Understanding International Prices: Customers as Capital

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Presentation for the National Bank of Poland

- Fundamental features of international price data
  - Aggregate data:
    - *Real* export and import prices of a country *positively* correlated
    - Both *positively* correlated with the real exchange rate
  - Disaggregated data shows evidence of pricing to market
    - export price $\neq$ domestic price for the same commodities
    - vary systematically with the real exchange rate
- Puzzle for a large class of models

Outline

- Illustrate why these observations are puzzling
- Document correlation of aggregate prices
- Document pricing-to-market using disaggregated data
- Propose model with marketing and customers as capital
- Show how model consistent with prices and quantities

Illustrate the Puzzle for Standard Theory

- Assumes
  - country specific tradable goods
  - consumption baskets biased towards the home good
  - law of one price for each tradable good

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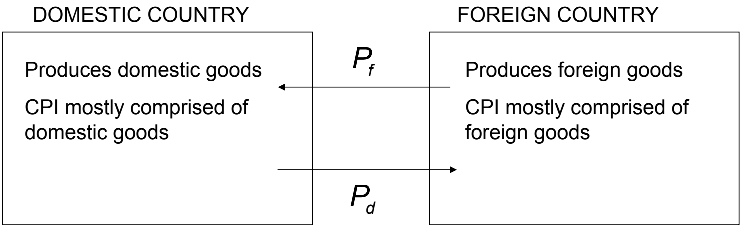
  - consumption baskets biased towards the home good
  - law of one price for each tradable good
    - inconsistent with pricing-to-market observations
    - show also inconsistent with aggregate data

Illustrate the Puzzle for Standard Theory



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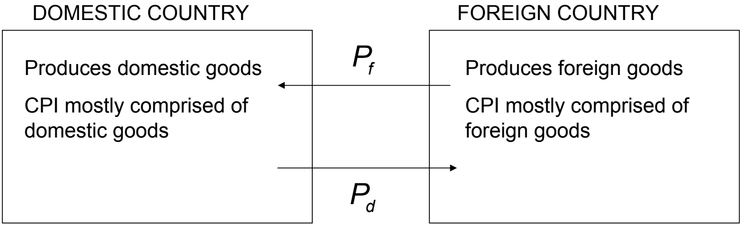

$$p_m \equiv \frac{P_f}{CPI} \equiv \frac{P_f}{(P_d)^{\omega}(P_f)^{1-\omega}} = (\frac{P_f}{P_d})^{\omega}$$

$$\Rightarrow corr(p_x, p_m) = -1$$

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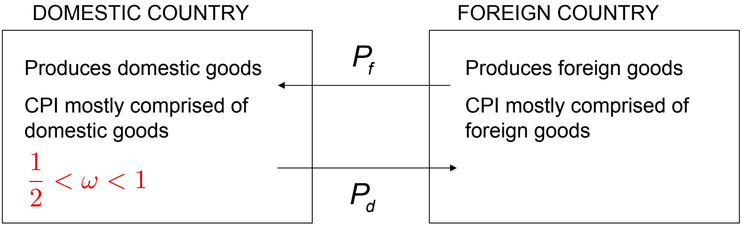

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$$x \equiv \frac{CPI^*}{CPI} = \frac{(P_f)^{\omega}(P_d)^{1-\omega}}{(P_d)^{\omega}(P_f)^{1-\omega}} = (\frac{P_f}{P_d})^{2\omega-1}$$

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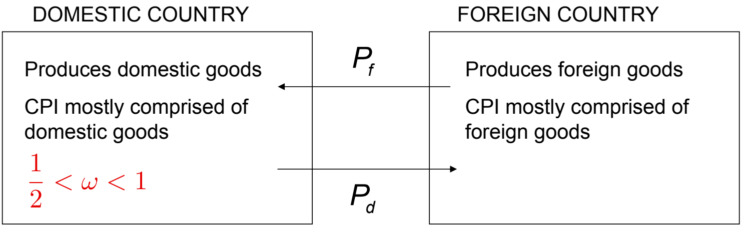

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Similar results hold for sticky price models or constant markup models (Dixit-Stiglitz)

Evidence for Correlations of Aggregate Prices

12 major OECD countries

Statistics refer to detrended quarterly series, 1980-2004

	Statistic	
	$corr(p_x, p_m)$	$corr(p_x, x)$
OECD median	0.87	0.61

where

$$p_x = \frac{EPI}{CPI}, \quad p_m = \frac{IPI}{CPI} \quad x = \frac{CPI^*}{CPI}$$

$EPI =$ export price index, $IPI =$ import price index

Data has opposite signs as the standard model

Disaggregated Evidence For Pricing-To-Market

Disaggregated Evidence For Pricing-To-Market

- Chosen OECD country: Japan
- Strong patterns on macro level (all correlations close to 1)
- Disaggregated data suggests
  - Export price movements attributable to pricing-to-market
    - reminiscent of Marston (1990)

Disaggregated Evidence For Pricing-To-Market

- Disaggregated wholesale price data for Japan 1995-2004
- Quarterly frequency, detrended using HP-filter
  - 31 manufacturing commodities: copying machines, computers, etc...

