Optimal food price stabilisation in a small open developing country

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Motivation

- Large use of trade policies in the two recent food price spikes (evidence of counter-cyclical agricultural trade policies, Andersen & Nelgen, 2010):
  - Exporters have used export restrictions to isolate their markets.
  - Many importers move their tariffs to reduce their domestic price volatility.
- Very non-cooperative policies but potentially quite effective at stabilising domestic prices.
- Large use of stocks

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- Large use of stocks (but not always in the good direction).

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$\hookrightarrow$ Understand the motivations for and consequences of using trade and storage policies for price stabilisation purposes.

Questions

Normative approach

What is the optimal food price stabilisation policy in a small open economy when consumers are risk-averse?

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$\rightarrow$ optimal reaction of a country **neglecting the international consequences of its actions**

($\neq$ policy recommendations)

Our approach

Model accounting for trade and storage decisions in a stochastic context with domestic and world yield shocks.

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Set-up

- Market incompleteness in the storage-trade model. Consumers are assumed to be risk averse and lack insurance possibilities.
- Optimal price stabilisation policies to correct for the imperfection.

The model

Overview

- Close to Williams & Wright (1991).
- Infinite horizon partial equilibrium model with rational expectations.
- A risk-neutral storer.
- A risk-averse consumer.
- Inelastic stochastic supply.
- International trade (small country assumption).
- Normally self-sufficient country.

The model

Speculative storer

Classical storage arbitrage equation – Zero-profit condition

$$S_t \geq 0 \quad \perp \quad \beta \underbrace{\mathrm{E}_t\left(P_{t+1}\right)}_{\text{Rational expectations}} + \zeta_t - P_t - k \leq 0,$$

with

k unit physical storage cost.

ζ_t storage subsidy.

The model

International trade

Arbitrage at the export and import parity prices

$$
\begin{aligned}
M_t \geq 0 \quad &\perp \quad P_t - \nu_t^M - \overbrace{\left(P_t^w + \tau\right)}^{\text{Import parity price}} \leq 0, \\
X_t \geq 0 \quad &\perp \quad \underbrace{\left(P_t^w - \tau\right)}_{\text{Export parity price}} - P_t - \nu_t^X \leq 0,
\end{aligned}
$$

with

P_t^w world price generated by a rational expectations storage model.

τ trade costs.

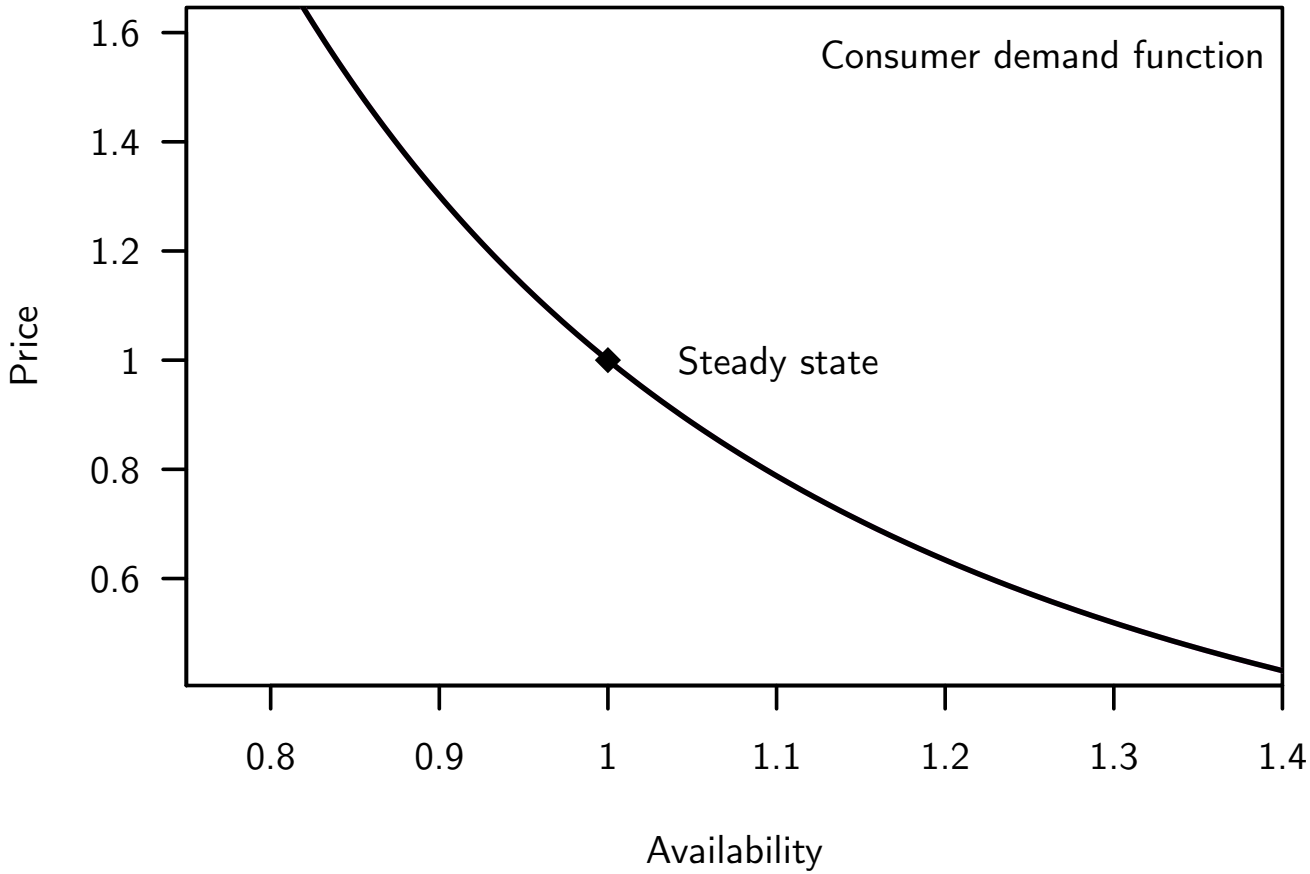
ν_t^M, ν_t^X import and export taxes.

Dynamics without public intervention

Price behavioural diagrams

Dynamics without public intervention

Price behavioural diagrams



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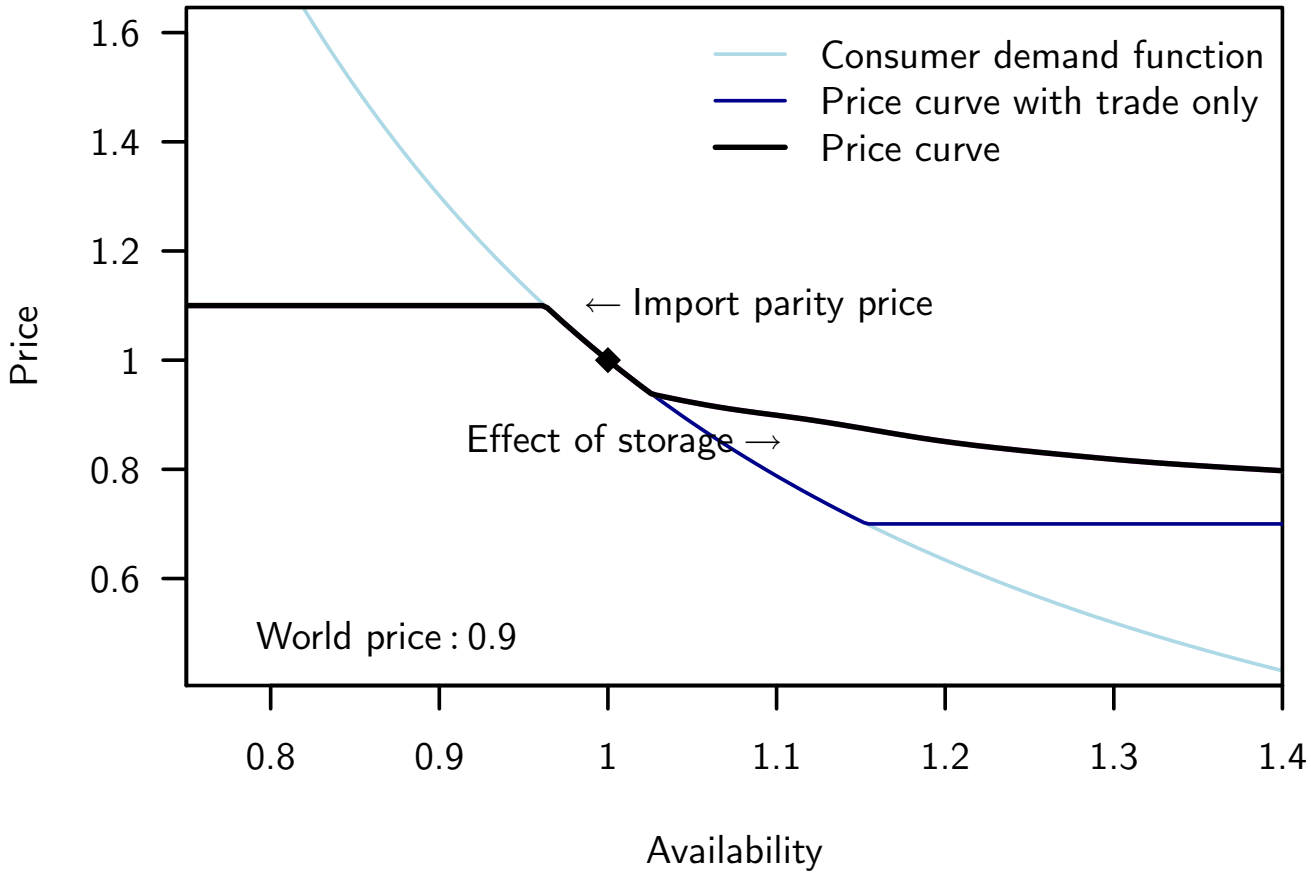

