Dominant Currency Paradigm

A New Model for the Small Open Economy

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International Spillovers

Nominal Rigidities

1. First generation ("Consensus View"): Fleming (1962), Mundell (1963), Dornbusch (1976), Svenson & van Wijnbergen (1989), Obstfeld & Rogoff (1995)

   - Prices rigid in the producer's currency (PCP)
   - Depreciations (appreciations) are inflationary (deflationary)

$$P_M = \mathcal{E}_{h/f}\bar{P}_f^f \qquad \mathcal{E}_{h/f}\uparrow, P_M\uparrow$$

   - Depreciations (appreciations) deteriorate (improve) terms of trade.

$$TOT \equiv \frac{P_M}{P_X} = \frac{\mathcal{E}_{h/f}\bar{P}_f^f}{\bar{P}_h^h} \qquad \mathcal{E}_{h/f}\uparrow, TOT\uparrow$$

   - Expenditure Switching: Improvement in trade balance.

International Spillovers

Nominal Rigidities

2. Second generation: Betts and Devereux (2000), Devereux and Engel (2003)
   - Prices rigid in the local (destination) currency (LCP)
   - Depreciations have no impact on inflation

$$P_M = \bar{P}^h \qquad \mathcal{E}_{h/f} \uparrow, P_M \leftrightarrow$$

   - Depreciations (appreciations) improve (deteriorate) terms of trade.

$$TOT \equiv \frac{P_M}{P_X} = \frac{\bar{P}^h_f}{\bar{P}^f_h \mathcal{E}_{h/f}} \qquad \mathcal{E}_{h/f} \uparrow, TOT \downarrow$$

   - No expenditure switching
3. Symmetry, Bilateral ERs important

Disconnect between Model and Facts ‣ go

1. Neither *PCP*, nor *LCP*, but pricing in very few currencies
   - Outsized role for dollar
     - Dollar invoicing share: 4.7 times its share in world imports, 3.1 times its share in world exports.
     - Euro invoicing share: 1.2 times for imports and exports.

2. Prices are rigid in their currency of invoicing

3. Conditional on a price change, prices not very sensitive to exchange rates
   - Strategic complementarity in pricing
     - Variable desired mark-ups
   - Imported intermediate inputs

4. dominant currency Paradigm: 1+2+3

Literature

- Dollar Pricing: Corsetti and Pesenti (2005), Goldberg and Tille (2008, 2009), Devereux et al. (2007), Canzoneri et al (2013).
    - One-period ahead price stickiness.
    - No intermediate inputs
    - No strategic complementarity in pricing

What we do

1. Model the dominant currency paradigm
   - dominant currency pricing
   - imported inputs
   - strategic complementarity in pricing
2. Empirically evaluate *DCP*
   - Colombian customs and firm data
3. Derive optimal monetary policy

Model: small open economy

- Home H trades with U (dominant currency) and R
- All prices and quantities in U and R are exogenous

Households

- Utility: $U(C_t, N_t) = \frac{1}{1-\sigma_c} C_t^{1-\sigma_c} - \frac{\kappa}{1+\varphi} N_t^{1+\varphi}$
- Consumption Aggregator: Kimball

$$\sum_i \frac{1}{|\Omega_i|} \int_{\omega \in \Omega_i} \gamma_i \Upsilon \left(\frac{|\Omega_i| C_{iH}(\omega)}{\gamma_i C} \right) d\omega = 1.$$

Strategic complementarities/Variable mark-ups

- Wage setting (Calvo)
- Trade international risk-free bonds in U currency

Producers

- Production Function: $Y_t = e^{a_t} L_t^{1-\alpha} X_t^{\alpha}$
- Labor Aggregator: Standard CES
- Intermediate input aggregator X: Same as C
- Profits

$$\Pi_t = \sum_{i,j} \mathcal{E}_{j,t} P^j_{Hi,t} Y^j_{Hi,t} - \mathcal{MC}_t \, Y_t$$

- Roundabout production: $Y_{Hi,t} = C_{Hi,t} + X_{Hi,t}$
- Price Stickiness: Calvo
  - Nest producer, local, dominant currency
  - $\theta^k_{i,j}$ share of prices from i to j in currency k.
  - Domestic prices and wages in H currency ($\theta^i_{i,i} = 1$)

