Precautionary Demand for Foreign Assets in Sudden Stop Economies:
An Assessment of the New Merchantilism

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The stylized facts & the New Merchantilism

1. Gradual financial globalization since late 1980s
   – Upward trend in Chinn-Ito & Edwards indexes since 1985
   – Highest capital mobility (Obstfeld-Taylor "introspection" index)

2. 18 Sudden Stops since Mexico 1994

3. Foreign reserves have surged since Sudden Stops
   – 8% of GDP in median SS country, 13% in Asia!

New Merchantilism:

- Reserves are hoarded to keep exchange rate undervalued and the CA in surplus (Dooley, Folkerts-Landau, & Garber, (2005))

- Reserves are a war-chest for defense against future Sudden Stops (Aizenman & Marion (2003)).

Financial globalization in Sudden Stop countries
(average of country indexes)

Edwards
right axis

Chinn-Ito
left axis
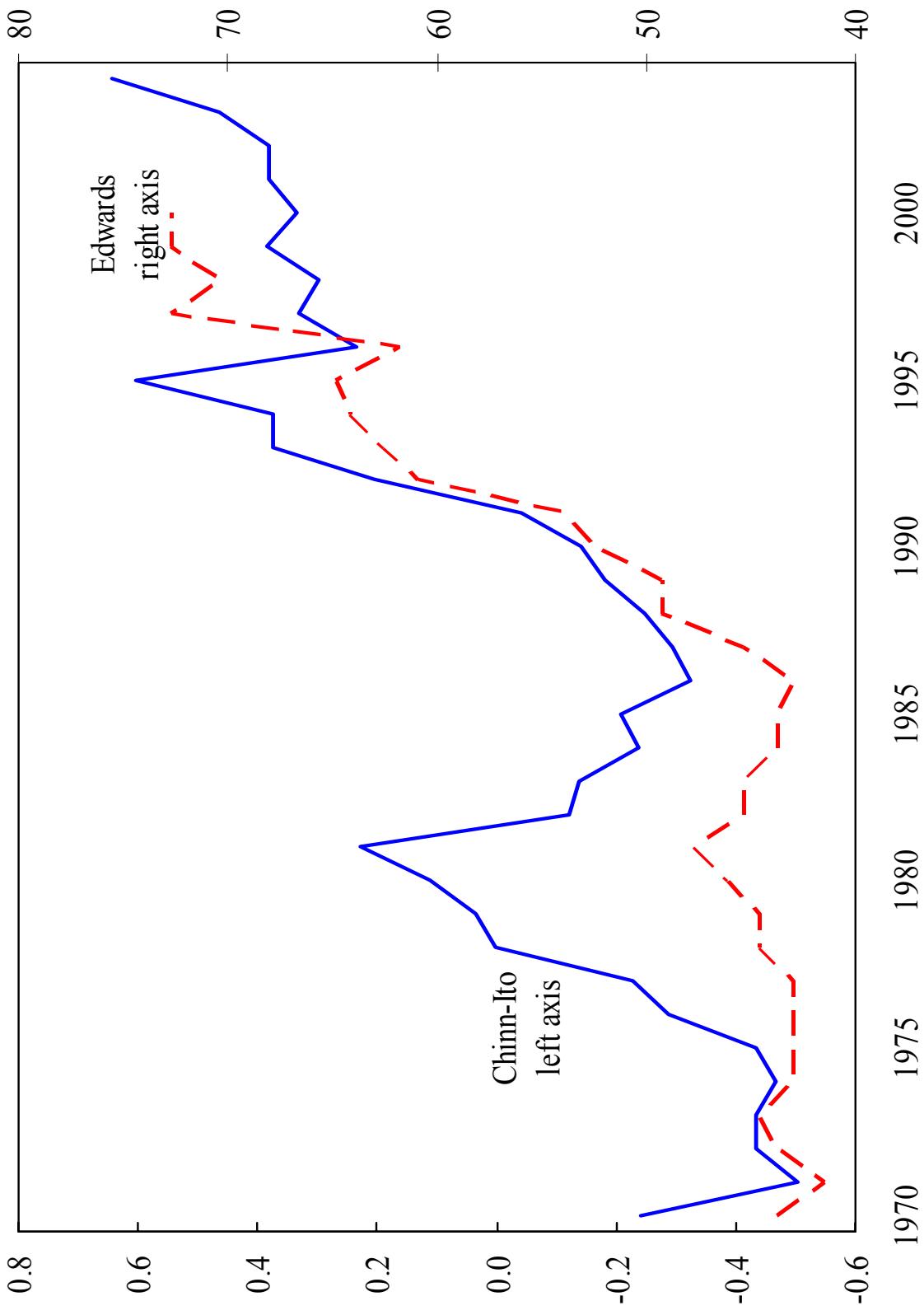
Surge in reserves in Sudden Stop Countries

(difference of averages for SS year to 2005 minus 1985 to SS year)