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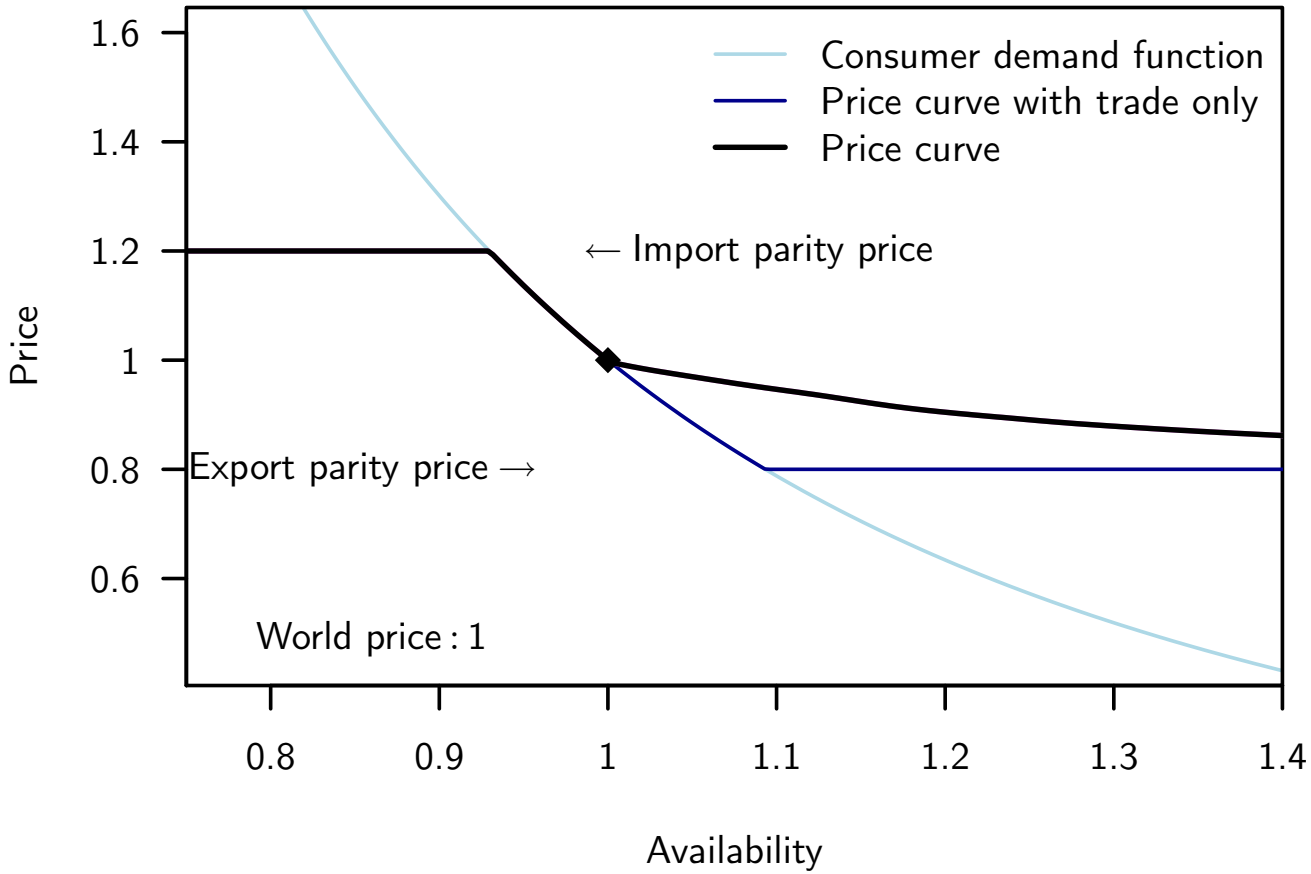

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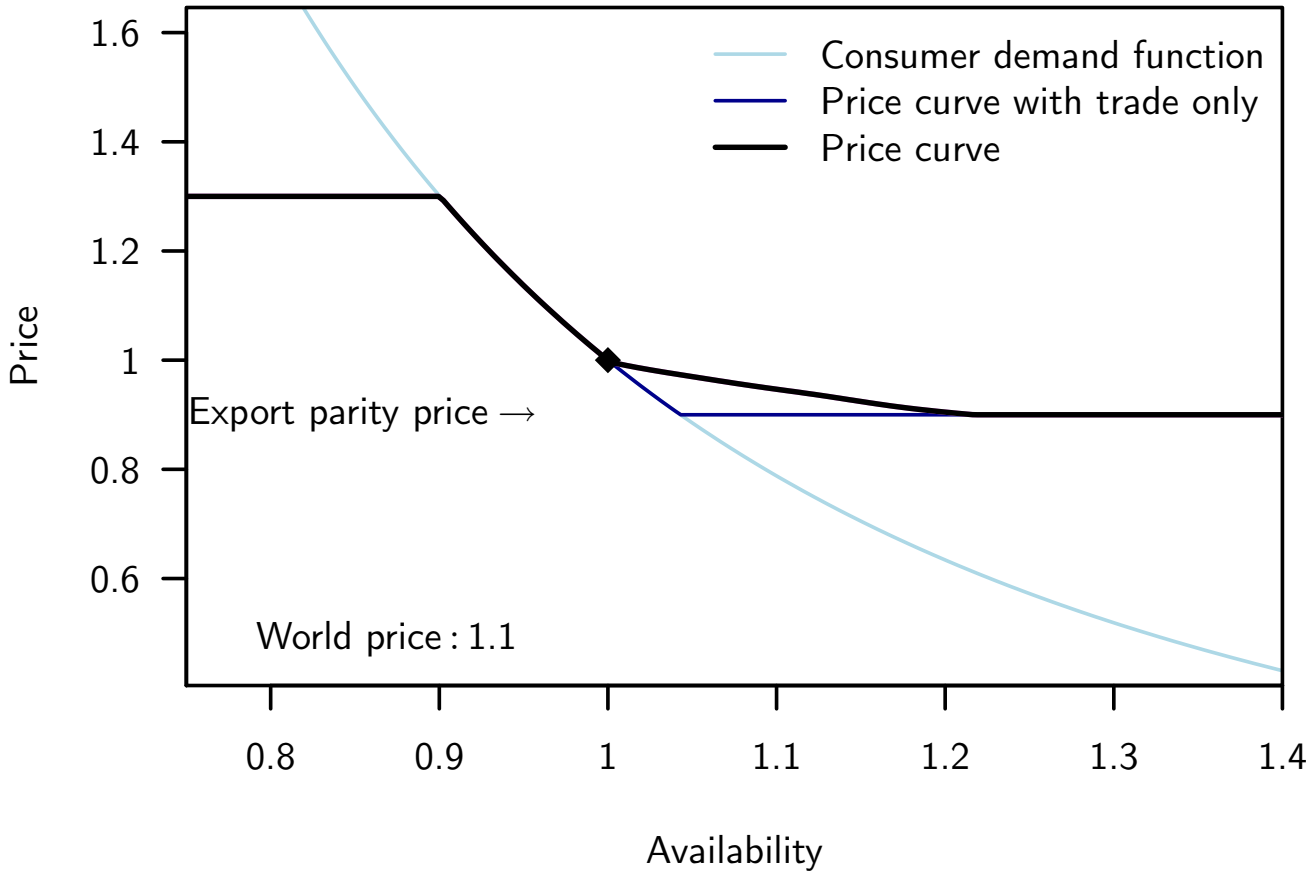

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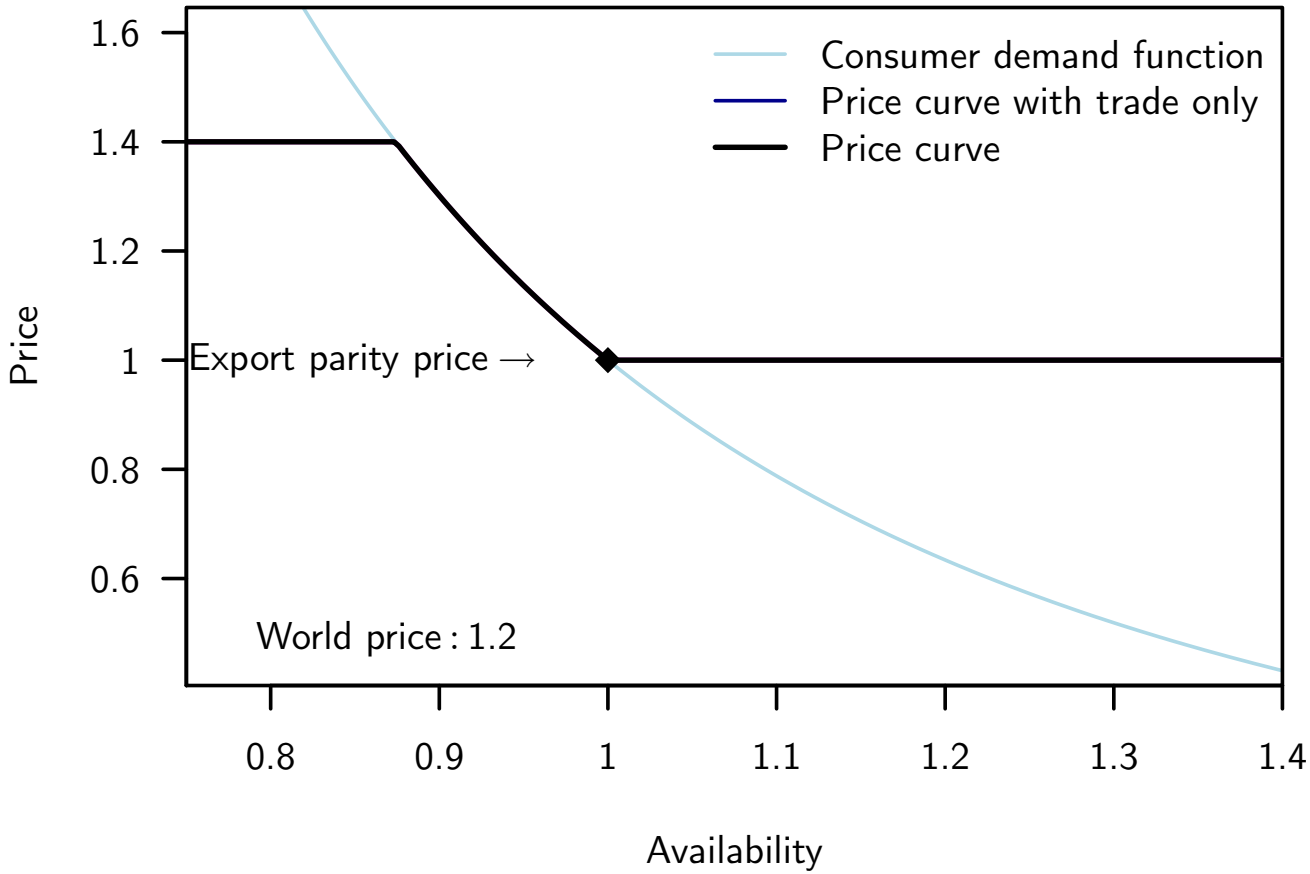

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Social welfare function

- Partial equilibrium $\Rightarrow$ Need to carefully account for each agent's welfare,

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It is the concavity of the social welfare function introduced by consumer risk aversion that justifies public intervention.