Closing the Model

- Domestic interest rates

$$i_t - i^* = \rho_m(i_{t-1} - i^*) + (1 - \rho_m)\phi_M \pi_t + \epsilon_{M,t}$$

- Dollar interest rate

$$i_{U,t} = i_t^* + \psi(e^{B_{U,t+1} - \bar{B}} - 1) + \epsilon_{U,t}$$

- Exchange rate U-R

$$\ln \mathcal{E}_{R,t} + \ln P_{R,t}^R - \ln P_t = \eta \left(\ln \mathcal{E}_{U,t} + \ln P_{U,t}^U - \ln P_t \right) + \epsilon_{R,t}$$

Price Dynamics

- Export prices

$$\pi^j_{Hi,t} = \frac{\lambda_p}{1+\Gamma}\left[\left(mc^j_{H,t} - p^j_{Hi,t}\right) + \Gamma\left(p^j_{i,t} - p^j_{Hi,t}\right) + \mu\right] + \beta\mathbb{E}_t\pi^j_{Hi,t+1}$$

$\lambda_p = (1-\delta_p)(1-\beta\delta_p)/\delta_p$

- Marginal costs and prices:

$$\begin{aligned} mc^j_{H,t} &= (1-\alpha)w_t + \alpha\sum_i \gamma_k p_{iH,t} - a_t - e_{j,t} \\ p_{iH,t} &= \sum_j \theta^j_{iH,t}(p^j_{iH,t} + e_{j,t}) \end{aligned}$$

- Cost shocks in U, R, directly impact H pricing.

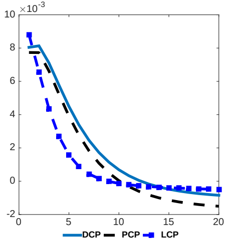
Calibration with Klenow & Willis (2006) Preferences go

	Parameter	Value
Household Preferences		
Discount factor	β	0.99
Risk aversion	σ_c	2.00
Frisch elasticity of N	φ^{-1}	0.50
Disutility of labor	κ	1.00
Production		
Interm share	α	2/3
Demand		
Elasticity	σ	2.00
Super-elasticity	ϵ	1.00
Rigidities		
Wage	δ_w	0.85
Price	δ_p	0.75
Monetary Rule		
Inertia	ρ_m	0.50
Inflation sensitivity	ϕ_M	1.50
Shock persistence	ρ_{ε_i}	0.50

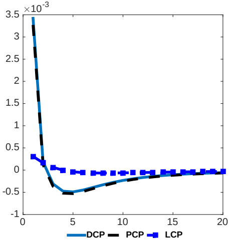
Note: SS Markup elasticity $\Gamma = \epsilon/(\sigma - 1) = 1$

H Monetary policy shock (25bp cut in policy rate)

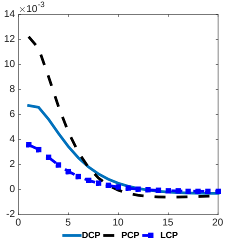
$\Gamma = 1, \alpha = 0.66, \gamma_H = 0.6, \eta = 1$



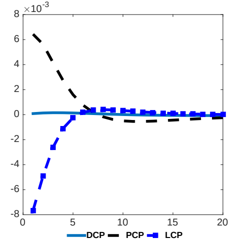
(a) *ER*



(b) π



(c) *Output*



(d) *TOT*

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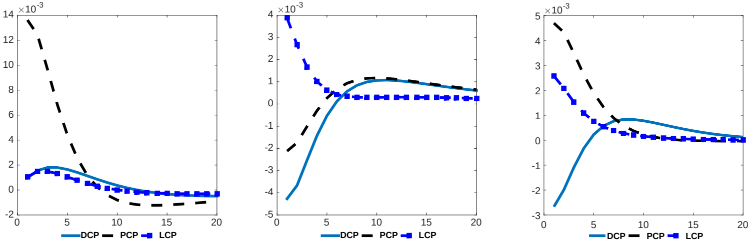
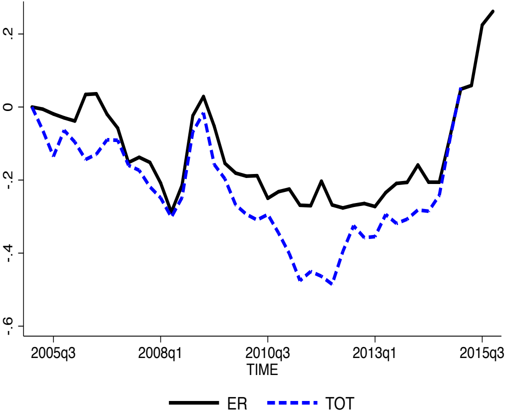


