

Managing Wheat Price Volatility in India

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Food security in India

- Food security: top priority for policy makers

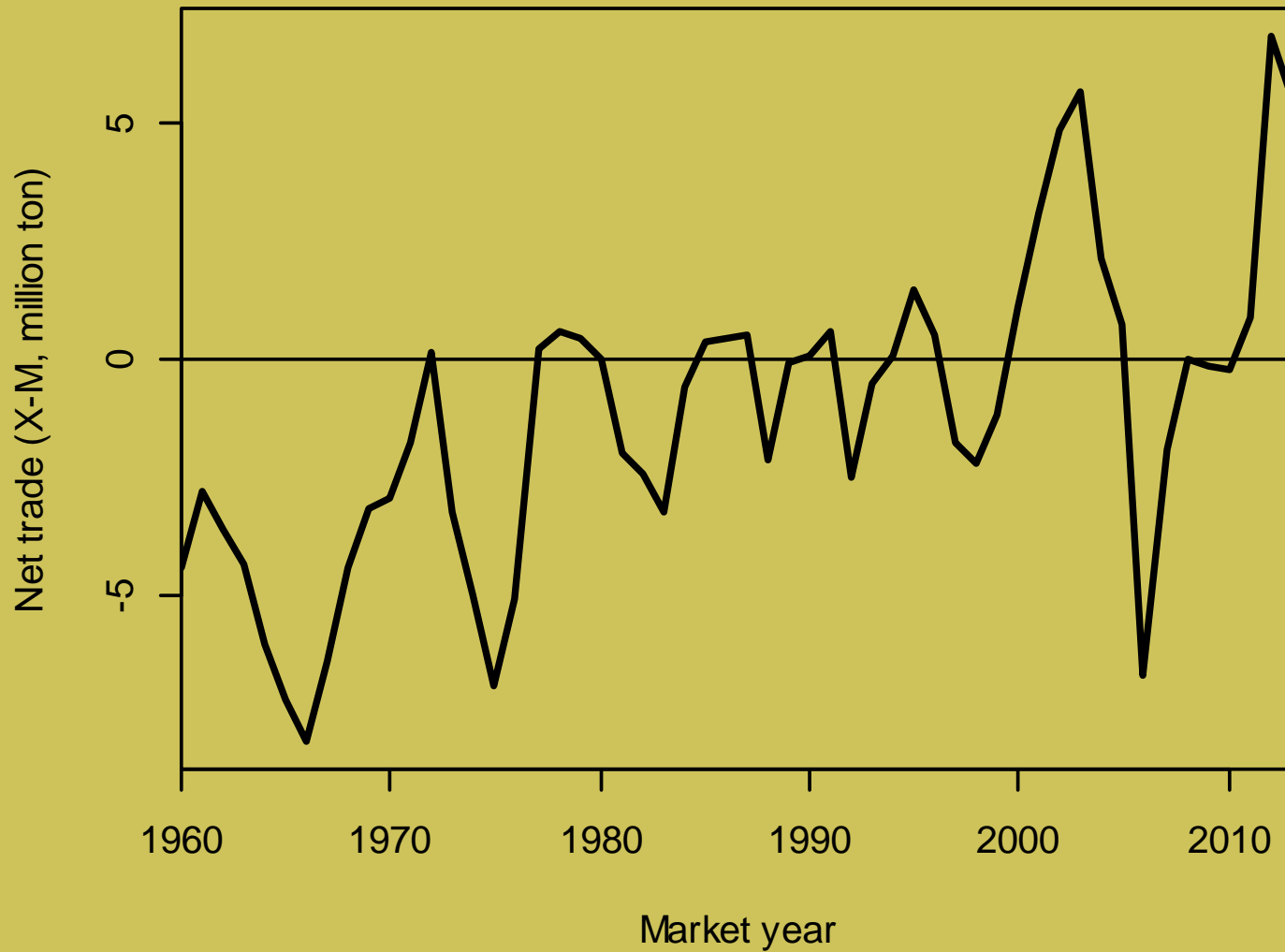


Food security in



India's wheat market

From importer to exporter

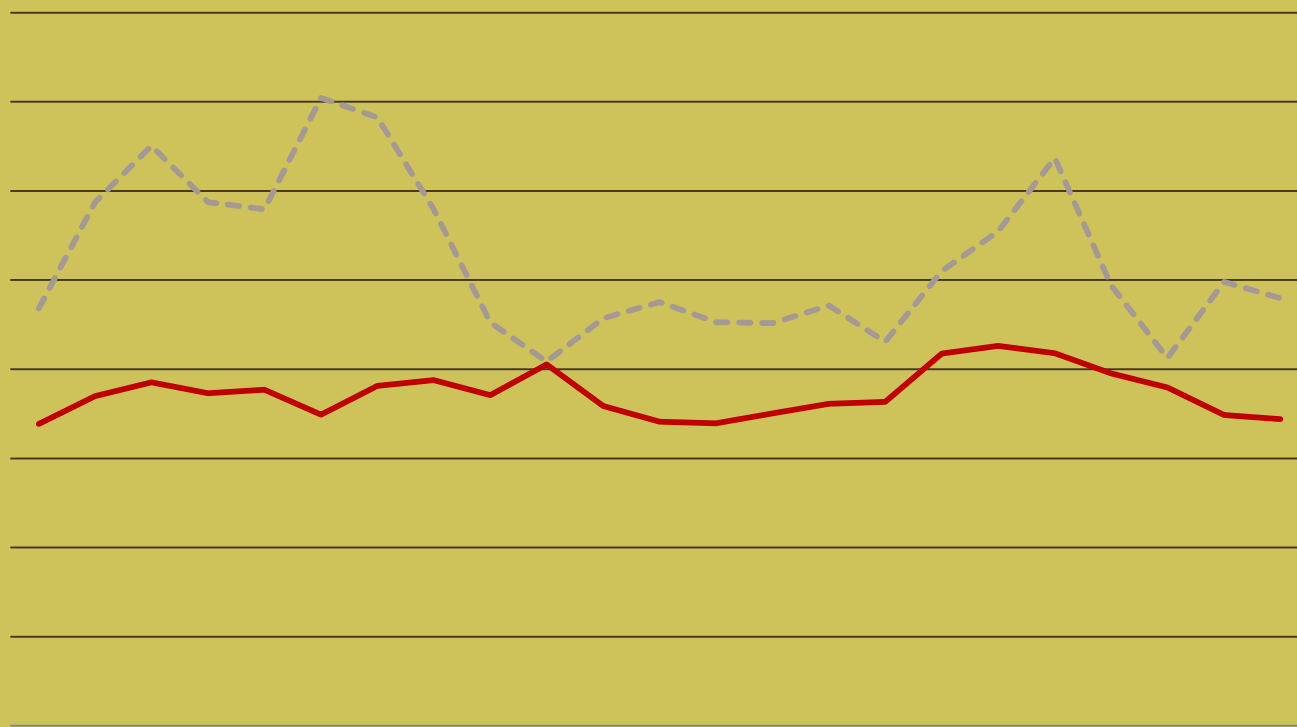




Stable Production

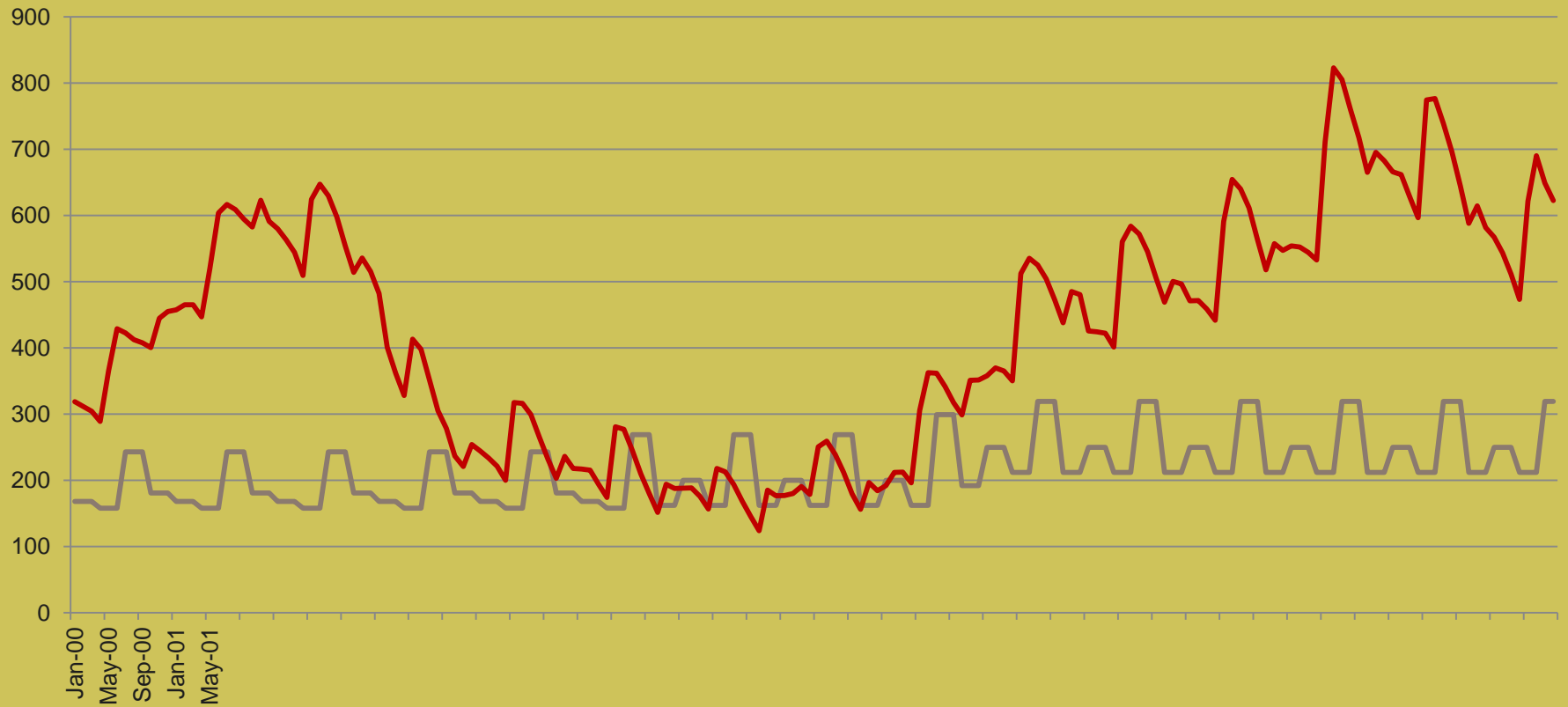


Stable domestic market





Grain stocks vs norms





Questions

- What are the implications of current policies?
 - For India and the world market
- Can a model identify better policies?
 - What is the optimalof storage and trade policies?
- Can simple rules yield similar results?



Modeling India's Wheat Market



Key features

- 2-country stochastic rational-expectations partial equilibrium model
 - India () & the Rest of the World ()
 - Production, consumption, storage & trade
- A social welfare



Producers & Consumers

Producers respond to expected prices:

© Š ()



Stocks & trade

Private



Welfare

Welfare: sum of surpluses + loss function.

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Where C is the cost function, R is the revenue function, B is the benefit function, L is the loss function, P is the price, Q is the quantity, D is the demand function, S is the supply function, E is the equilibrium, C is the cost, R is the revenue, B is the benefit, L is the loss, P is the price, Q is the quantity, D is the demand function, S is the supply function, E is the equilibrium.