Country	Year of Sudden Stop	Change in reserves
Hong Kong	1998	34.69
Korea	1997	16.23
Malaysia	1997	14.36
Thailand	1997	13.17
Uruguay	2002	12.87
Indonesia	1997	12.17
Philippines	1997	10.65
Russia	1998	9.41
Turkey	2001	7.90
Peru	1998	7.41
Pakistan	1998	6.61
Argentina II	2001	6.51
Argentina I	1994	5.42
Chile	1998	3.57
Brazil	1998	3.30
Colombia	1998	2.97
Mexico	1994	2.65
Ecuador	1999	-3.46
Median		7.66
Median Asian Countries		13.17

Our analysis

- Is the New Merchantilism consistent with quantitative predictions of an optimal self-insurance framework?
  - Calibration to EMs business cycles and Mexican NIAs

- Three drivers of precautionary foreign asset demand:

  1. Business cycle volatility
     - Increases in variability & persistence of output fluctuations

  2. Financial globalization
     - Lower tax on NFP w. lump-sum rebate

  3. Endogenous Sudden Stop risk
     - Credit constraint & liab. dollarization trigger Fisherian deflation

Main findings

1. Volatility cannot explain surge in reserves because it has not increased post-globalization

2. Financial globalization and Sudden Stop risk produce large rise in foreign assets
   - Larger globalization effects at high financial integration
   - Self insurance reduces sharply long-run prob. of Sudden Stops

3. Slow adjustment with protracted surpluses and undervalued real exchange rates

4. Implicit hedge in two-sector model lowers prec. savings

5. Result robust to specification of preferences

Optimal self-insurance framework

- Preferences

$$E_0 \left[\sum_{t=0}^{\infty} \left\{ \exp\left(-\sum_{\tau=0}^{t-1} v(c_\tau) \right) \right\} \frac{c_t^{1-\gamma}}{1-\gamma} \right], \quad v(c) = \begin{cases} \rho^{UE} \ln(1+c) & w.\ UE\ setup \\ \ln(1+\rho^{BAH}) & w.\ BAH\ setup \end{cases}$$

$$c(c_t^T, c_t^N) = \left[a\left(c_t^T\right)^{-\mu} + (1-a)\left(c_t^N\right)^{-\mu} \right]^{-\frac{1}{\mu}}, \quad a > 0, \ \mu \geq -1.$$

- Budget constraint

$$c_t^T + p_t^N c_t^N = \varepsilon_t^T y^T + \pi_t^N - b_{t+1} + b_t \left[1 + r(1-\tau) \right] + T_t + \left(A^T + p_t^N A^N \right)$$

- Credit constraint

$$b_{t+1} \geq -\kappa \left[\varepsilon_t^T y^T + \pi_t^N \right] \geq \Omega, \quad where \quad \pi_t^N \overset{eq}{=} p_t^n y_t^n - p^m m_t$$

- Nontradables produced with imported inputs

$$y_t^N = z_t Z m_t^\alpha, \qquad 0 \le \alpha \le 1.$$

- Shocks to tradables endowment and nontradables TFP

  – Calibrated to match observed variability, co-movement and persistence of sectoral GDPs

- Measures of precautionary savings

  $(I) \quad E[b]^{Sss} - \overline{b}^{Dss} \qquad\qquad (II) \quad E[b]^{Sss}$

  – In BAH setup: $\quad \overline{b}^{Dss} = \phi \qquad$ (independent of τ)

  – In UE setup: $\quad \exp(v(\overline{b}^{Dss})) = R \qquad$ (depends on τ)

Why two preferences?

- Subjective discounting affects self insurance

- Because of CRRA utility in BAH and UE setups, agents self-impose Aiyagari's *Natural Debt Limit*

  - Since $u'(.) \to \infty$ as c approaches zero,

  $$b_{t+1} \geq \phi \geq -\min(\varepsilon_t y + A)/r$$

- BAH setup:

  - Equilibrium requires $\rho^{\text{BAH}} < r$ otherwise $b \to \infty$

  - $\mathbb{E}[b]$ is inelastic at ϕ for low r, and infinitely elastic as $r \to \rho^{\text{BAH}}$

  - Skewed wealth distributions

- UE setup:

  - RTP rises w. past consumption

  - Well-defined equilibrium requires $\rho^{UE} \leq \gamma$

  - Symmetric wealth distributions

Why two preferences?

- Subjective discounting affects self insurance

  – CRRA imposes *Natural Debt Limit:* $b_{t+1} \geq \phi \geq -\min(\varepsilon_t y + A)/r$

