

Long-Run Price Elasticity of Trade and the Trade-Comovement Puzzle

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Link Between Trade and Comovement ---

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 - International trade important in transmission of business cycles
 - Tighter trade relations between countries lead to more synchronized business cycles

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- Intuition: Demand complementarities cause shock spill-over in proportion to the initial trade share
- Vast interest in the literature due to direct relation to optimal currency area criteria (Frankel & Rose (1998))

Evidence for Positive Link Confirmed by Data _____

- Cross-country regressions (GDP and TFP)

Frankel & Rose (1998), Calderon et al. (2002), Baxter and Kouparitsas (2005), Kose and Yi (2006)

- Horserace between various factors using within- and cross-country data (Europe and US)

Clark & van Wincoop (2001)

Magnitudes

- Regression

$$\text{corr}(x_i, x_j) = \alpha + \beta_x \text{trade}_{ij,\tau} + \epsilon_{ij,\tau}$$

- $\text{trade}_{ij,\tau}$ is log of the sum of imports over sum of GDPs
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- Doubling trade increases correlation of output by 0.043 and TFP by 0.023
- In data trade intensity varies a lot: from 0.019% to 7.37%
- Moving from 10th to 90th percentile of trade intensity increases correlation of GDP by 0.2

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- Only a small fraction of overall variation explained (R^2 small)

Why a Puzzle? Kose and Yi (2001,2006) _____

- Use 3-country standard Backus, Kehoe & Kydland (1995) model (bilateral pair + ROW)
- Generate variation in trade intensity by varying trade barriers
- Standard model predicts a *extremely small or negative* link, opposite to the data

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- Standard model predicts a *extremely small or negative* link, opposite to the data
- Our simulations give a *strictly negative* relation

Forces Behind the Puzzle

- Trade-comovement link driven by two opposing forces
 1. Demand-side channel that works in line with the common view
demand complementarity effect
 2. Supply-side channel that works in opposite direction and wins
resource-shifting effect

Intuition: Demand Side Channel

- Driven by CES demand structure

$$G(D, F, W) = \left(D^{\frac{\gamma-1}{\gamma}} + (\tau_F F)^{\frac{\gamma-1}{\gamma}} + (\tau_W W)^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}}$$

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- If initial amount of French fries small, implied impact on quantities small
- Result: demand spillovers hardwired to the *initial trade share*

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 - Reduces comovement of business cycles

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- Country with highest productivity should produce and ship goods worldwide to ensure consumption smoothing
 - Reduces comovement of business cycles
- Strength of resource-shifting motive varies with trade
 - High trade barriers makes it costly to produce goods *not* where they are consumed
 - Payoff from shifting resources decreases with higher trade barriers

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- Low elasticity of substitution
 - complementarity effect strong
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- High elasticity of substitution
 - kills demand complementarities

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- Data:
 - in the long-run quantities respond sizably to price changes
 - in the short-run, response is very small
- Standard Model: no difference between short-run and long-run elasticity

This Paper

- Show puzzle related to failure to account for high long-run elasticity *and* low short-run elasticity
- Develop theory with explicit frictions of building market shares
 - generates low-short run elasticity *AND* high long-run elasticity
 - accounts a large part for the positive trade-comovement relation seen in the data