(a) *Exports* (b) *Imports* (c) *Trade*$(X + M)$

Colombia

2005-2014

- Commodity Currency, free float since September 1999
- Currency composition of exports: USD: 98.4%
- Weighted (by income) average imported input share: 38% for manufacturers, 44% for manuf exporters



- $\beta_{TOT,ER} = 1.15$

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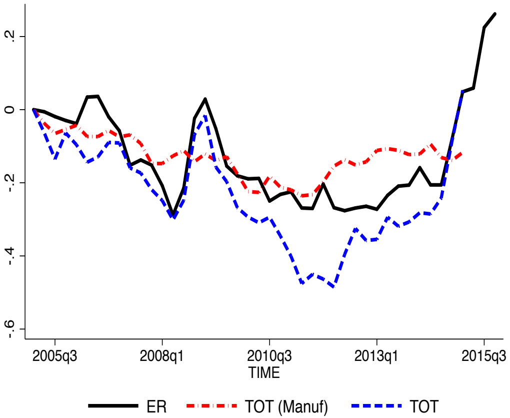
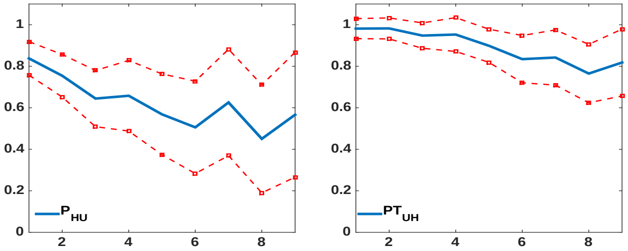


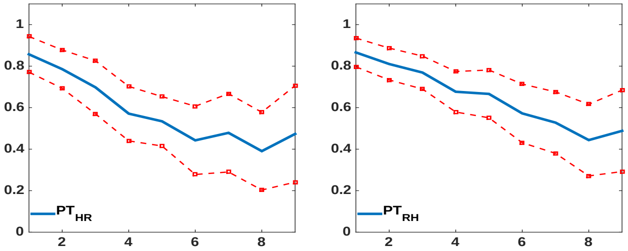
- $\beta_{TOT,ER} = 1.15$, $\beta_{MTOT,ER} = 0.33$

Dollar Pass-through, Dollar Destinations/Origins

Data $\Delta p_t = \alpha + \sum_{k=0}^{8} \beta_k \Delta e_{t-k} + \epsilon_t$ (prices in peso, quarter*year clusters)



Dollar Destinations/Origins (USA, Panama, Puerto Rico, Ecuador, and El Salvador)



Non-Dollar Destinations/Origins

Non-Dominant Vs. Dominant Currency

Prices

Table: ERPT (Non-Dollarized Economies)

	(1)	(2)	(3)	(4)
	Δp_{HR}	Δp_{HR}	Δp_{RH}	Δp_{RH}
Δe_R	0.697***	0.0896*	0.742***	0.301***
	(0.115)	(0.0464)	(0.126)	(0.0791)
Δe_U		0.660***		0.540***
		(0.0473)		(0.0662)

Non-Dominant Vs. Dominant Currency

Quantities

Table: ERPT (Dollarized Economies)

	(1) Δy_{HU}	(2) Δy_{UH}
Δe_U	-0.466	-0.939**
	(0.344)	(0.397)

Table: ERPT (Non-Dollarized Economies)

	(1) Δy_{HR}	(2) Δy_{HR}	(3) Δy_{RH}	(4) Δy_{RH}
Δe_R	-0.872***	-0.251	-0.569**	-0.297
	(0.254)	(0.278)	(0.216)	(0.246)
Δe_U		-0.972**		-0.942***
		(0.327)		(0.270)