    …but the elasticity of savings is very different

<u>Mean foreign assets: BAH preferences</u>
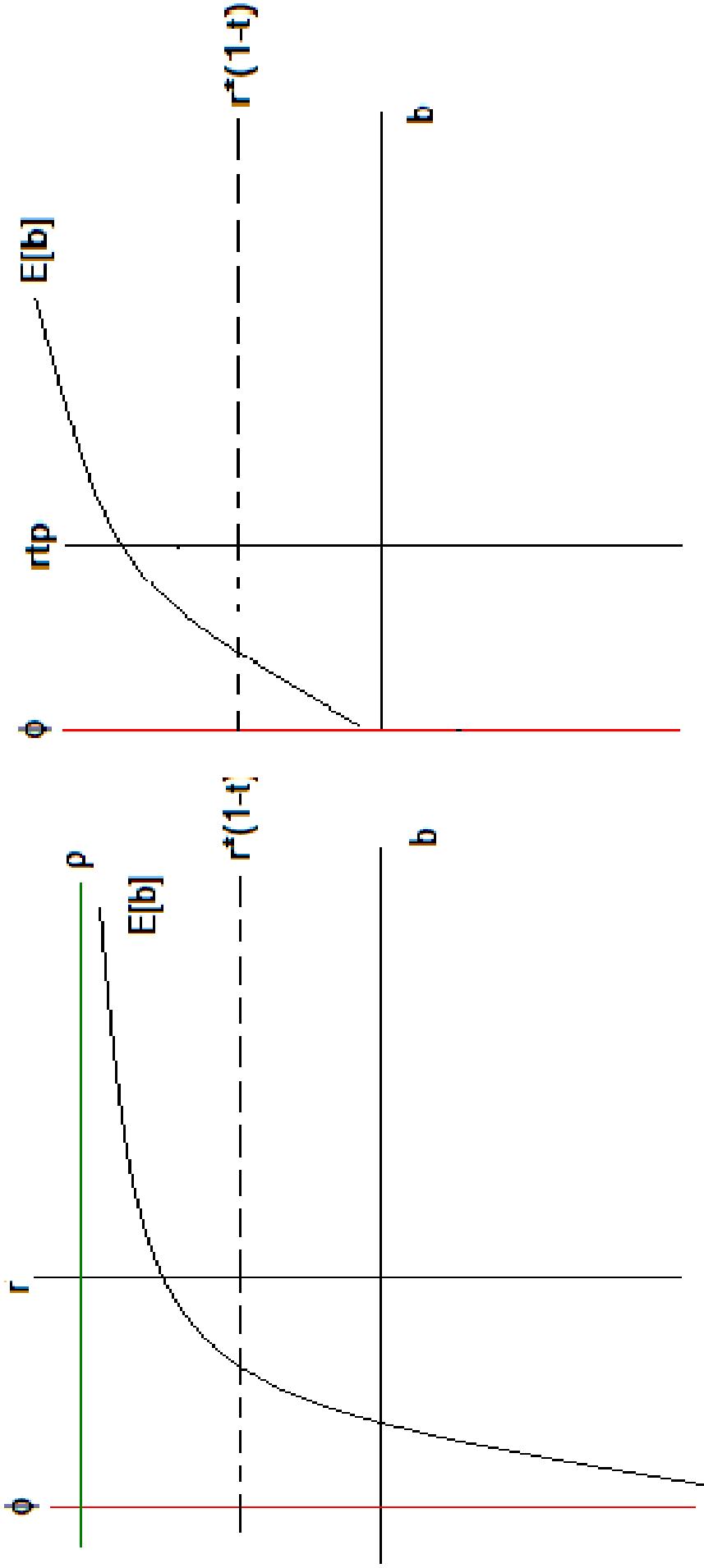
<u>Mean foreign assets: UE preferences</u>
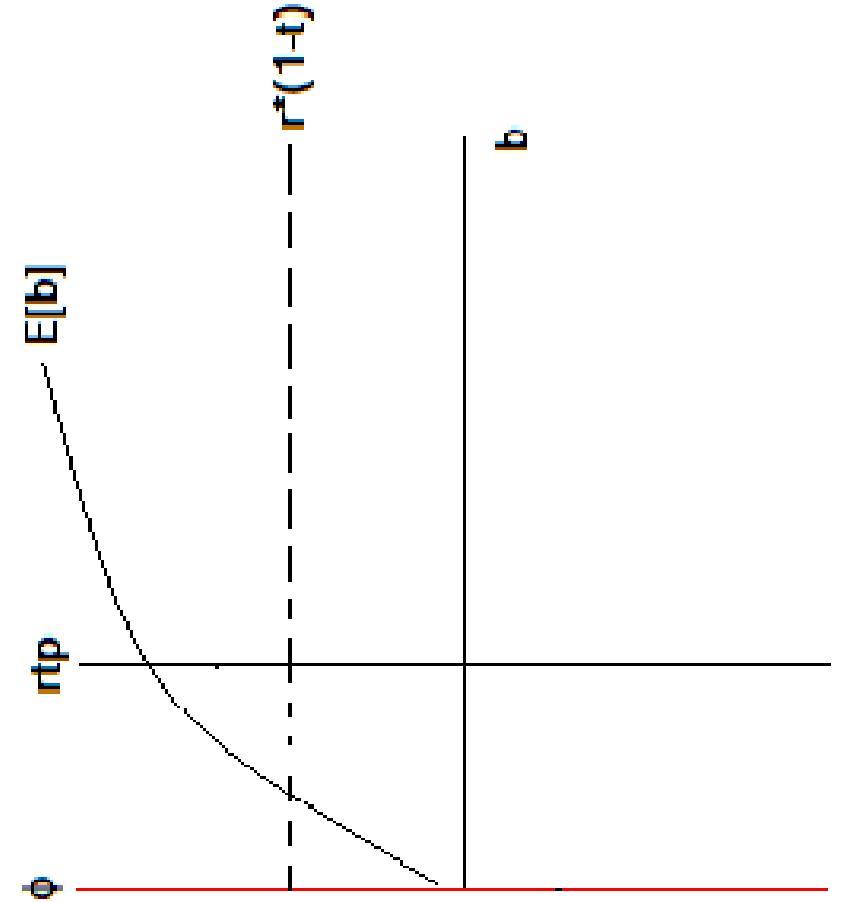
One-sector model: Calibration to Mexican data