Optimal policy approach

Optimisation problem

2 state-contingent instruments of policy:

- Trade policy.
- Storage subsidy.

Government lacks commitment mechanism. Its policy is discretionary obeying

$$\max \mathrm{E}_t \sum_{t=0}^{\infty} \beta^i W_{t+i}$$

subject to the equations defining the recursive equilibrium.

Results

Optimal trade policy

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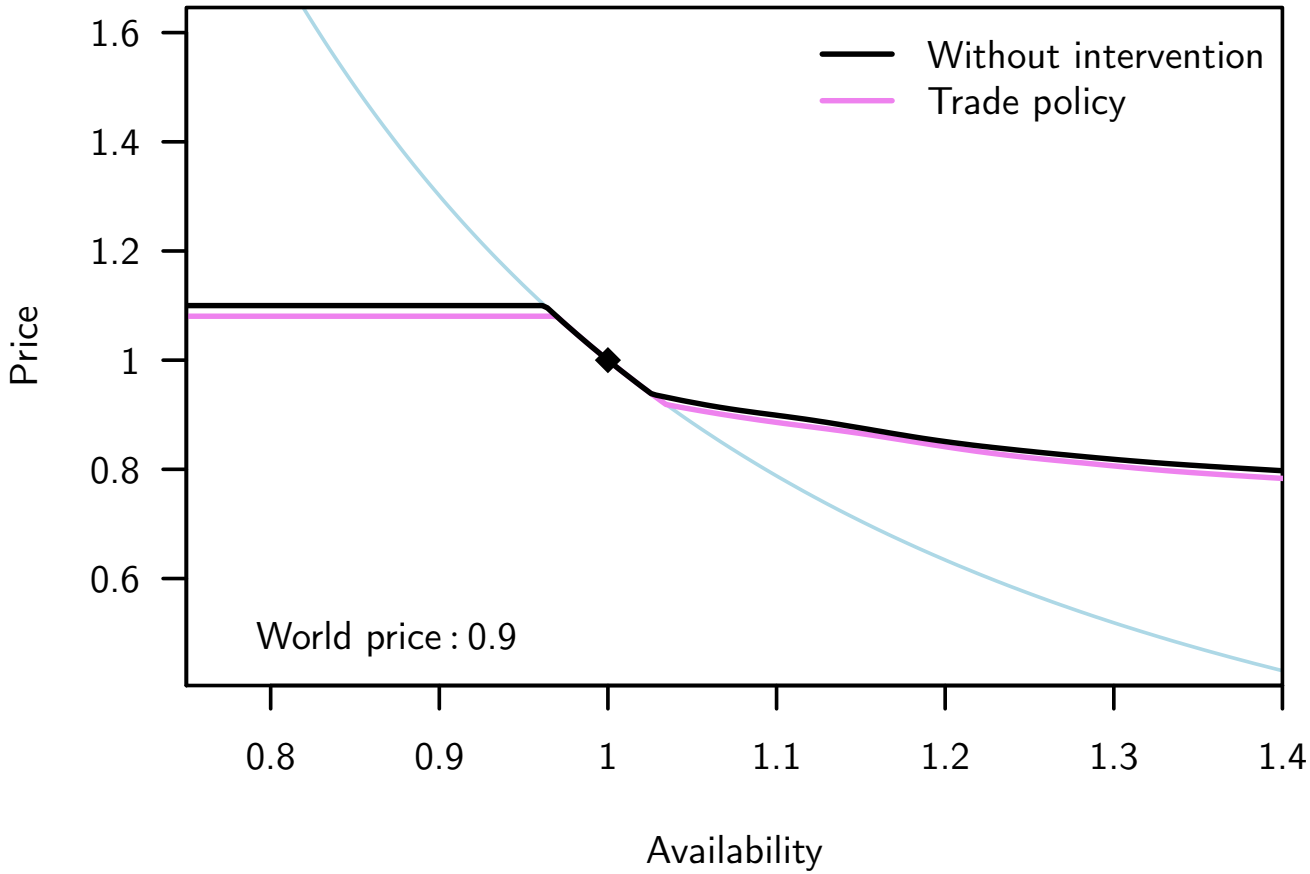

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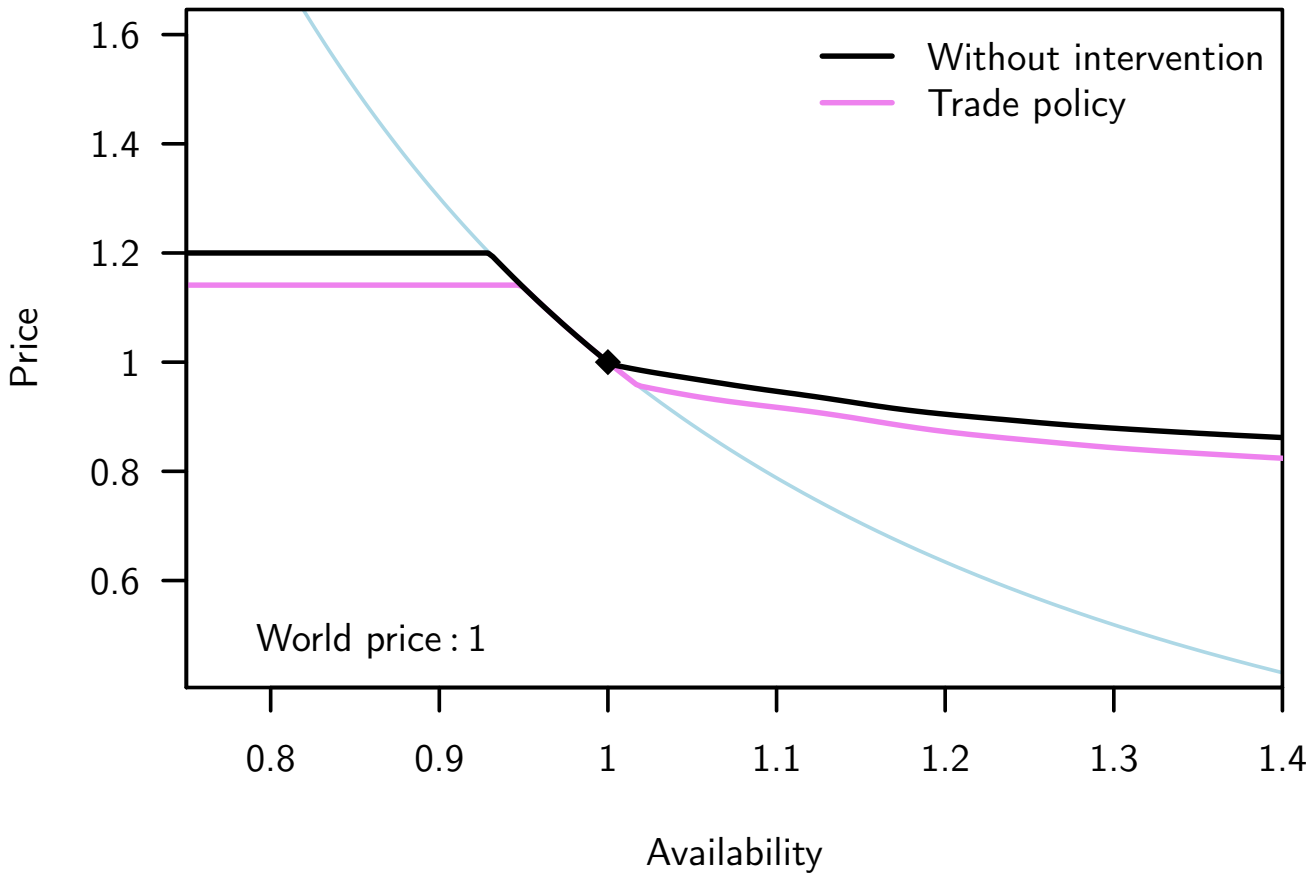