Discerning Pricing Paradigms

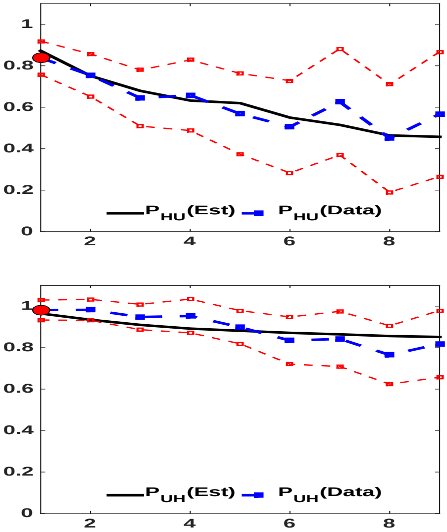
Shocks: Commodity prices, Productivity, $\mathcal{E}_R/\mathcal{E}_U$

	Parameter	Value
Measured		
Export Invoicing Shares		
to U	θ^U_{HU}	1.00
to R	$\theta^U_{HR}, \theta^R_{HR}$	0.93,0.07
Shocks		
commodity prices	σ_ζ, ρ_ζ	0.09, 0.74
Estimated		
Import Invoicing Shares		
from U	θ^U_{UH}	1.00
from R	$\theta^U_{RH}, \theta^R_{RH}$	0.93, 0.07
e_R process	$\eta, \rho_{\epsilon_r}, \sigma_r$	0.74, 0.82,0.016
a process	$\sigma_a, \rho_a, \rho_{a,\zeta}$	0.13,0.49,-0.26

Note: other parameter values as reported in the text.

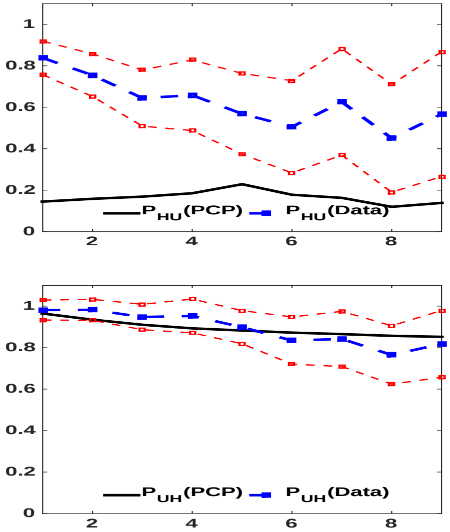
Dollar Pass-through, Dollar Destinations/Origins

Data Vs. DCP



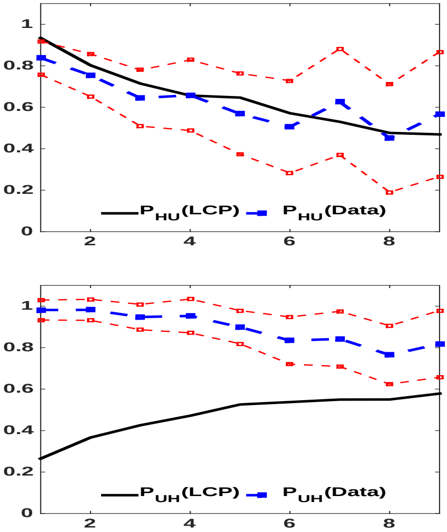
Dollar Pass-through, Dollar Destinations/Origins

Data Vs. PCP

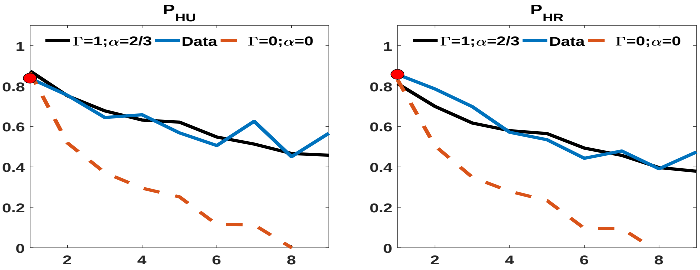


Dollar Pass-through, Dollar Destinations/Origins ‣ go

Data Vs. LCP



Role of $\Gamma > 0$ $\alpha > 0$



Non-Dominant Vs. Dominant Currency

Table: ERPT (Non-Dollarized Economies, R)

	(1) Δp_{HR}	(2) Δp_{HR}	(3) Δp_{RH}	(4) Δp_{RH}
		Data		
Δe_R	0.697***	0.0896*	0.742***	0.301***
	(0.115)	(0.0464)	(0.126)	(0.0791)
Δe_U		0.660***		0.540***
		(0.0473)		(0.0662)
		DCP		
Δe_R	0.72	0.28	0.68	0.22
Δe_U		0.66		0.70
		PCP		
Δe_R	0.49	0.26	0.92	0.88
Δe_U		0.36		0.06
		LCP		
Δe_R	0.98	0.93	0.44	0.19
Δe_U		0.08		0.39