Preview of Mechanism

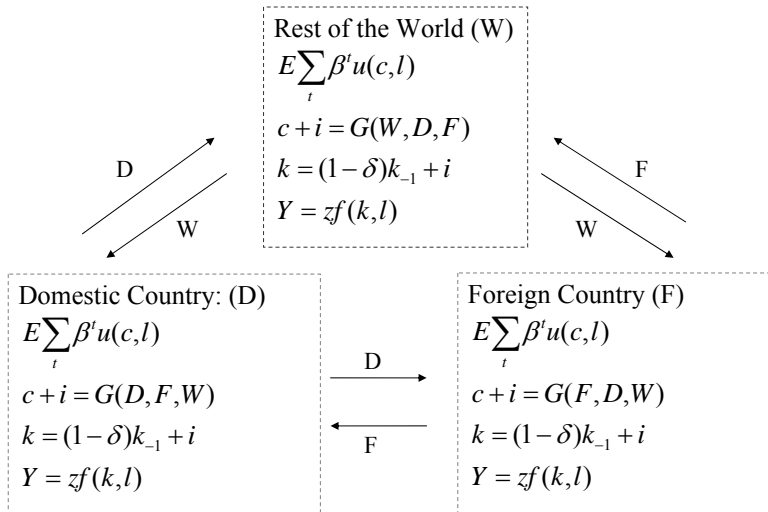
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Preview of Mechanism

- Consistency with high long-run elasticity of trade
 - **eliminates the effect of resource shifting on trade-comovement link**
- Search frictions of building market shares
 - make the model consistent with short-run elasticity
 - **generate additional demand complementarity channel**
 - similar to assumed low elasticity of substitution

The Model

Standard Features



New Features

- Search and matching
 - to sell, producers need to match with retailers in each country (build *market share*)
 - up to *one* unit per period traded in each match
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 - to sell, producers need to match with retailers in each country (build *market share*)
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 - matches are long-lasting
- Marketing friction
 - costly to build market share quickly
 - in equilibrium, expanding sales (market shares) takes time

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Formalization: Retailers

- In each country there is an endogenous measure h_i of searching retailers
- Retailers search at cost χv_i
 - with probability π_i meet producer from country $i = D, F, W$
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 - with probability π_i meet producer from country $i = D, F, W$
 - π_i determined in equilibrium by marketing capitals
- Search intensity h_i determined by zero profit

$$\pi_D V_D + \pi_F V_F + \pi_W V_W = \chi v_i$$

Key Parameters

- Use independent evidence to discipline key parameters γ and ϕ
- Armington elasticity γ high to account for long-run evidence

$$G(D, F, W) = \left(D^{\frac{\gamma-1}{\gamma}} + (\tau_F F)^{\frac{\gamma-1}{\gamma}} + (\tau_W W)^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}}$$

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- The rest standard

Results: bilateral pairs exercise

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COEFFICIENT FOR	DATA	MODEL	STANDARD MODEL
GDP Correlation	0.0616	0.0297	negative
TFP Correlation	0.0297	0.0233	0

Results: European country exercise

- One small country (European country), two big countries (ROW and rest of Europe)
- Reproduce trade across these regions, look at comovement

STATISTIC	DATA	MODEL
Imports/GDP from Europe	16.42%	16.42%
Imports/GDP from ROW	2.73%	2.73%
Correlation with rest of Europe	0.62	0.46
Correlation with ROW	0.35	0.35
Ratio of Correlations	1.75	1.31

Mechanism

Key elements

1. High long-run elasticity of substitution between goods
2. Search and matching-driven demand complementarities in the short-run

Why high elasticity matters

- Small variation in trade barriers needed to support observed trade intensities
- Significantly dampens the influence of resource shifting effect on trade-comovement link

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- Example: positive productivity shock in domestic country
 - retailers search harder - h at home goes up
 - look for more productive home producers
 - importers get kick from increased h - proportional to their market share

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- Has effect on GDP and productivity spillovers

Conclusion

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- Key: modeling frictions that give long-run and short-run elasticity disconnect
- Frictions related to firm-level entry data in Ruhl & Willis (2007)

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- Key: modeling frictions that give long-run and short-run elasticity disconnect
- Frictions related to firm-level entry data in Ruhl & Willis (2007)
- Model also improves upon other predictions of the standard theory
 - pricing-to-market that gives rise to observed patterns of prices
 - improved predictions for business cycle statistics for quantities
 - explored in companion paper: *Understanding International Prices: Customers as Capital*