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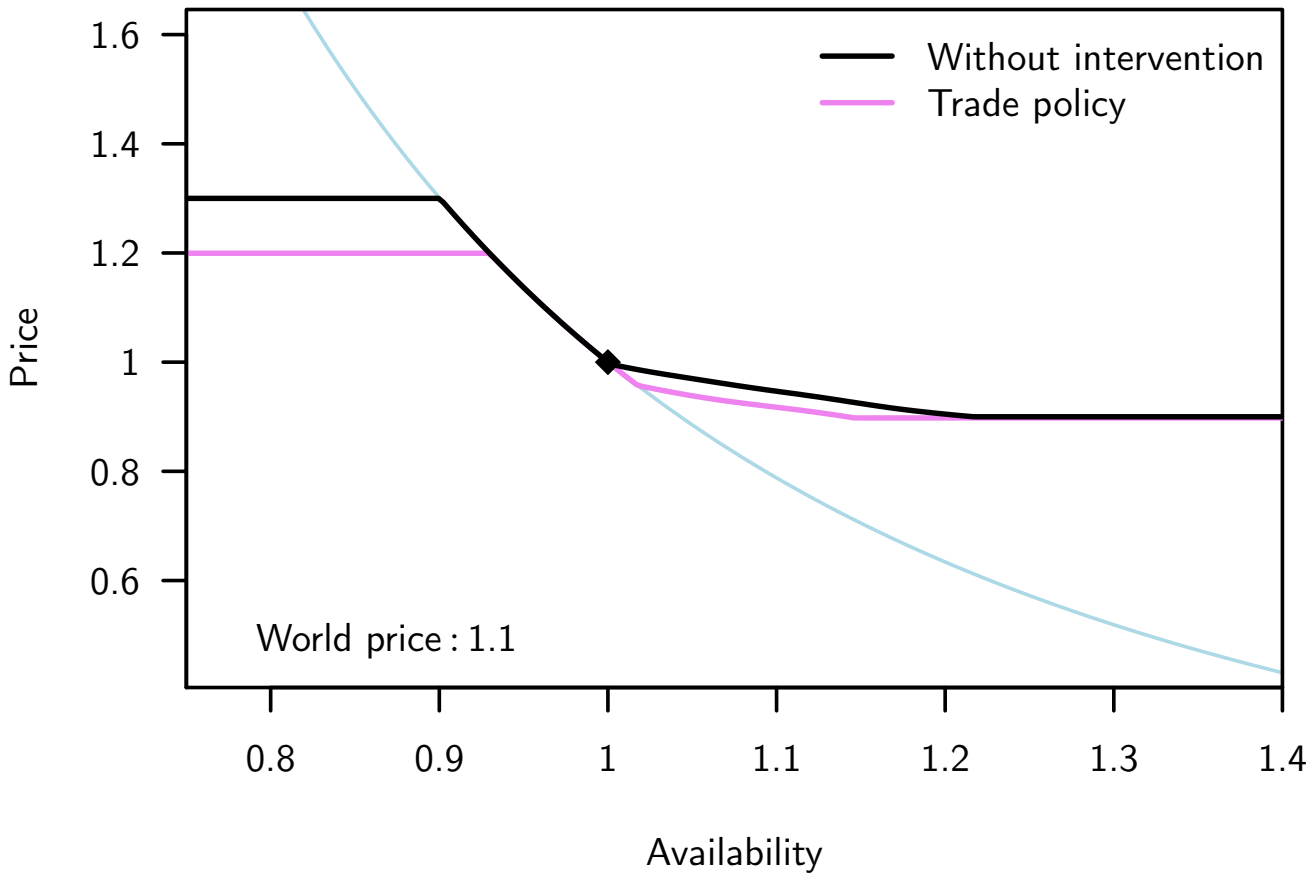

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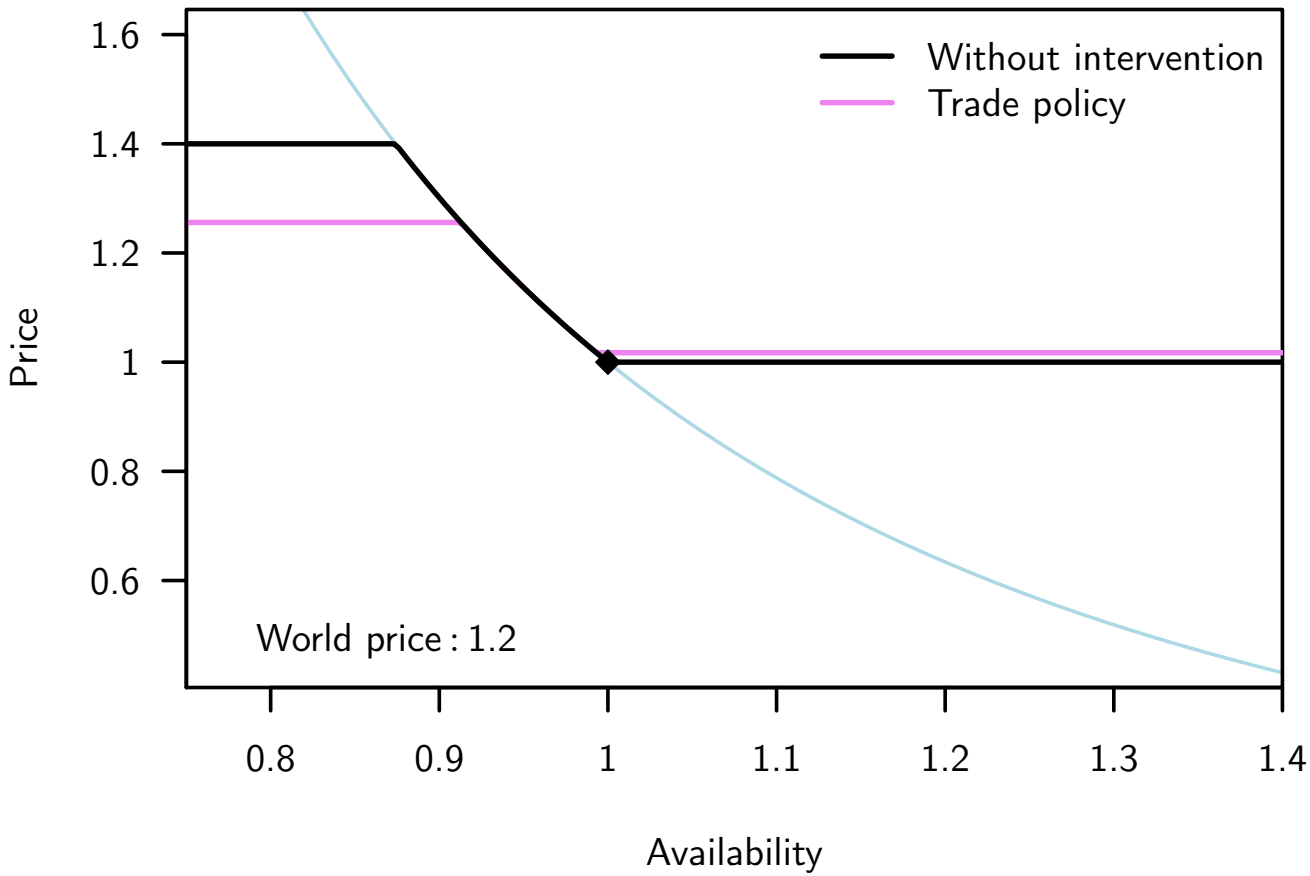

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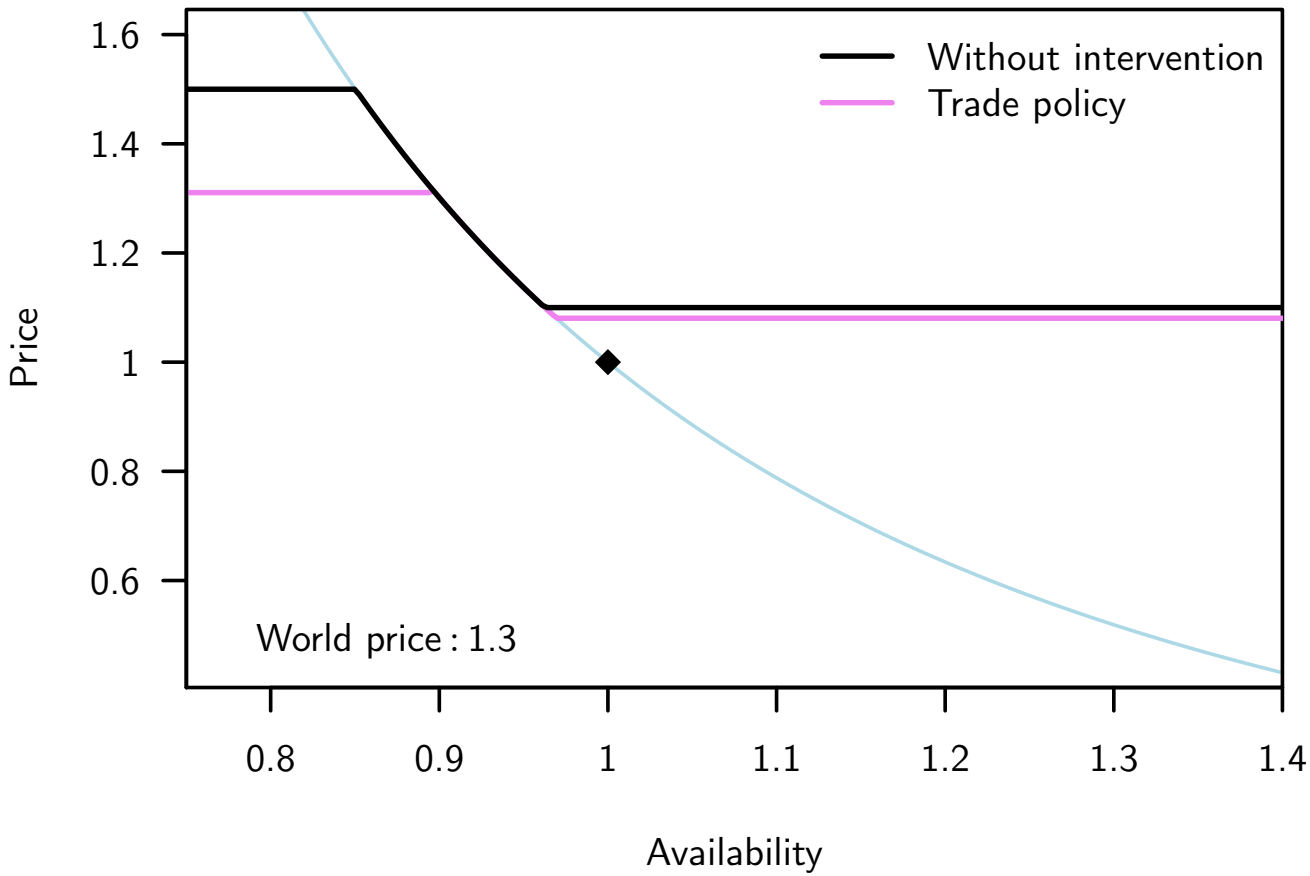

Optimal trade policy

- Subsidise import at low availability .
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- $\Rightarrow$ trim high prices from the distribution.

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In reality, we do not see import subsidies so often, but decrease in import tariffs.