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  - 31 manufacturing commodities: copying machines, computers, etc...
    - Domestic Price : DP^i
      - price of goods produced and sold at home
    - Export Price : EP^i
      - price of goods produced at home but sold abroad

Micro Evidence For Pricing-To-Market

- Decomposing movements in export prices

$$p_x^i \equiv \frac{EP^i}{CPI} \equiv \underbrace{\frac{EP^i}{DP^i}}_{\text{PTM}} \underbrace{\frac{DP^i}{CPI}}_{\text{RPM}}$$

PTM. Pricing-To-Market

– deviations of export price from domestic price for the same good

RPM. Relative Price Movements

– deviations of domestic price of the good from CPI

Micro Evidence For Pricing-To-Market

- Decomposing movements in export prices

$$p_x^i \equiv \frac{EP^i}{CPI} \equiv \underbrace{\frac{EP^i}{DP^i}}_{\text{PTM}} \underbrace{\frac{DP^i}{CPI}}_{\text{RPM}}$$

- Decomposing volatility: $\text{std}(p_x^i)/\text{std}(x) \approx 88\%$

$$\text{PTM} = \frac{\text{std}(\frac{EP^i}{DP^i})}{\text{std}(\frac{EP^i}{DP^i}) + \text{std}(\frac{DP^i}{CPI})} \approx 80\%$$

$$\text{RPM} = \frac{\text{std}(\frac{DP^i}{CPI})}{\text{std}(\frac{EP^i}{DP^i}) + \text{std}(\frac{DP^i}{CPI})} \approx 20\%$$

- Volatility attributable to pricing-to-market (PTM)

Micro Evidence For Pricing-To-Market

- Decomposing movements in export prices

$$p_x^i \;\equiv\; \frac{EP^i}{CPI} \;\equiv\; \underbrace{\frac{EP^i}{DP^i}}_{\text{PTM}} \; \underbrace{\frac{DP^i}{CPI}}_{\text{RPM}}$$

- Decomposing correlation with x: corr(p_x^i, x) = 0.81

$$\text{PTM} = \text{corr}\left(\frac{EP^i}{DP^i},\; x \right) \;=\; 0.84$$

$$\text{RPM} = \text{corr}\left(\frac{DP^i}{CPI},\; x \right) \;= -0.14$$

- Correlation attributable to pricing-to-market (PTM)

Data - Summary

- Aggregate data
  - real export and import prices positively correlated
  - real export price positively correlated with the real exchange rates
- Disaggregated data suggests
  - export price movements can be attributed to pricing-to-market

    for more evidence see the survey by Goldberg and Knetter (1997)

Solution: Marketing Frictions

- Building market shares is costly and time consuming

  as argued by Dornbusch (1987) and Krugman (1986)

- Leads to *variable markups* and *pricing-to-market*

Solution: Marketing Frictions

- Building market shares is costly and time consuming
  as argued by Dornbusch (1987) and Krugman (1986)
- Leads to *variable markups* and *pricing-to-market*
- Our contribution
  - develop an explicit model in which customers are capital
  - make it into a quantitative GE model
  - address the question how promising is this mechanism
    to account for the price data

Related Literature

- Models with Time-Varying Markups (Dornbusch 1987, Krugman 1986)
  - Consumer Search: Alessandria (2004, 2005)
  - Vertical Industry Structure: Atkeson and Burstein (2006)
  - Local Nontradable Component: Dedola and Corsetti (2002, 2004)
- Short-Run/Long-Run Elasticity Puzzle
  - Sunk Cost of Entry: Kim Ruhl (2004)
  - Evidence: Eaton and Kortum (2002), Head and Ries (2001), Hummels (2001), Yi (2003), Blonigen and Wilson (1999), Reinert and Roland-Holst (1992) (2004)
- Incomplete Pass-Through Literature
  - Goldberg and Campa (2005, 2006), Goldberg and Knetter (1997), Marston (1990)