β	Discount factor	0.944
γ	Coefficient of relative risk aversion	2.000
ϖ	Ad-hoc debt limit on international assets	-0.510
R	Gross world interest rate	1.059
y	Mean of income	1.000
c	Consumption to GDP ratio	0.692
b	Steady-state ratio of net foreign assets to GDP	-0.440
σ_e	Standard deviation of output innovations	0.026
θ_y	Autocorrelation of output	0.597

Precautionary demand for foreign assets & output volatility: One-sector Model

(percent of GDP)

A. Variability

Standard deviation of output (%)

— Uzawa-Epstein — Bewley-Aiyagari-Hugget
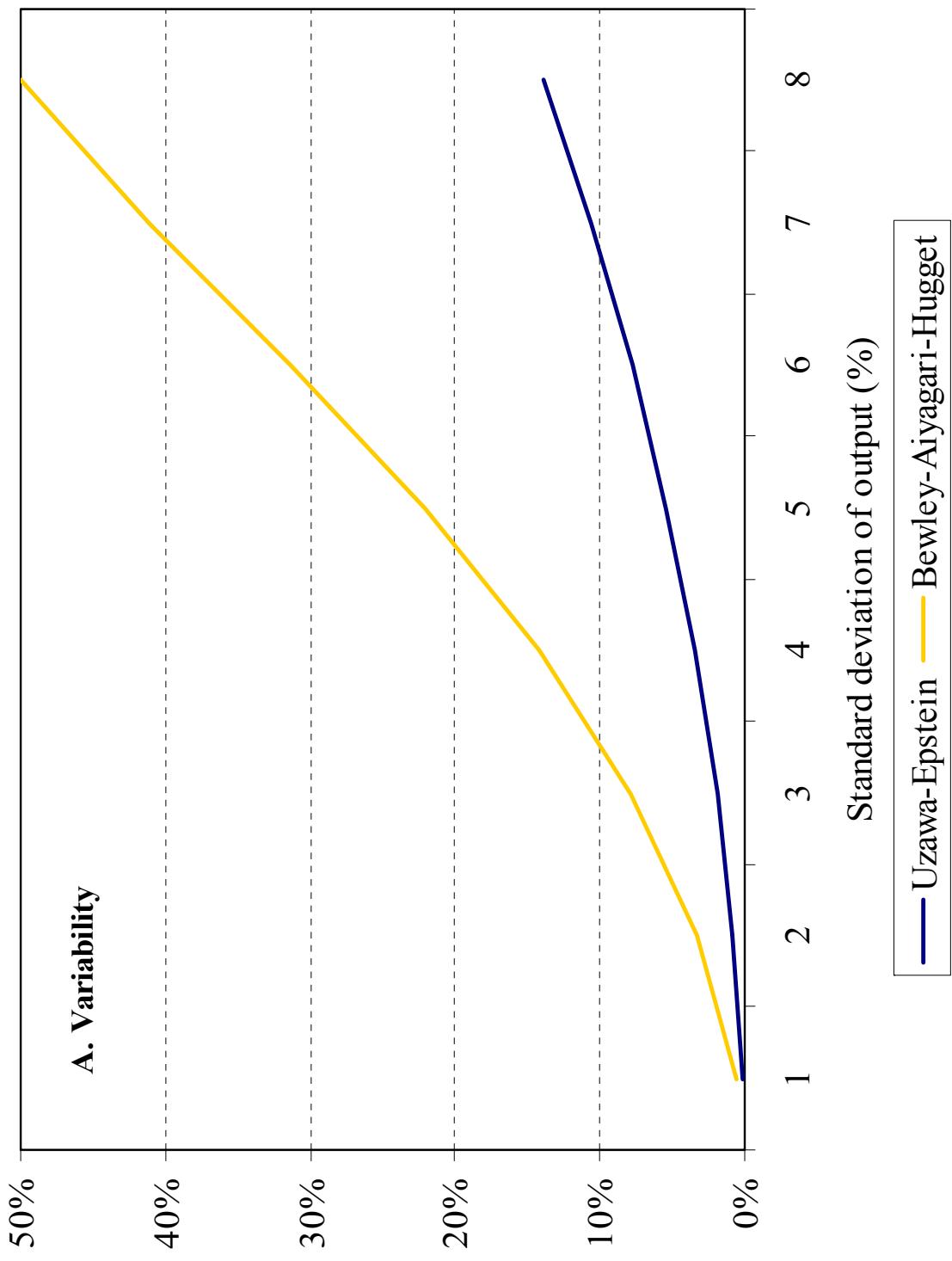
Evolution of GDP volatility in Sudden Stop Countries
(20-year rolling std. devs. of HP-filtered GDP)