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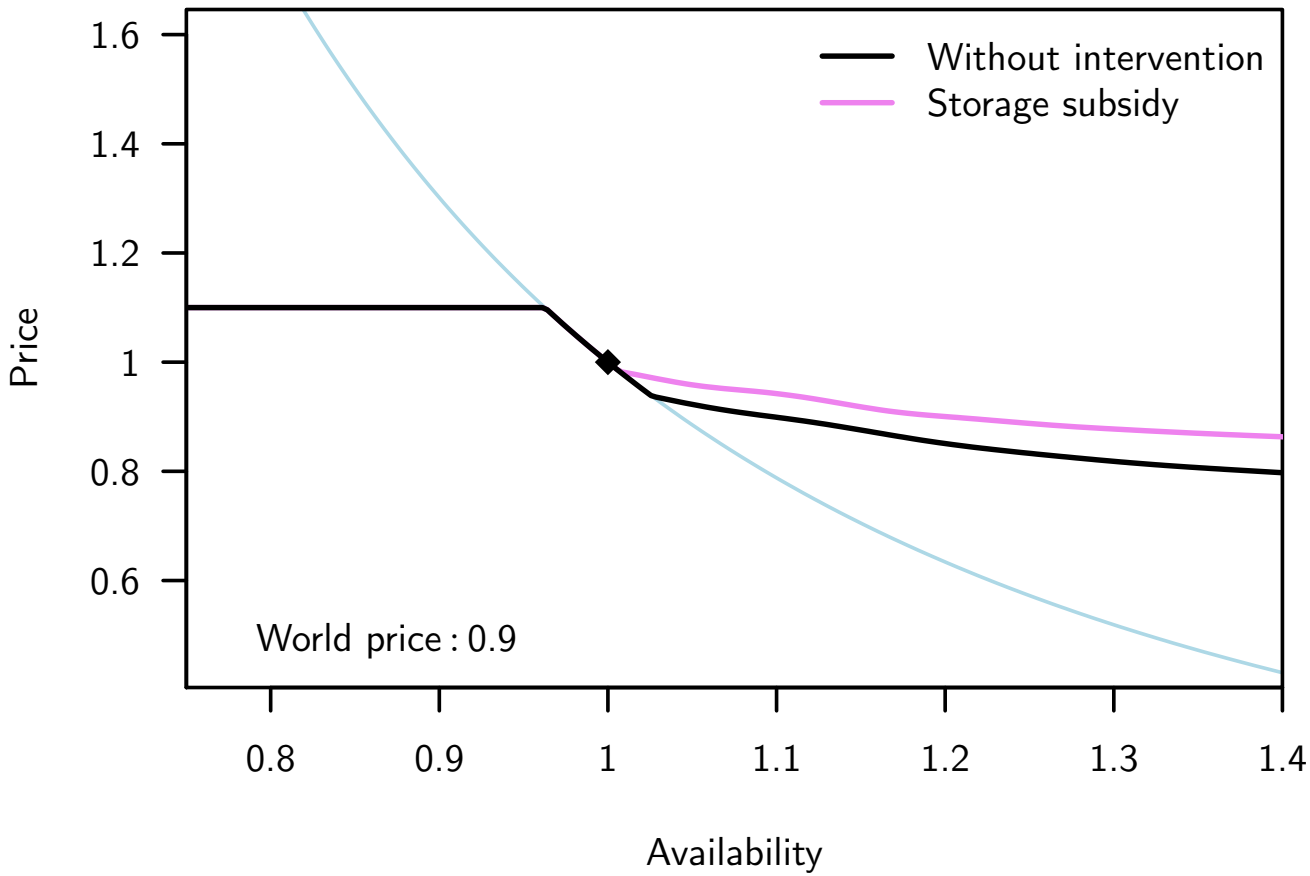

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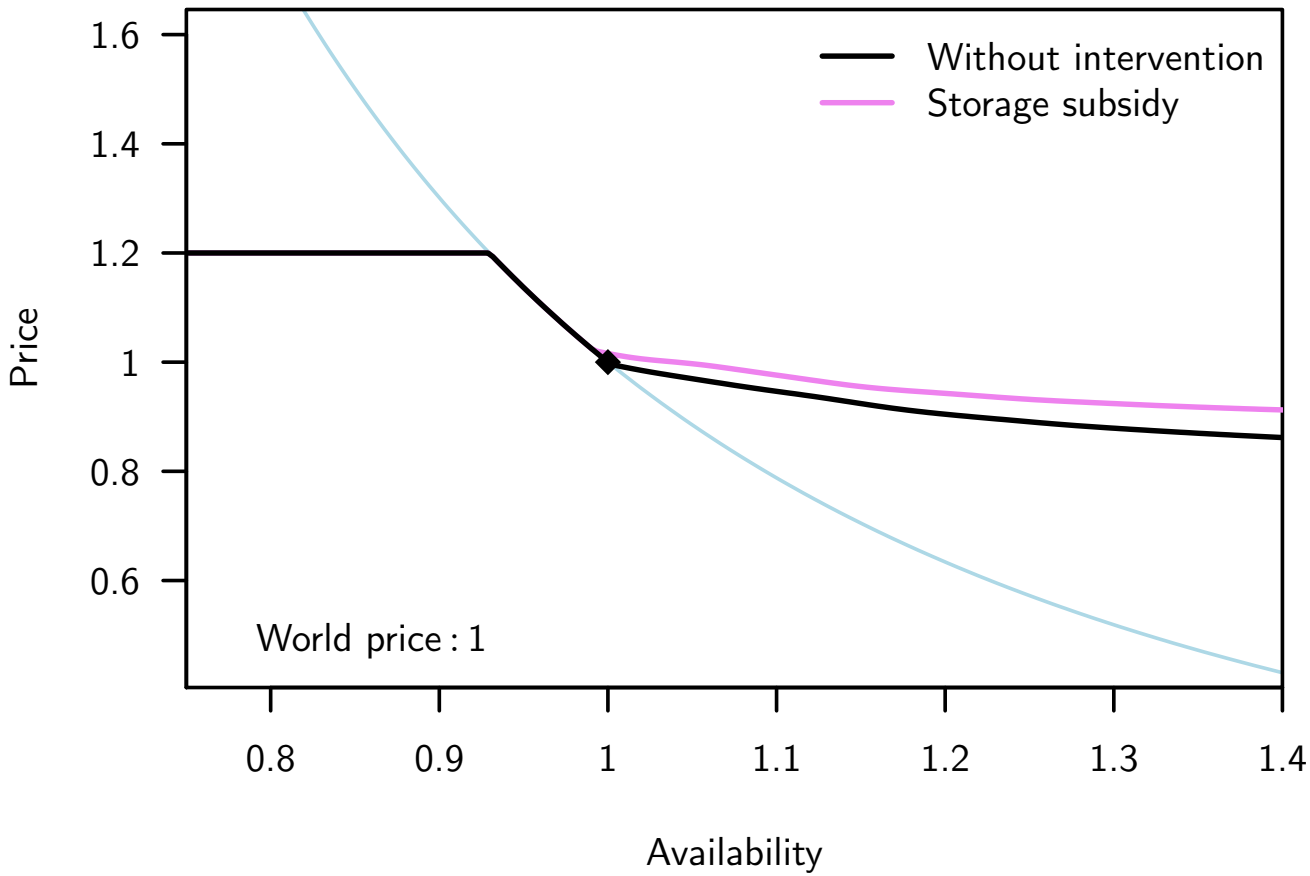

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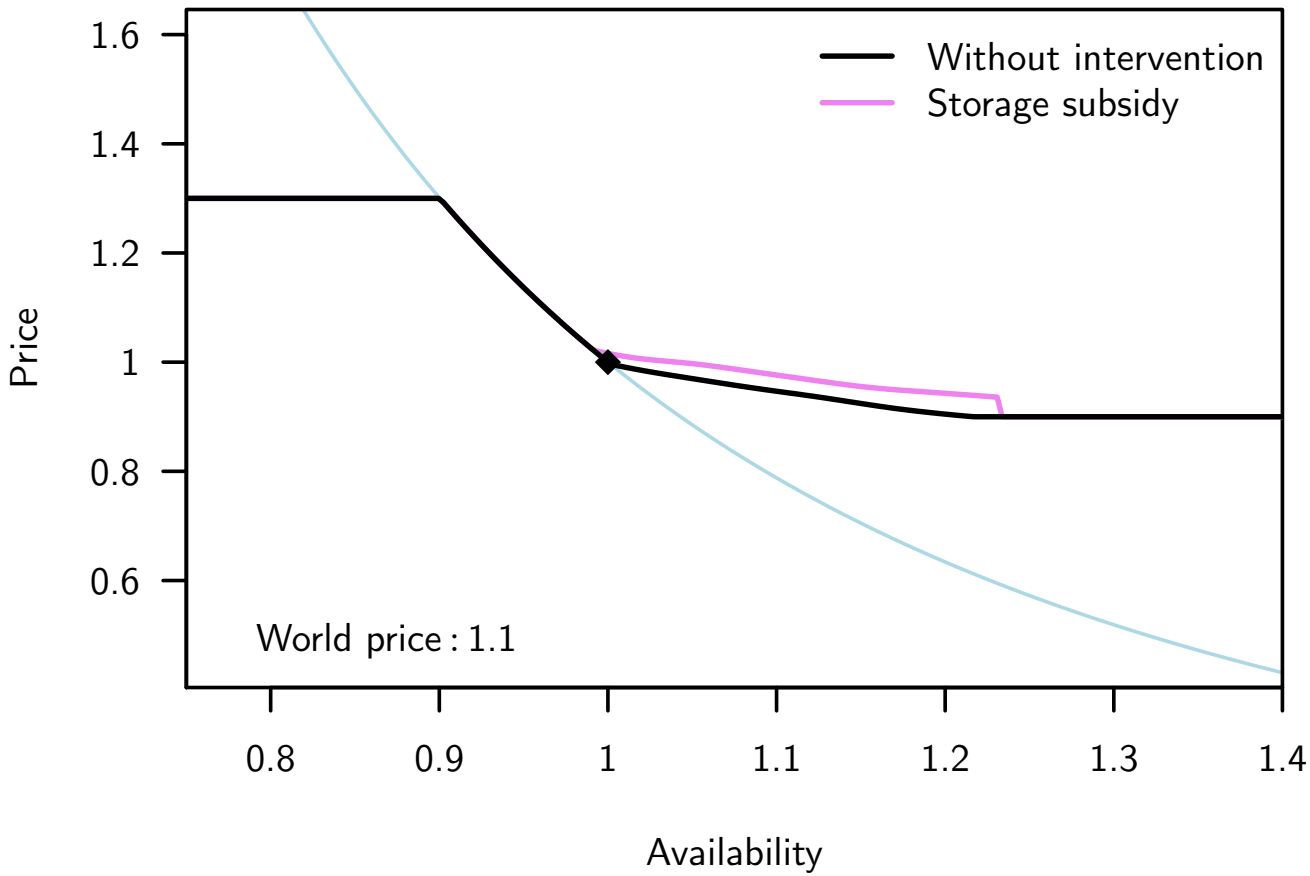