Model of Customers as Capital

Basic Structure

- Symmetric world with two-countries and country-specific goods
    - d good produced in the *domestic country*
    - f good produced in the *foreign country*
- Composite consumption and investment good
    - domestic country: $c + i = G(d, f)$
    - foreign country: $c^* + i^* = G(f^*, d^*)$
- d and f the only tradable goods
- Physical capital and labor immobile across countries

Production Technology

- Production technology

  domestic: $zF(k,l)$ foreign: $z^*F(k^*,l^*)$

- Productivity shocks

  $$\log(z_t) = \psi \log(z_{t-1}) + \varepsilon_t \qquad \log(z_t^*) = \psi \log(z_{t-1}^*) + \varepsilon_t^*$$

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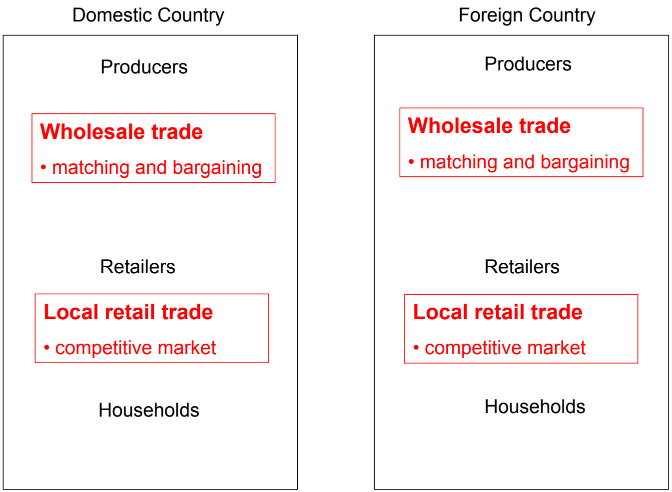
- Technology summarized by unit production cost v

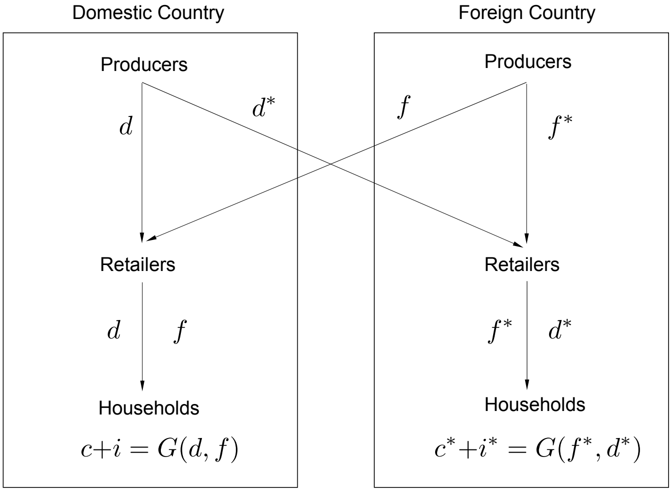
$$v(s^t) = \min_{k,l}\{w(s^t)l + r(s^t)k | z(s^t)F(k,l) = 1\}$$

- Let $s^t = (s_0, ..., s_t)$ where $s_t = (\varepsilon_t, \varepsilon_t^*)$ with prob. distribution $\mu(s^t)$

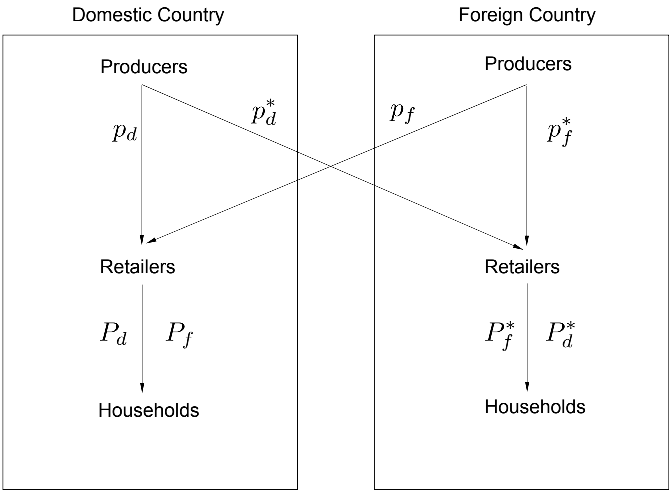
Market Structure



Flow of Goods



Prices



Domestic Country
Foreign Country
Producers
Producers
p_d
p_d^*
p_f
p_f^*
Retailers
Retailers
P_d
P_f
P_f^*
P_d^*
Households
Households

Domestic Producers: Production

- Measure one of producers
- Produce good d according to CRS technology: $zk^{\alpha}l^{1-\alpha}$
- Marginal cost of producing an additional unit is v