Mean and Median Volatility

Median Volatility By Regions
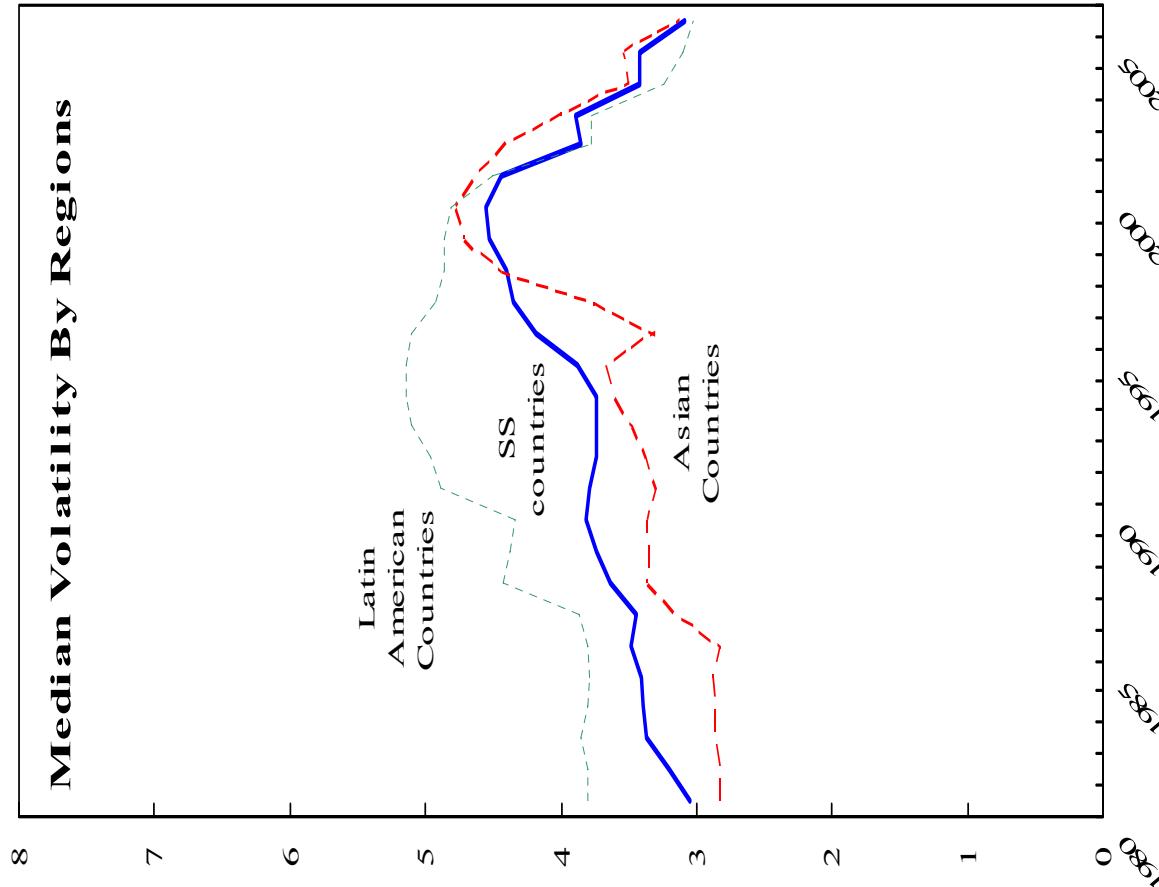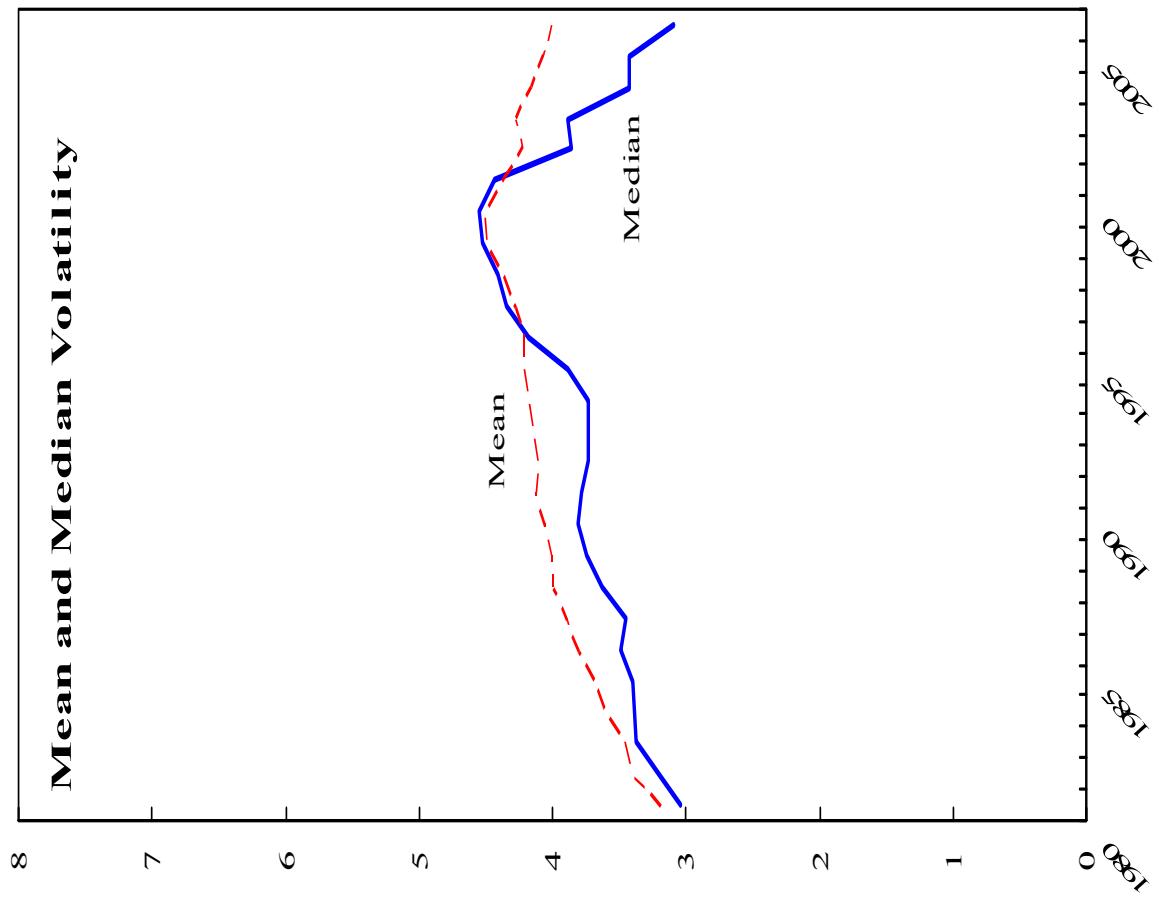
Financial globalization effects: One-sector Model
(shares of GDP)