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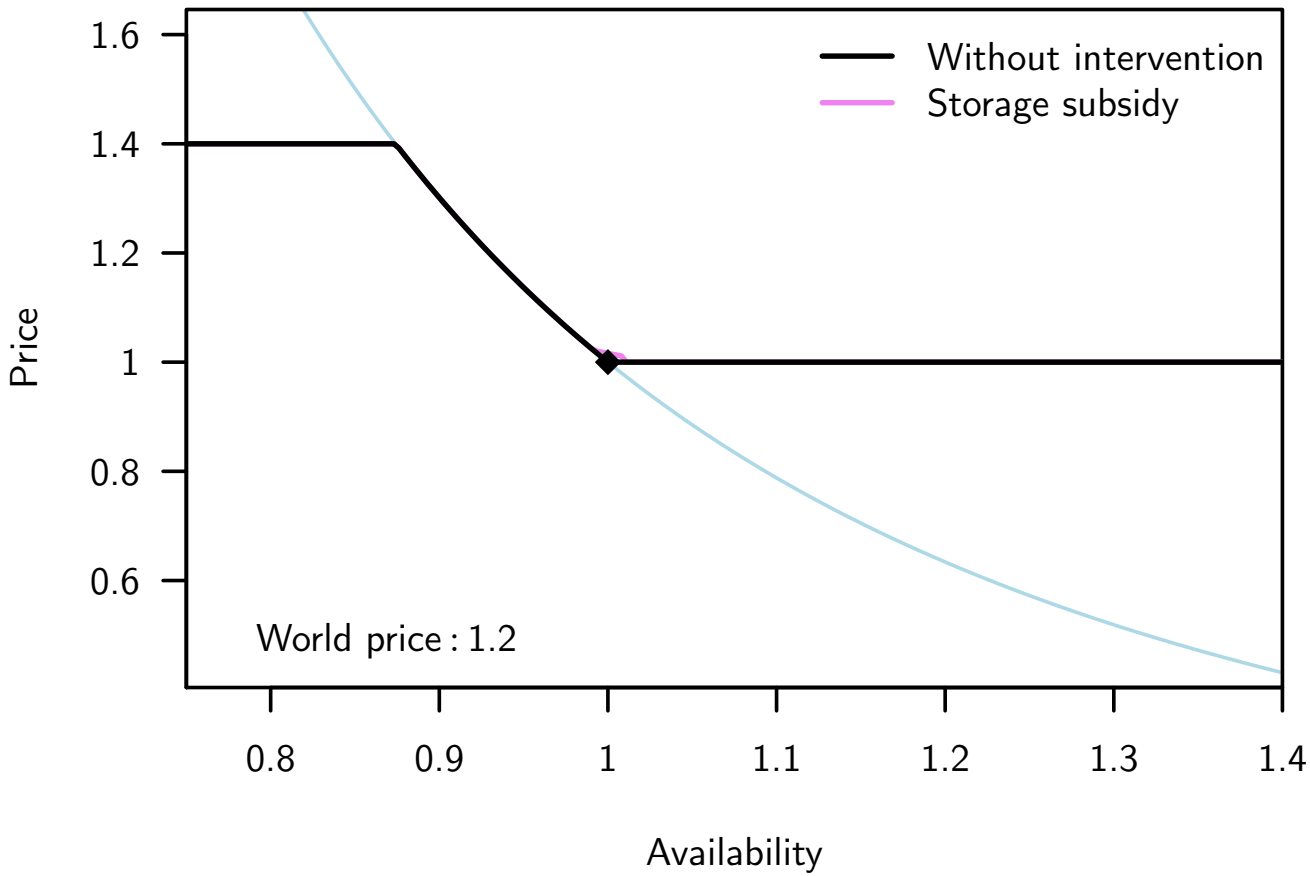

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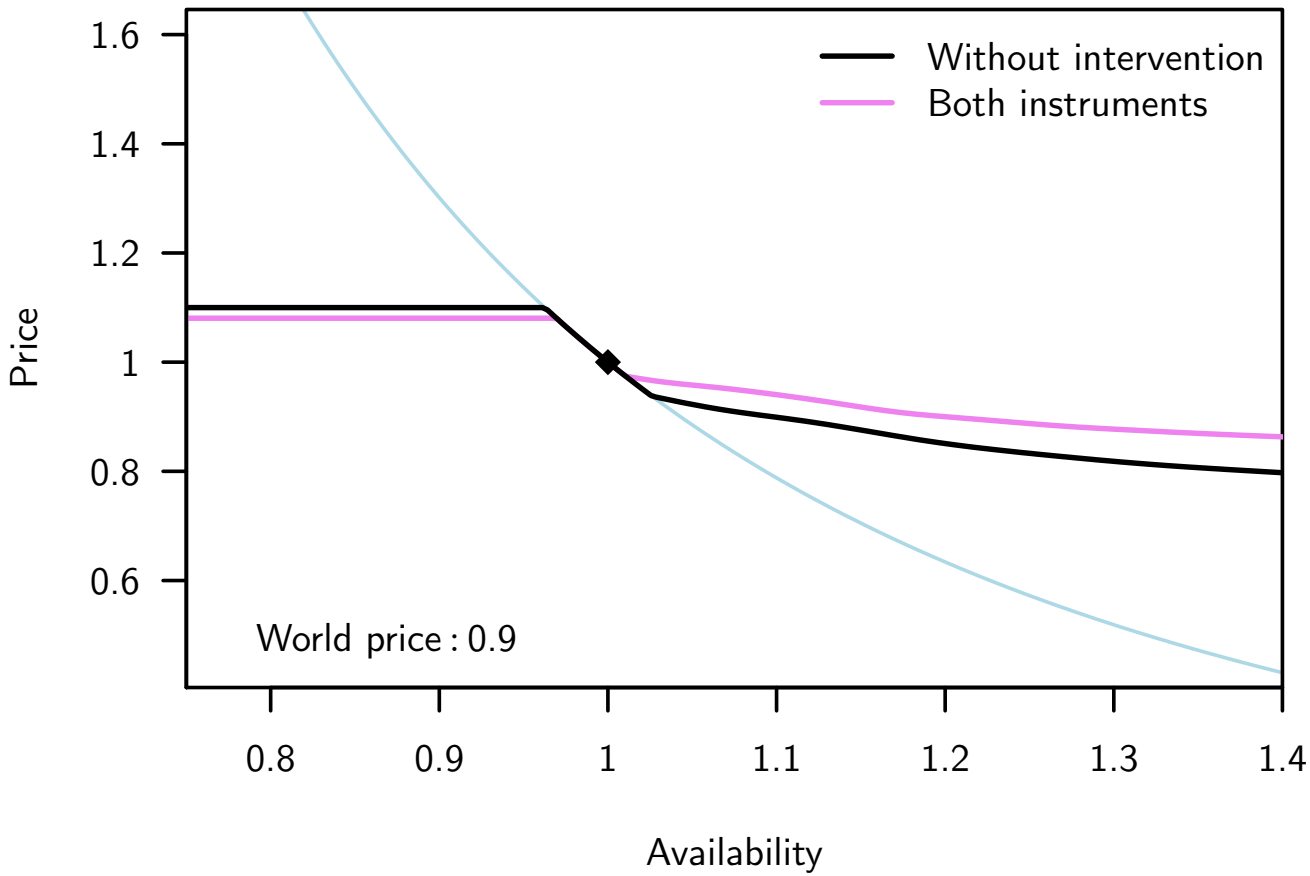