Domestic Producers: Marketing Friction

- Basic idea:
  - customers are capital
    - producers can only sell to their customers
  - *new* customers are attracted by relative marketing capital
    - marketing capital is accumulated
  - takes time to figure out how to attract *new* customers
    - time to accumulate marketing capital

Domestic Producers: Marketing Friction

- Each with a *customer list* H_d, H_d^* and marketing capital m_d, m_d^*
- Can only sell to customers from the list (a fixed amount per period)
- Marketing capital brings new customers to the list

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  $\frac{m_d}{\bar{m}_d + \bar{m}_f} h$ – searching retailers who become *new customers*

  h – searching retailers (*potential new* customers)

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- Customer list evolves according to the law

$$H_d = (1-\delta_H)H_{d,-1} + \frac{m_d}{\bar{m}_d + \bar{m}_f}h$$

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- Marketing capital evolves according to the law

$$m_d = (1 - \delta_m) m_{d,-1} + a_d - \phi m_{d,-1} (\frac{a_d}{m_{d,-1}} - \delta_m)^2$$

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- Customer list evolves according to the law ($H_{d,-1}$ – state variable)

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- Marketing capital evolves according to the law ($m_{d,-1}$ – state variable)

$$m_d = (1-\delta_m)m_{d,-1} + a_d - \phi m_{d,-1}(\frac{a_d}{m_{d,-1}} - \delta_m)^2$$

Domestic Producers: Profit Maximization

- Maximize expected present value of Π

$$\Pi = (p_d - v)d + (xp_d^* - v)d^* - va_d - xv^* a_d^*$$

subject to

- sales constraints

$$d \leq H_d$$

- laws of motion

$$H_d = (1 - \delta_H)H_{d,-1} + \frac{m_d}{\bar{m}_d + \bar{m}_f}h$$

$$m_d = (1 - \delta_m)m_{d,-1} + a_d - \phi m_{d,-1}(\frac{a_d}{m_{d,-1}} - \delta_m)^2$$

- analogous constraints apply in the foreign market

Retailers: Search Technology

- Search to match with producers (at cost χv)
  - meet local producer with probability π
  - meet foreign producer with probability $1 - \pi$
- The match gives opportunity to trade *one* unit of output per period
- The match dissolves with per period probability δ_H

Retailers: Search Technology

- Search to match with producers (at cost χv)
  - meet local producer with probability $\pi = \frac{\bar{m}_d}{\bar{m}_d + \bar{m}_f}$
  - meet foreign producer with probability $1 - \pi = \frac{\bar{m}_f}{\bar{m}_d + \bar{m}_f}$
- The match gives opportunity to trade *one* unit of output per period
- The match dissolves with per period probability δ_H

Retailers: Equilibrium Measure h

- Measure of searching retailers h is endogenously determined by

$$\pi V_d + (1-\pi)V_f \leq \chi v \quad \text{with '='} \quad \text{whenever} \quad h > 0$$

where:

$$V_d = \max\{0, P_d - p_d\} + (1-\delta_H)E_t[QV_d']$$

$$V_f = \max\{0, P_f - p_f\} + (1-\delta_H)E_t[QV_f']$$

Bargaining and Wholesale Prices

- Producer & retailer bargain for the wholesale price p_d (or p_f)

- At each history s^t prices satisfy the Nash Bargaining problem

$$p_d(s^t) \in \text{argmax}_p \{J_d(s^t; p)^\theta V_d(s^t; p)^{1-\theta}\}$$

where

$$J_d(s^t; p) = \max\{0, p - v(s^t)\} + (1 - \delta_H) E_t Q(s^{t+1}|s^t) J_d(s^{t+1}; p_d(s^{t+1}))$$

- value from the match for the producer

$$V_d(s^t; p) = \max\{0, P_d(s^t) - p\} + (1 - \delta_H) E_t Q(s^{t+1}|s^t) V_d(s^{t+1}; p_d(s^{t+1}))$$

- value from the match for the retailer

Bargaining and Wholesale Prices

Proposition

The solution results in *instantaneous* surplus splitting

$$p_d = \theta P_d + (1 - \theta)v$$

$$p_f = \theta P_f + (1 - \theta)xv^*$$

Bargaining and Wholesale Prices

Proposition

The solution results in *instantaneous* surplus splitting

$$p_d = \theta P_d + (1-\theta)v$$

$$p_f = \theta P_f + (1-\theta)xv^*$$

- Intuition:
  - from tomorrow on the trade surplus is split in proportion $\theta, 1-\theta$
  - from today on the trade surplus is split in proportion $\theta, 1-\theta$
  - Implication: today's *instantaneous* surplus must be split the same way