Mean foreign assets

Precautionary savings

Tax on capital flows (Percent)

Tax on capital flows (in percent)

Right Axis

Bewley-Aiyagari-Hugget: NDL

Bewley-Aiyagari-Hugget:ADL=-1.0

Bewley-Aiyagari-Hugget: ADL=-2
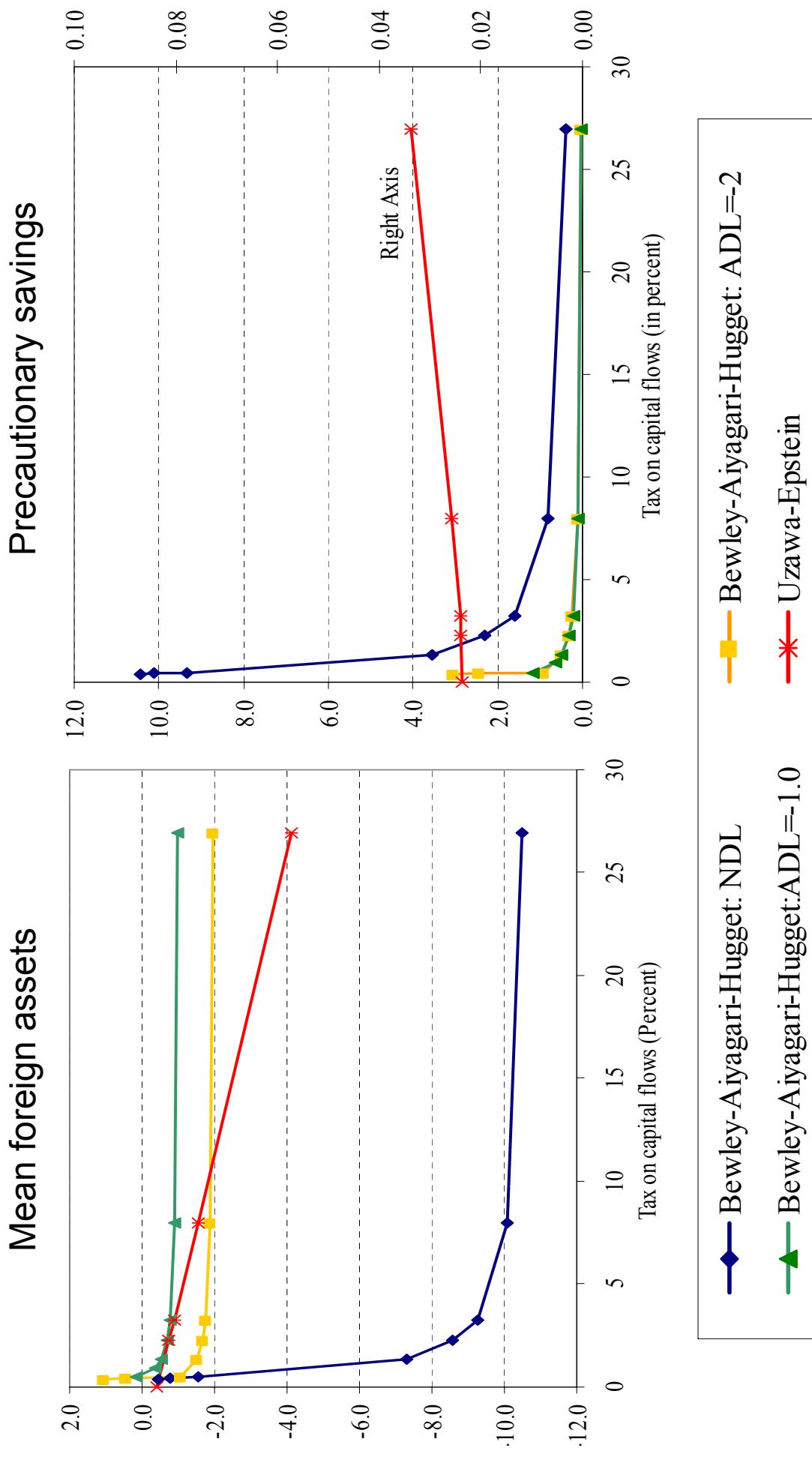
Uzawa-Epstein