Optimal Monetary Policy

When $\varepsilon = \alpha = \varphi = 0$, $\sigma_c = 1$, and complete markets,

$$\pi_{HH,t} = \frac{\lambda_p}{\gamma}\left[\tilde{y}_t - (1-\gamma)\tilde{s}_t\right] + \beta \mathbb{E}_t \pi_{HH,t+1}$$

$$\tilde{y}_t = \mathbb{E}_t \tilde{y}_{t+1} - (i_t - \mathbb{E}_t \pi_{HH,t+1} - r_t^n) + (1-\gamma)\mathbb{E}_t(\Delta \tilde{m}_{t+1})$$

$$\tilde{m}_t = \frac{1}{\gamma}(\tilde{y}_t - \tilde{s}_t)$$

- $s_t \equiv$ terms of trade
- $\tilde{m}_t = \tilde{e}_{U,t} + \tilde{p}^U_{HU,t} - \tilde{p}_{HH,t}$: LOP deviation
- $r_t^n = \log\beta + \mathbb{E}_t \Delta a_{t+1}$: natural real rate
- γ measures home-bias; $\lambda_p = (1-\delta_p)(1-\beta\delta_p)/\delta_p$
- $\tilde{x}$: log-deviation from flex price allocation

Optimal Monetary Policy

When $\varepsilon = \alpha = \varphi = 0$, $\sigma_c = 1$, and complete markets,

- Welfare loss function

$$\mathbb{W}^{DCP} \approx \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{2}\tilde{y}_t^2 + \gamma \frac{\sigma}{2\lambda_p} \pi_{HH,t}^2 + \frac{\gamma(1-\gamma)}{2} \tilde{m}_t^2 \right] + t.i.p$$

- Terms-of-trade evolves independently of monetary policy.
- Optimal discretionary policy:

$$\tilde{y}_t + (1-\gamma)\tilde{m}_t = -\sigma \pi_{HH,t}$$

- PPI Inflation targeting:

$$\begin{aligned} \pi_{HH,t} &= 0 \\ \tilde{y}_t &= (1-\gamma)\tilde{s}_t \end{aligned}$$

- No "divine coincidence."
- Without cost-push shocks, no gains to commitment

Conclusion

- Dominant currency paradigm
- Shock transmission different
  - stable terms of trade
  - high dominant currency ERPT into trade prices and volumes regardless of origin or destination
  - low pass-through of non-dominant currencies
  - weak export expansions following depreciations
  - stronger dominant currency may lower global trade
- Data strongly supports *DCP*
- Monetary policy targets dollar driven failure of *LOP* besides inflation and output gap
  - PPI inflation targeting, output gap fluctuates with the terms of trade

Dominance of dollar invoicing in world trade ▸ back

	Dollar Share	Euro Share	Own Currency Share	US Export Share	Euro Export Share
Argentina	0.97	0.02	0.00	0.08	0.14
Australia	0.77	0.01	0.20	0.06	0.05
Brazil	0.94	0.04	0.01	0.17	0.20
Canada	0.70	.	0.23	0.80	0.04
China	.	.	0.05	0.19	0.13
Denmark	0.23	0.31	0.19	0.05	0.37
France	0.40	0.50	0.50	0.14	0.49
Germany	0.24	0.62	0.62	0.15	0.42
Japan	0.50	0.08	0.39	0.22	0.10
South Africa	0.52	0.17	0.25	0.10	0.21
South Korea	0.85	0.06	0.01	0.15	0.10
Switzerland	0.19	0.35	0.35	0.11	0.48
Thailand	0.82	0.02	0.07	0.15	0.09
Turkey	0.46	0.41	0.02	0.06	0.37
United Kingdom	0.29	0.13	0.51	0.14	0.49
United States	0.97	.	0.97	–	0.15

EM share in world imports: 38%, exports: 33%

Parameterization ▸ back

- Preferences: Klenow and Willis (2006)

$$Y_{iH,t}(\omega) \equiv C_{iH,t}(\omega) + X_{iH,t}(\omega) = \gamma_i \left(1 + \epsilon \ln \frac{\sigma - 1}{\sigma} - \epsilon \ln Z_{iH,t}\right)^{\sigma/\epsilon} (C_t + X_t)$$