Households

- Maximize $\quad E_t \sum_{t=0}^{\infty} \beta^t u(c, 1-l)$

  subject to

  - Armington aggregation

$$c + i = G(d, f) = (\omega d^{\frac{\gamma-1}{\gamma}} + (1-\omega) f^{\frac{\gamma-1}{\gamma}})^{\frac{\gamma}{\gamma-1}}$$

  - law of motion for physical capital

$$k(s^t) = (1-\delta) k(s^{t-1}) + i$$

  - standard budget constraint under complete markets

$$P_d d + P_f f + \int_S Q(s_{t+1}|s^t) b(s_{t+1}|s^t) \mu(ds_{t+1}) = b(s^t) + wl + rk(s^{t-1}) + \Pi$$

  - Numeraire normalization: price of final good is one

Equilibrium Feasibility

- Meeting probability consistency condition

$$\pi = \frac{\bar{m}_d}{\bar{m}_d + \bar{m}_f}$$

- Representativeness $m_d = \bar{m}_d$, $m_f = \bar{m}_f$

- Production feasibility $d + d^* + a_d + a_f + \chi h = zF(k, l)$

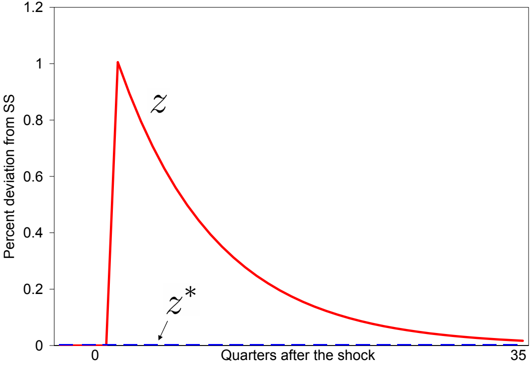
- Definition of equilibrium is standard

Intuition and Qualitative Features

Parameterization: Qualitative Features

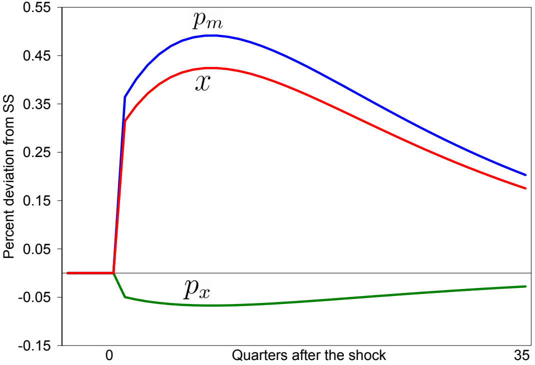
- Model parameters are such that
  - domestic and foreign goods close substitutes
  - market shares are sluggish in the short-run
- Justified by:
  - short-run vs. long-run elasticity puzzle (see Ruhl 2004)
    - trade *unresponsive* to price changes in time-series
    - trade *responsive* to price changes in the long-run
    - pattern inconsistent with the standard theory

Primitive Shock



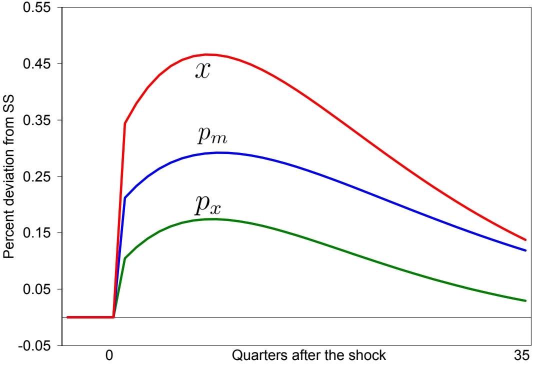
Positive productivity shock in domestic country

Failure of the Standard Model



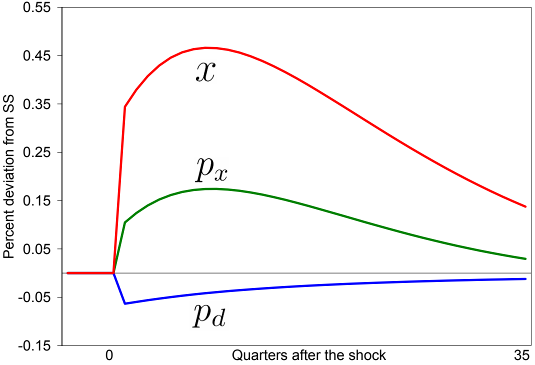
$corr(p_x, p_m) < 0 \quad corr(p_x, x) < 0$