Two-sector model Calibration to Mexican data

|		
β	Discount factor in the Bewley-Aiyagari-Hugget (BAH) framework	0.944
β^{UE}	Time preference elasticity in the Uzawa-Epstein UE) framework	0.187
γ	Coefficient of relative risk aversion	2.000
μ	Elasticity of substitution	0.316
ϖ	Ad-hoc debt limit on international assets in the BAH framework	-0.700
α	Share of input costs to gross output of nontradables	0.200
R	Gross world interest rate	1.059
b	Steady-state ratio of net foreign assets to GDP	-0.440
p^N	Steady-state relative price of non-tradables in units of tradables	1.000
p^m	Price of intermediate input	1.000
$y^T + p^N y^N$	Steady-state total income in units of tradables	1.000
c^T/y^T	Tradable consumption to output ratio	0.665
c^N/y^N	Non-tradable consumption to output ratio	0.710
$p^N y^N/y^T$	Non-tradable GDP to tradable GDP	1.543
A^T	Lump-sum levels of exogenous tradable absorption	0.106
A^N	Lump-sum levels of exogenous non-tradable absorption	0.176

Stochastic structure

- VAR of tradables endowment, nontradables TFP

- "Identification by simulation" for TFP to match nontradables variability, autocorrelation and correlation with tradables GDP

Globalization effects: one- & two-sector models

(share of GDP)

Precautionary savings

Tax on capital flows (in percent)

Right Axis

BAH two sectors:ADL=-1.0   BAH one sector:ADL=-1

UE two sectors   UE one sector
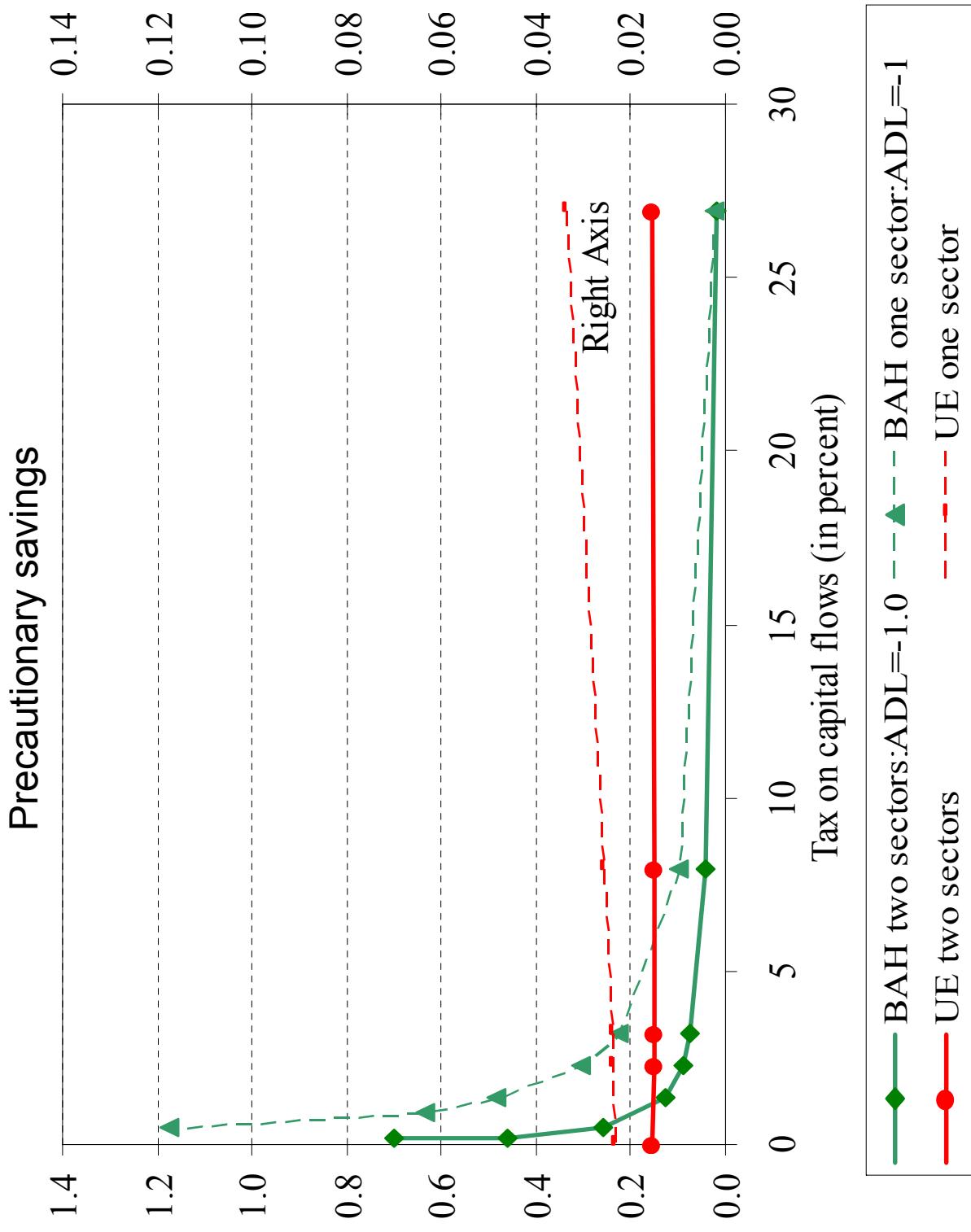
Endogenous Sudden Stops