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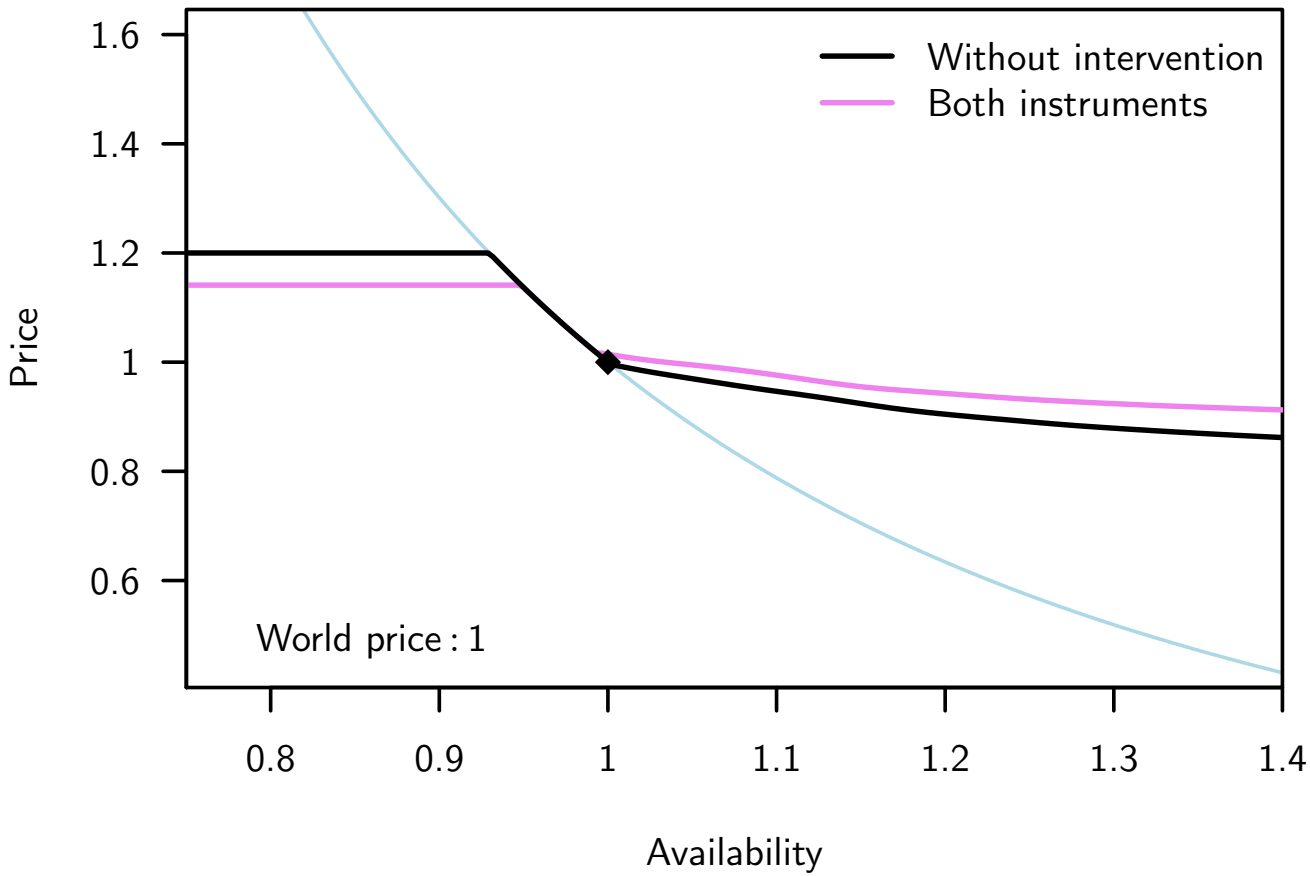

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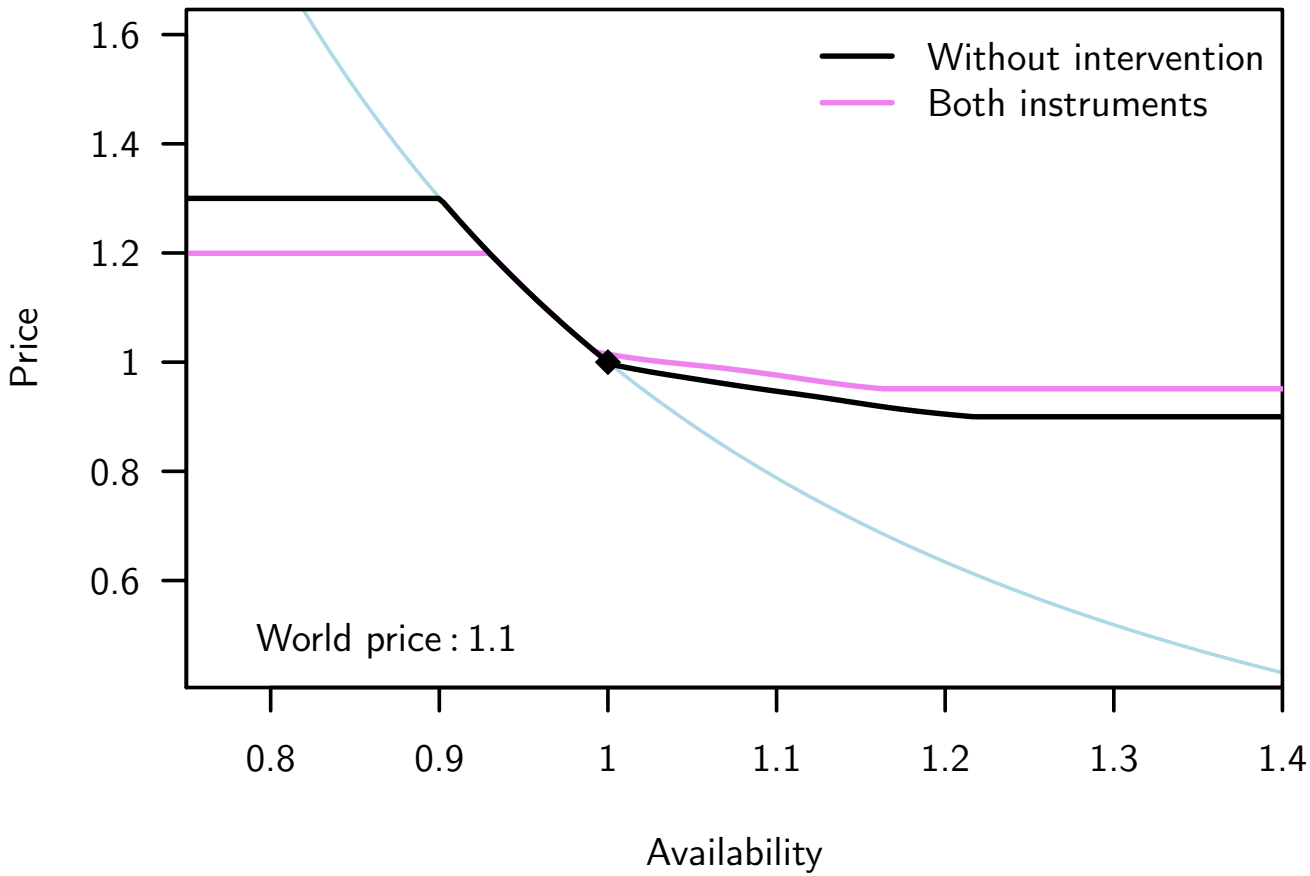

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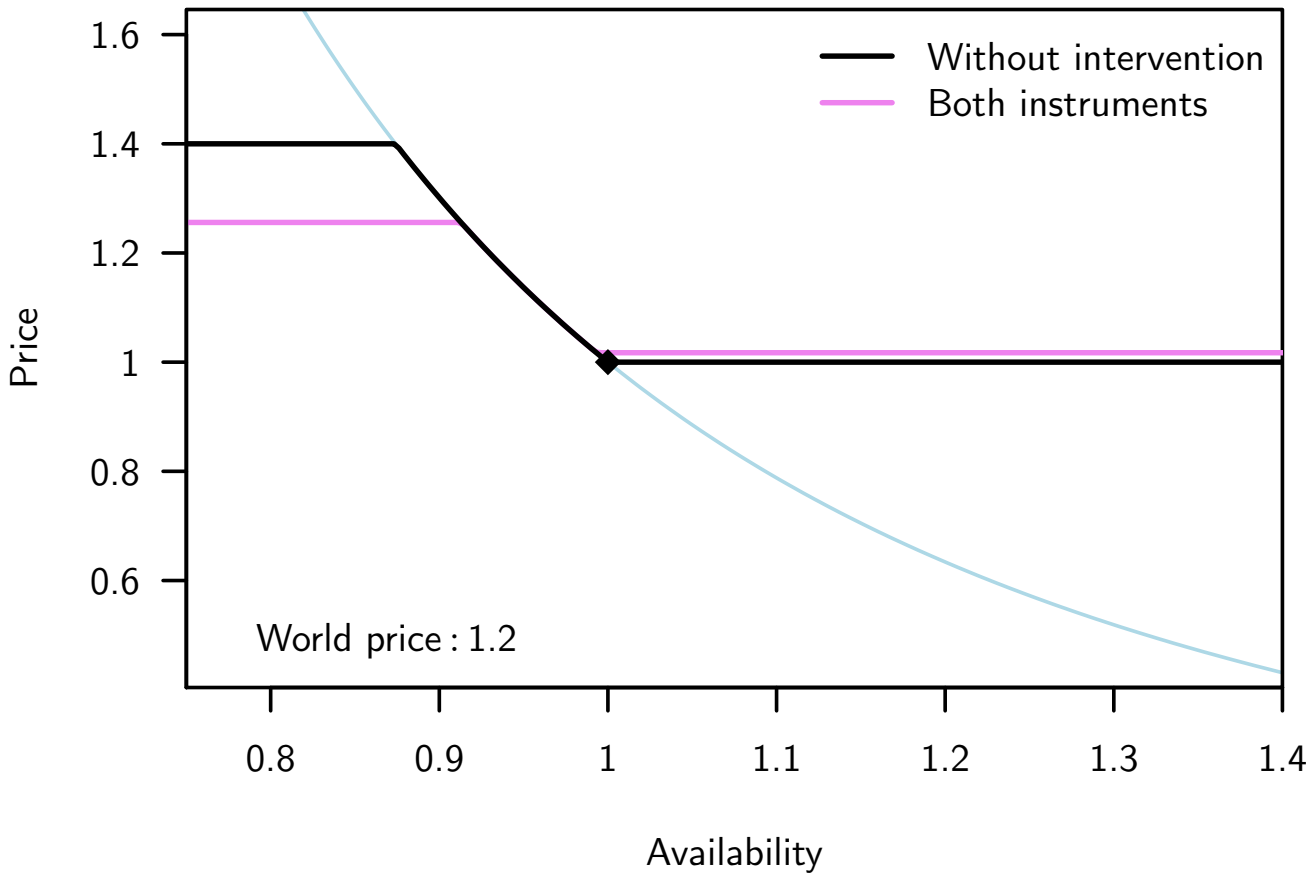

