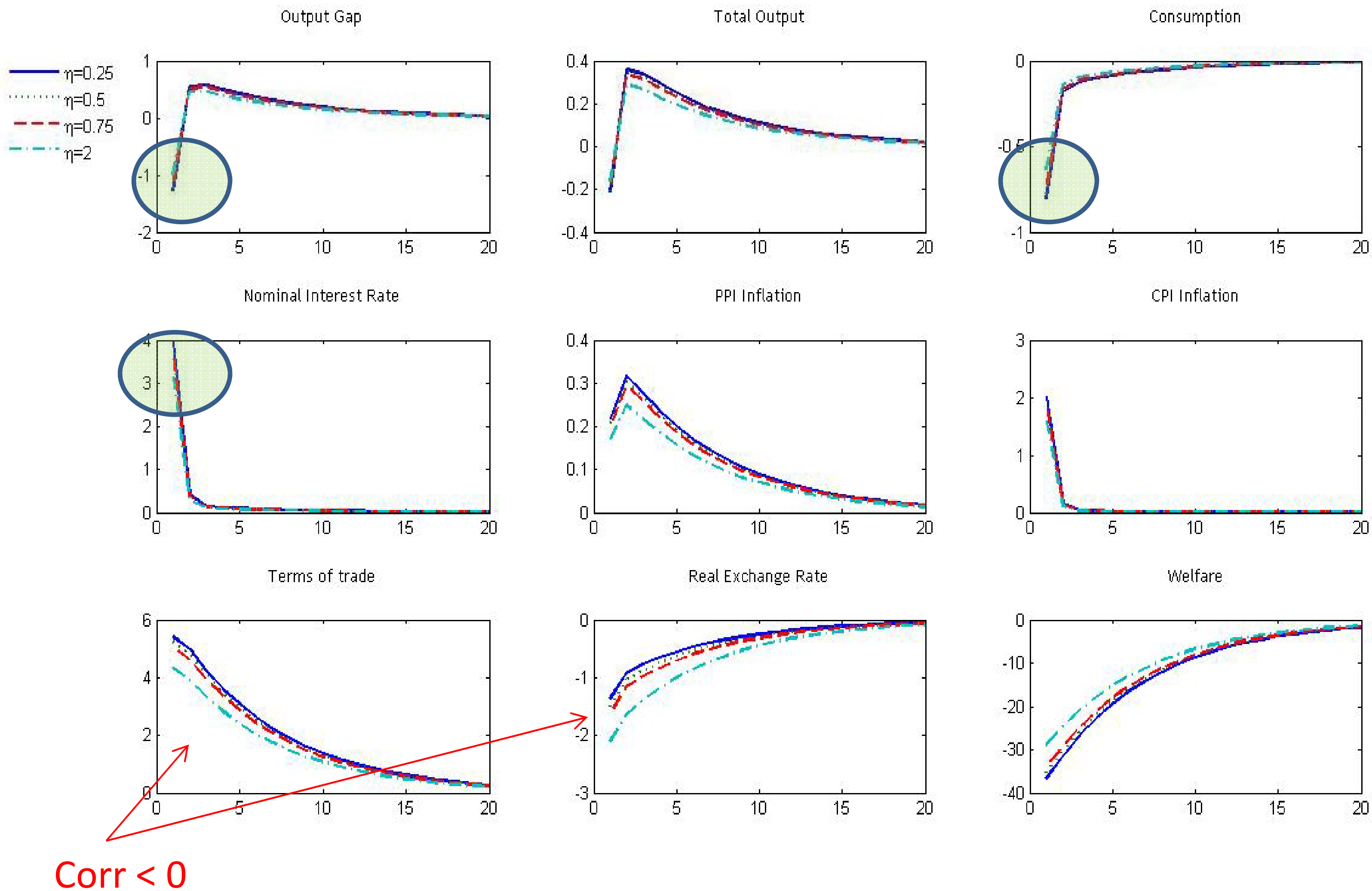
Impulse-Response to a standard deviation of food price shock under **financial autarky** and **PPI IT**

(σ=2; γ=5; φ=1)



Impulse-Response to a standard deviation of food price shock under **financial autarky** and broad **CPI IT**

(σ=2; γ=5; φ=1)



III. Optimal Feasible Policy

The central banker's optimal policy for this model economy involves the minimization of the following expression:

$$-E\sum_{t=0}^{\infty}\beta^t\left[\tfrac{1}{2}l_y(\hat{y}_t-\tilde{e}_t)^2+\tfrac{1}{2}l_\pi\pi_{ht}^2\right]$$

Looks familiar except that target output e is a complex combination of shocks – notably, global food price shocks.

Note how inflation to be targeted is the "home" (h) good inflation, i.e., close to the concept of "core" rather than headline CPI.

Yet, the ("dovish") central banker still has to establish the optimal weights on the output gap (ly) and the optimal weight of food in target output e.

Table 2. Calibrated Weights in the Optimal Policy Rule

a) Relative Weight of Output

ψ	Unit Elasticities	η = 0.25	η = 0.25 and γ=5
1	0.200	0.217	1.968
0.8	0.200	0.225	0.352
0.6	0.200	0.238	0.262
0.4	0.200	0.258	0.240
0.2	0.200	0.300	0.246
0	0.200	0.296	0.201

b) Relative Weight of Food Price Shock in Target Output

ψ	Unit Elasticities	η = 0.25	η = 0.25 and γ=5
1	0	-0.173	-0.372
0.8	0	-0.199	-0.152
0.6	0	-0.231	-0.078
0.4	0	-0.271	-0.043
0.2	0	-0.321	-0.020
0	0	-0.324	-0.022

V. Upshot

Food inflation has long played a key role in inflationary outbursts, so it is surprising the little attention paid to it in monetary policy models

We fill some of this lacunae for a specific case: the "worst sufferer" net food importing SOE

The welfare superiority of targeting either broad or "core" CPI hinges on the degree of international financial integration and non-food trade elasticities.

Generally, if international financial frictions are trivial and trade price elasticities are high (as in many AE SOE), targeting broad CPI has a welfare-enhancing edge.

Yet, even small departures of complete markets can make PPI (or "core" inflation) targeting welfare-superior, and call for more weight on the output gap.

<u>Bottom-line</u>: under large global food price shocks, no one-size-fits all in terms of optimal monetary accommodation, but some useful guidelines emerge from this paper's analysis.