- $Z \equiv \frac{P_{iH}(\omega)}{P} D$
- Demand elasticity

$$\sigma_{iH,t} = \frac{\sigma}{\left(1 + \epsilon \ln \frac{\sigma-1}{\sigma} - \epsilon \ln Z_{iH,t}\right)}$$

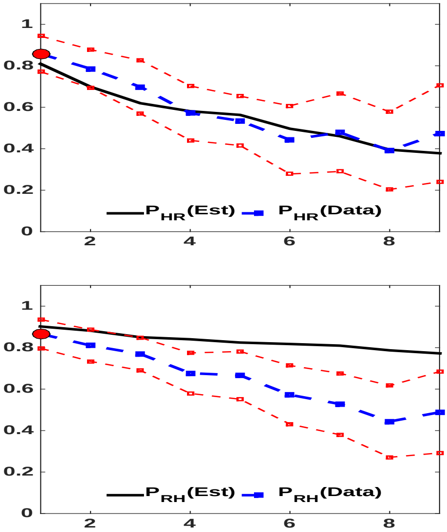
- Mark-up elasticity

$$\Gamma_{iH,t} = \frac{\epsilon}{\left(\sigma - 1 - \epsilon \ln \frac{\sigma-1}{\sigma} + \epsilon \ln Z_{iH,t}\right)}$$

- Symmetry: $Z_{iH,t} = (\sigma - 1)/\sigma$

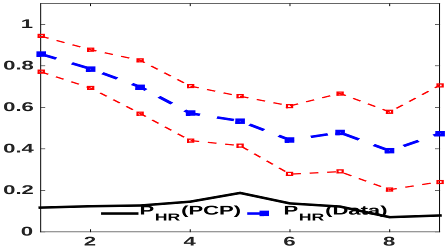
Dollar Pass-through, Non-Dollar Destinations/Origins ▸ back

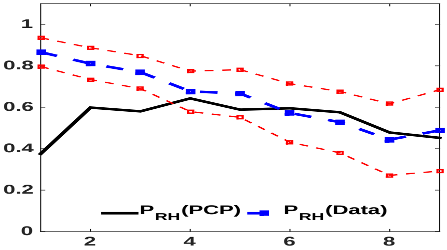
Data Vs. DCP



Dollar Pass-through, Non-Dollar Destinations/Origins ▸ back

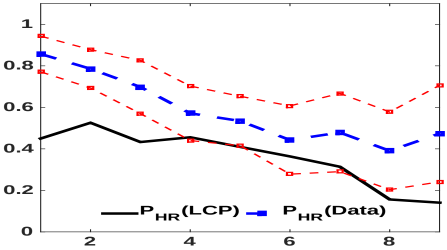
Data Vs. PCP

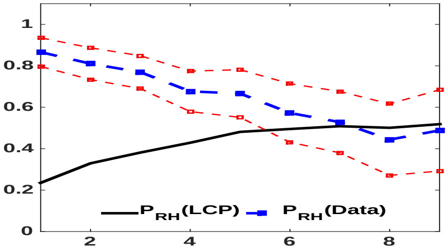




Dollar Pass-through, Non-Dollar Destinations/Origins ▸ back

Data Vs. LCP





Estimation

- Minimum distance estimator: $\mathbf{m}(\vec{\tau})\Omega^{-1}\mathbf{m}^{\mathsf{T}}(\vec{\tau})$
- 11 moments, 9 parameters:
  $\vec{\tau} = \{\theta^U_{UH}, \theta^U_{RH}, \theta^R_{RH}, \eta, \rho_{\epsilon_r}, \sigma_r, \sigma_a, \rho_a, \rho_{a,\zeta}\}$

	Data	Model
$\beta^U_{0,UH}$	0.98	0.97
$\beta^U_{0,RH}$	0.89	0.80
$\beta^H_{0,RH}$	0.18	0.13
$\hat{\eta}$	0.54	0.54
$\hat{\sigma}_r$	0.018	0.017
$\hat{\rho}_{\epsilon_r}$	0.78	0.78
$\hat{\rho}_{a,\zeta}$	0.84	0.87
$\hat{\sigma}_a$	0.023	0.026
$\hat{\rho}_a$	0.64	0.64
$\beta^U_{0,HR}$	0.86	0.81
$\beta^U_{0,RH}$	0.87	0.90