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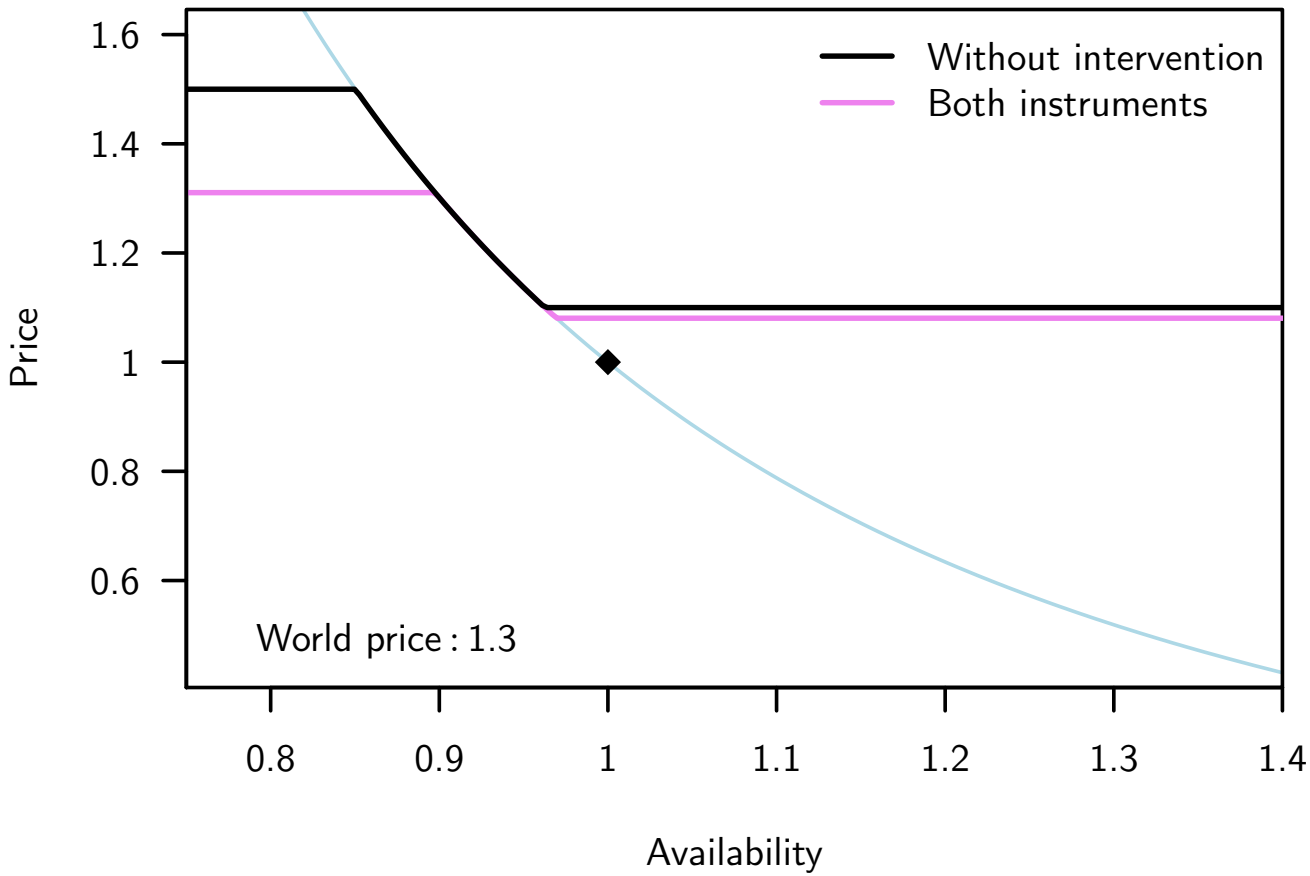
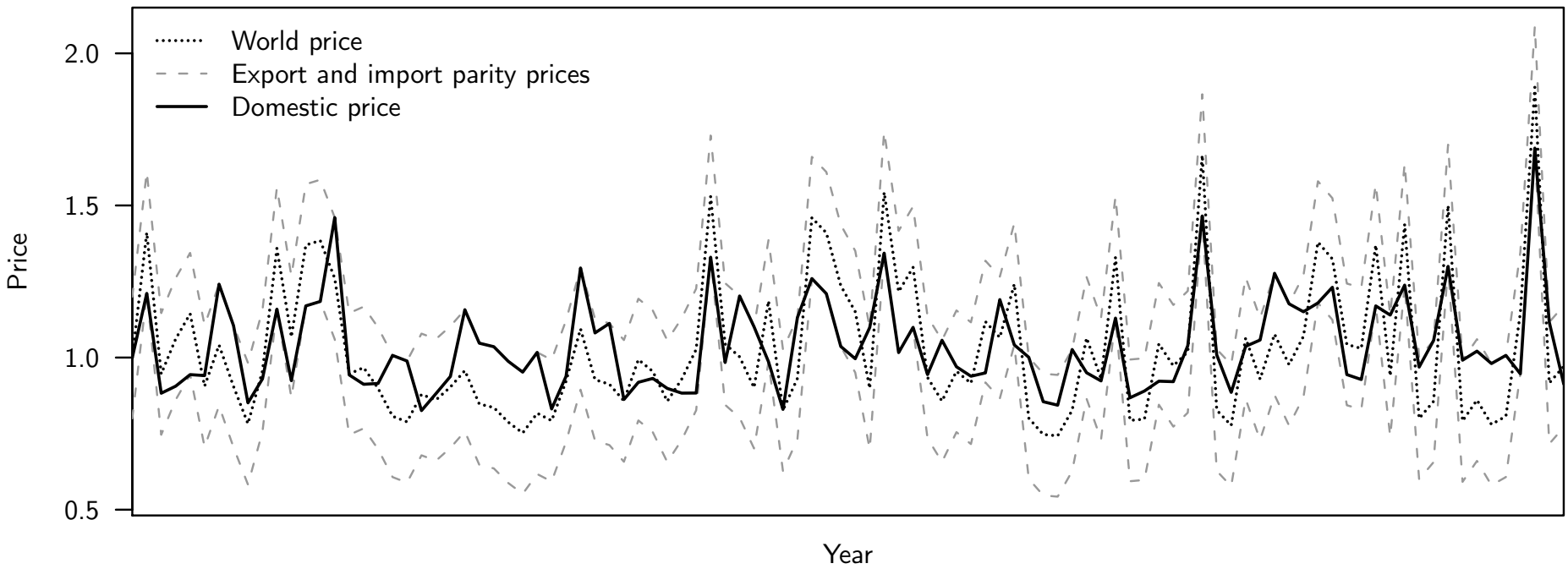


Results – Benchmark

Simulated price history



Results – Optimal policy

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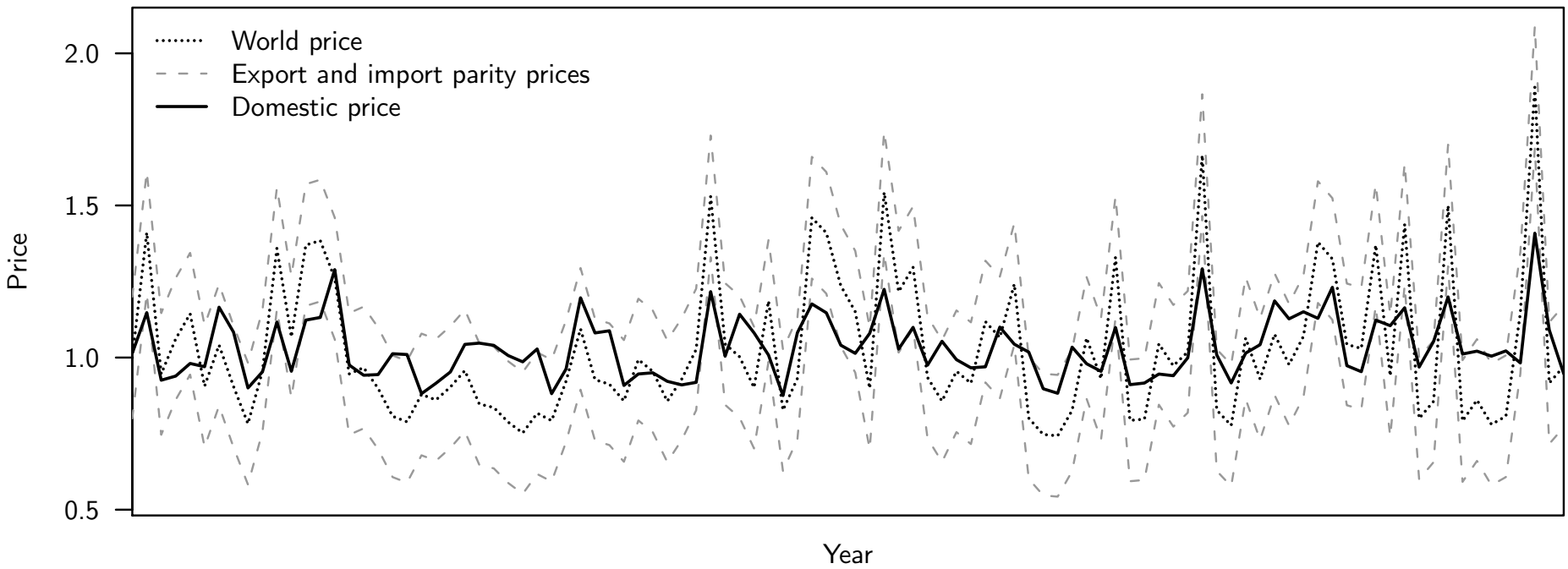

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	Benchmark	Trade policy	Storage subsidy	Both
Statistics on the asymptotic distribution				
Mean price	1.039	1.003	1.056	1.029
CV of price	0.150	0.109	0.127	0.076

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Mean price	1.039	1.003	1.056	1.029
CV of price	0.150	0.109	0.127	0.076
Welfare effects				
Consumers		2.47	−0.94	1.05
Producers		−2.53	1.08	−0.92
Government		0.12	−0.12	−0.03
Total		0.06	0.03	0.10

Conclusion

- Characterisation of optimal food price stabilisation policies in a small open economy.
- Stabilisation by storage alone is not desirable because of the leakage to the world market.
- Trade policy is most effective policy instrument.
- Strong complementarity of the two instruments.
- Food price stabilisation policies entail distributive effects much larger than the total welfare gains, since welfare effects are dominated by mean price changes rather than volatility change.

Perspectives

International policy coordination

- Trade policy = non-cooperative policy.
- Storage policy: inefficient in open economy for one country, but as a worldwide policy? How to share the burden of stabilisation across heterogeneous countries?

Thank you for your attention.