Success of Our Model



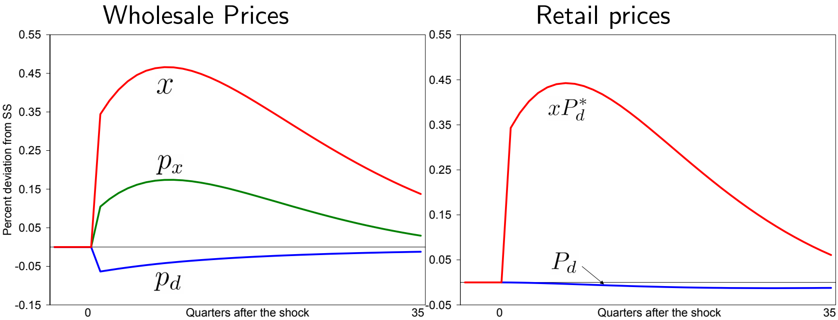
$$corr(p_x, p_m) > 0 \quad corr(p_x, x) > 0$$

Key Feature: Producers Price To Market



Markup on exported goods goes up when real exchange rate depreciates

Why Do Producers Price To Market?



$$p_x = \theta x P_d^* + (1-\theta)\, v$$

$$p_d = \theta P_d + (1-\theta)\, v$$

$$xP_d^* > P_d$$

$p_x > p_d$ – not arbitraged away due to marketing friction

Why xP_d^* rises relative to P_d?

A. Retail prices (P_d^*, P_d) change slowly and little

B. Real exchange rate x depreciates: xP_d^* goes up relative to P_d

Why xP_d^* rises relative to P_d? A. Retail Prices Change Slowly and Little

- Retail prices depend on relative supply of domestic to foreign goods

$$P_d = \omega[\omega + (1-\omega)\frac{f}{d}^{\frac{\gamma-1}{\gamma}}]^{\frac{1}{\gamma-1}}$$

- Relative supply sluggish due to sluggish market shares in the S-R

$$\frac{f}{d} = \frac{H_f}{H_d} = \frac{(1-\delta_H)H_{f,-1} + \frac{\bar{m}_f}{\bar{m}_d+\bar{m}_f}h}{(1-\delta_H)H_{d,-1} + \frac{\bar{m}_d}{\bar{m_d}+\bar{m_f}}h}$$

- Domestic and foreign goods closely substitutable (high γ)

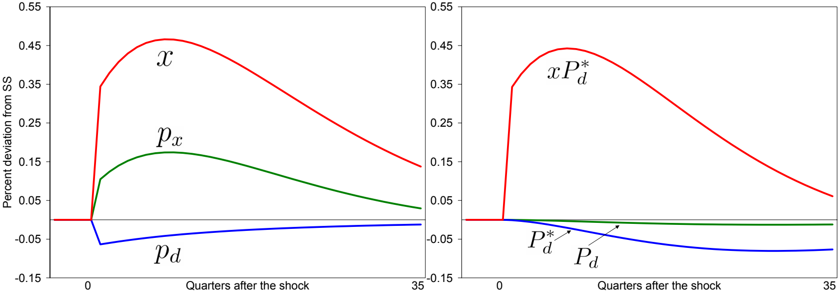
Why xP_d^* rises relatively to P_d? B. Real Exchange Rate Depreciates

- Real exchange rate determined by *efficient risk sharing*

$$x = \frac{u_c(c^*, 1 - l^*)}{u_c(c, 1 - l)}$$

- Shock makes consumption at home rise more then abroad
  - Domestic producers have relatively larger market share at home
    - at home it is relatively easy to find domestic goods
  - Market shares are sluggish in the S-R due to marketing friction
    - at home retailers search harder
    - most of increased output stays at home

Recap



- Retail prices sluggish
- Real exchange rate depreciates: $xP_d^* > P_d$
- Bargaining leads to $p_x > p_d$
- Marketing frictions make $p_x > p_d$ sustainable in S-R

Contrast with the Literature

- Time varying markups in the literature (e.g. Atkeson and Burstein (2005))
  - permanent shocks have permanent effects
    - static friction
    - same S-R and L-R dynamics

- This paper:
  - permanent shocks have no long-run effects
    - dynamic friction
    - S-R and L-R dynamics differ

Parameterization

Quantitative Discipline

- Account for the short run vs. long run price elasticity puzzle
  - trade *responsive* to tariff reductions in the long run
  - trade *unresponsive* to price fluctuations in time-series