Parameter Values

Parameter	Value
India's Demand Elasticity	-0.3
ROW Demand Elasticity	-0.12
Wheat budget share %	10
Supply Elasticity	0.2
Private Storage Cost per ton	\$22
Public Storage Cost per ton (source: FCI)	\$87
Trade Costs per ton	
- Import	\$65
-Export	\$35
Standard deviation of production shocks in India and in ROW %	3.5



Estimating trade insulation

- Neglecting trade costs and assuming trade:
 -
- Prices likely cointegrated, so estimation in level would capture their long-run dynamics, not short-



Solution methods

- Rational expectations storage models do not have closed form solutions.
- The solution is approximated by numerical methods
 - Projection methods: grid of points on state variables on which the model has to hold exactly.
 - Spline interpolation between grid points.
- RECS solver (<http://www.recs-solver.org/>)

Impacts on welfare

	Laissez-faire	Trade policy	Storage policy	Both
Mean price%		-2.8	0.01	-3.3
Price CV (%)	14.4	10.7	10.1	3.1
Ave. Public storage	0	0	4.2	10.4
Ave. Private storage	0.10	0.02	0	0
RoW Price CV (%)	20.7	24.0	19.6	23.3
Contributions to India's Welfare (% of consumption expense)				
Cons Surplus		2.4	-1.3	2.1
Prod Surplus		-2.7	1.4	-2.2
Storage cost		0.0	-2.2	-3.7
Trade cost		0.08	0.0	0.13
Reduction in volatility cost		0.4	0.3	0.7
Total India welfare		0.2	-1.8	-3.0



Impacts of optimal policies & optimal simple rules



Fully optimal Policies

- Identify an active policy to maximize welfare
 - Model chooses trade tax & public storage levels
 - State-contingent policies (depend on current availability in the 2 regions and on history of the states: policies under commitment).
 - Analyze for different degrees of preference for price stability
- Allow to identify the best policy options, but
 - Very complex policies
 - Policies are function of variables that are not observable (e3st3x3(pli




Optimal simple rules

- Compare with Simple – and potentially more tractable – rules for policy
 - Rules

Key impacts,

	Laissez-faire	Optimal Policy	Simple Rules	Current Policies
Mean price%		-2.8	-2.3	-3.3
Price CV %	14.4	4.8	8.5	3.1
Average Storage	0.10	0.95	0.95	12.5
RoW Price CV %	20.7	22.7	22.5	23.3
Contributions to India's Welfare (% of consumption expense)				
Consumer Surplus		1.66	1.70	2.1
Producer Surplus		-1.79	-1.84	-2.2
Storage cost		-0.09	-0.12	-3.7
Trade cost		0.11	0.17	0.13
Reduction in volatility cost		0.57	0.49	0.7



Optimal policies vs simple rules

	Share of total welfare achieved by optimal simple rules
0	77.8%
3	85.8%
6	86.3%
9	86.1%
12	85.7%

Optimal simple rules achieves less welfare gains when :

- Gains come from terms-of-trade manipulation.
- OSR are not designed for this.

Optimal simple rules as

Variables	0	3	6	9	12
Price insulation ()	-0.17	-0.41	-0.49	-0.53	-0.55
Storage subsidy ()	0.02	0.72	0.97	1.08	1.15
Mean price %	0.0	-1.2	-1.5	-1.6	-1.7
Price CV (%)	12.8	9.9	8.5	7.8	7.2
Ave Private Storage	0.1	0.5	1.0	1.3	1.7
Contributions to India's Welfare (% of consumption expense)					
Consumer Surplus	0.64	1.53	1.70	1.77	1.80
Producer Surplus	-0.72	-1.68	-1.84	-1.91	-1.94
Storage cost	0.00	-0.05	-0.12	-0.17	-0.22
Trade cost	0.10	0.16	0.17	0.18	0.18
Reduction in volatility cost	0.00	0.21	0.49	0.79	1.10
Total India welfare	0.02	0.17	0.40	0.66	0.92



With high storage costs?

- Previous results based private storage costs.
- Optimal policies with current public costs (4x)?
 - Annual cost of storage = 61% of steady-state price.
- Optimal simple rule implies negligible levels of stocks
 - Better to let annual stocks be carried out in the RoW and to use trade policy to stabilize domestic market.





Thank you!