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  - trade *responsive* to tariff reductions in the long run
    - price elasticity of trade high ≈ 8
  - trade *unresponsive* to price fluctuations in time-series
    - price elasticity of trade low ≈ 1

Quantitative Discipline

- Account for the short run vs. long run price elasticity puzzle
  - trade *responsive* to tariff reductions in the long run
    - price elasticity of trade high ≈ 8
  - trade *unresponsive* to price fluctuations in time-series
    - price elasticity of trade low ≈ 1
- Pins down two parameters:
  - elasticity of substitution in preferences: γ

    $$G(d, f) = (\omega d^{\frac{\gamma-1}{\gamma}} + (1-\omega) f^{\frac{\gamma-1}{\gamma}})^{\frac{\gamma}{\gamma-1}}$$

    – $\gamma = 8$ gives high 'long-run elasticity'
  - market expansion friction: ϕ

    $$m_d = (1-\delta_m) m_{d,-1} + a_d - \phi \left(\frac{a_d}{m_{d,-1}} - \delta_m \right)^2 m_{d,-1}$$

    – ϕ gives low 'short-run elasticity'

Details: Market Expansion Friction ϕ

$$m_d = (1-\delta_m)m_{d,-1} + a_d - \phi m_{d,-1}(\frac{a_d}{m_{d,-1}} - \delta_m)^2$$

- Set jointly with other parameters to match
  - our measure of 'short-run empirical elasticity of substitution'

    volatility ratio: $\sigma(\frac{DA}{f})/\sigma(\frac{p_f}{P_{DA}}) \approx 0.81$ (16 OECD)

    where: DA – domestic absorption in constant prices

    f – imports in constant prices

    p_f – deflator price of imports

    P_{DA} – deflator price of domestic absorption

- Theoretical justification: in the frictionless model volatility ratio is γ

Parameterization – Overview

- Step 1: Select the following parameters independently

  $\gamma = 7.9$, $\beta = 0.99$, $\alpha = 0.36$, $\sigma = 2$, $\delta = 0.025$, $\delta_H = 0.1$ (arbitrary)

- Step 2: Select remaining parameters jointly

  $\phi = 4.35$, $\delta_m = 0.016$, $\theta = 0.42$, $\chi = 1.3$, $\eta = 0.34$, $\omega = 0.55$

  to hit the following targets from the data

Data Target	Value
1. Import to GDP	12%
2. Producer markups	10%
3. Volatility of p_x relative to x	37%
4. Volatility ratio	0.81
5. Market activities in time endowment	30%
6. Share of marketing expenditures in GDP	4.5%

Quantitative Results

Quantitative Results

- State results and contrast with standard theory
  - Benchmark ($\gamma = 7.9, \phi = 4.35$)
  - Standard model ($\gamma = 0.81$, no ϕ)
    - worse statistics for international prices
    - subject to long-run/short-run elasticity puzzle
    - similar statistics for quantities

Results: International Prices

Statistic	Data	Model Economies
		Benchmark $\gamma = 7.9$ $\phi = 4.35$
A. Correlations		
p_x, p_m	0.75	1.00
p_x, x	0.46	1.00
p_m, x	0.69	1.00
B. Volatility relative to x		
p_x	0.37	0.37
p_m	0.61	0.63
p	0.26*	0.27

Results: International Prices

Statistic	Data	Model Economies: Benchmark $\gamma = 7.9$ $\phi = 4.35$	Model Economies: Standard $\gamma = 0.81$ no ϕ
A. Correlations			
p_x, p_m	0.75	1.00	-1.00
p_x, x	0.46	1.00	-1.00
p_m, x	0.69	1.00	1.00
B. Volatility relative to x			
p_x	0.37	0.37	0.13
p_m	0.61	0.63	1.13
p	0.26*	0.27	1.26

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Both models fall short in terms of volatility of x!

Results: Short-Run vs Long-Run Elasticity Puzzle

Statistic	Data	Model Economies
		Benchmark $\gamma = 7.9$ $\phi = 4.35$
Long-Run Elasticity	7.90	7.90
Volatility Ratio	0.81	0.81

Results: Short-Run vs Long-Run Elasticity Puzzle

Statistic	Data	Model Economies: Benchmark $\gamma = 7.9$ $\phi = 4.35$	Model Economies: Standard $\gamma = 0.81$ no ϕ
Long-Run Elasticity	7.90	7.90	0.81
Volatility Ratio	0.81	0.81	0.81

Results: Quantities

Statistic	Data	Model Economies Benchmark $\gamma = 7.9$ $\phi = 4.35$
A. International Comovement		
Output	0.40	0.40
Consumption	0.25	0.32
Investment	0.23	0.02
Employment	0.21	0.42
B. Volatility relative to GDP		
Consumption	0.74	0.38
Investment	2.79	3.51
Employment	0.81	0.56
Net Exports	0.30	0.19

Results: Quantities

Statistic	Data	Model Economies: Benchmark $\gamma = 7.9$ $\phi = 4.35$	Model Economies: Standard $\gamma = 0.81$ no ϕ
A. International Comovement			
Output	0.40	0.40	0.29
Consumption	0.25	0.32	0.30
Investment	0.23	0.02	0.11
Employment	0.21	0.42	0.40
B. Volatility relative to GDP			
Consumption	0.74	0.38	0.30
Investment	2.79	3.51	3.35
Employment	0.81	0.56	0.49
Net Exports	0.30	0.19	0.15

Comparison to Disaggregated Data

- Consider our previous decomposition:

$$p_x^i \equiv \frac{EP^i}{CPI} \equiv \underbrace{\frac{EP^i}{DP^i}}_{\text{PTM}} \underbrace{\frac{DP^i}{CPI}}_{\text{RPM}}$$

- Volatility of p_x^i relative to x:
  - Data : 80% from PTM
  - Benchmark : 78% from PTM

- Correlation with x:
  - Data : PTM$= 0.84$ RPM$= -0.14$
  - Benchmark : PTM$= 1.00$ RPM$= -1.00$

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  - Data : PTM$= 0.84$ RPM$= -0.14$
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Conclusions

- Develop a model of marketing in which customers are capital
- Promising quantitatively
  - accounts for aggregate and disaggregated price dynamics
  - accounts for short-run vs long-run elasticity puzzle
  - maintains good fit for quantities
    - international comovement of GDP vs consumption (0.40 vs 0.32)

Backup Slides

Volatility Ratio in the Standard Model

- Standard model adopts Armington '69 model of trade

$$G(d,f) = (\omega d^{\frac{\gamma-1}{\gamma}} + (1-\omega) f^{\frac{\gamma-1}{\gamma}})^{\frac{\gamma}{\gamma-1}}$$

d– domestic good, f– foreign good, γ– Armington elasticity

- Step 1: demand relations: $p_d = G_d(d,f)$, $p_f = G_f(d,f)$
- Step 2: derive from demand relations

$$\log(\frac{f}{d}) = \gamma \log(\frac{p_d}{p_f}) + \gamma \log(\frac{\omega_t}{1-\omega_t})$$

- Step 3: independent ω shocks + standard deviation of both sides

$$\sigma[\log(\frac{f}{d})] \leq \gamma \sigma[\log(\frac{p_d}{p_f})]$$

Details: Market Expansion Friction ϕ

- Logged quarterly data 1980-2000

	Volatility Ratio	
Country	HP-1600	HP-10^6
US	1.23	1.02
Canada	1.27	0.64
Japan	0.60	0.43
UK	0.65	0.61
...	...	...
16 OECD median	0.81	0.83
Standard Model	$= \gamma$	$= \gamma$
This Model	$= 0.81$	$= 1.6$

Robustness

	Price index used to construct p_x, p_m, x							
	CPI all-items		CPI tradables		WPI or PPI		None (nominal)	
Country	p_x, x	p_m, x	p_x, x	p_m, x	p_x, x	p_m, x	p_x, e	p_m, e
Belgium	0.72	0.74	0.50	0.54	0.60	0.41	0.77	0.76
Canada	0.50	0.92	0.53	0.91	0.52	0.90	0.20	0.71
France	0.61	0.66	0.46	0.53	0.57	0.69	0.71	0.72
Germany	0.50	0.85	0.06	0.76	-0.05	0.88	0.63	0.80
Italy	0.68	0.72	0.61	0.63	0.59	0.73	0.62	0.72
Japan	0.92	0.85	0.92	0.87	0.92	0.87	0.88	0.76
Netherlands	0.76	0.80	0.72	0.78	0.80	0.82	0.72	0.76
Switzerland	0.51	0.83	0.48	0.82	0.44	0.88	0.59	0.80
US	0.46	0.69	0.47	0.70	0.45	0.79	0.13	0.44
Australia	0.45	0.95	n.a	n.a	0.50	0.93	0.35	0.91
Sweden	0.60	0.74	n.a	n.a	0.28	0.28	0.54	0.67
UK	0.61	0.79	n.a	n.a	0.41	0.65	0.34	0.61
Median	0.61	0.80	0.47	0.66	0.51	0.80	0.60	0.74

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