- Cycles lead to debt positions where constraint binds
  - Long-run business cycle moments unchanged
  - Countercyclical current account: debt built up during booms

- Fisherian deflation amplifies effects of shocks causing Sudden Stops:

$$b_{t+1} = -\kappa \left[\varepsilon_t^T y_t^T + p_t^N (1-\alpha) z_t Z m_t^\alpha \right]$$

$$p_t^N \alpha z_t Z m_t^{\alpha-1} = p^m$$

$$p_t^N = \left(\frac{1-a}{a} \right) \left(\frac{c_t^T}{c_t^N} \right)^{1+\mu}$$
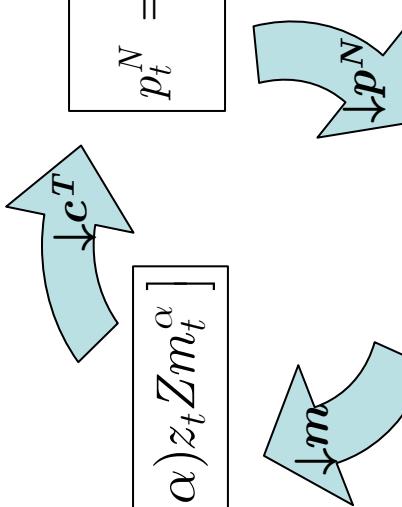
- Extra incentive for precautionary savings
  - "Excessive" SSs ruled out from stochastic steady state
  - Long-run probabilities of Sudden Stops: 3.9% (BAH), 7.9% (UE)

Stochastic steady states

	UE		BAH	
	Econ w/ perfect credit markets	Econ w/ binding credit constraints	Econ w/ perfect credit markets	Econ w/ binding credit constraints
Foreign assets/output ratio				
Mean	-0.424	-0.378	-0.447	-0.243
Coefficient of variation	8.689	6.342	19.405	18.179
Correlation with GDP	0.365	0.277	0.495	0.441
First Order Autocorrelation	0.985	0.974	0.995	0.994
Coefficients of variation (in percent)				
Consumption of tradables	1.643	1.523	3.139	2.993
Consumption of nontradables	5.369	5.379	4.926	4.896
Consumption	3.626	3.634	3.169	3.109
Price of nontradables	6.622	6.550	8.099	8.053
Current Account-GDP ratio	1.453	1.416	1.950	1.939
Tradables GDP	3.345	3.345	3.345	3.345
GDP in units of tradables	2.213	2.184	3.292	3.271
Nontradables GDP	3.050	3.059	2.797	2.793
Intermediate input	3.805	3.688	5.846	5.754
Correlation with GDP in units of tradables				
Consumption of tradables	0.374	0.341	0.804	0.803
Price of nontradables	0.749	0.740	0.867	0.873
Current Account-GDP ratio	-0.141	-0.142	-0.474	-0.497
Nontradables GDP	-0.579	-0.579	-0.562	-0.591

Impact amplification effects in Sudden Stop region
(excess responses to 1 s.d. shocks)

Foreign assets as a percent of long-run GDP

UE long run prob. border

BAH long run prob. border

long-run Sudden Stop region
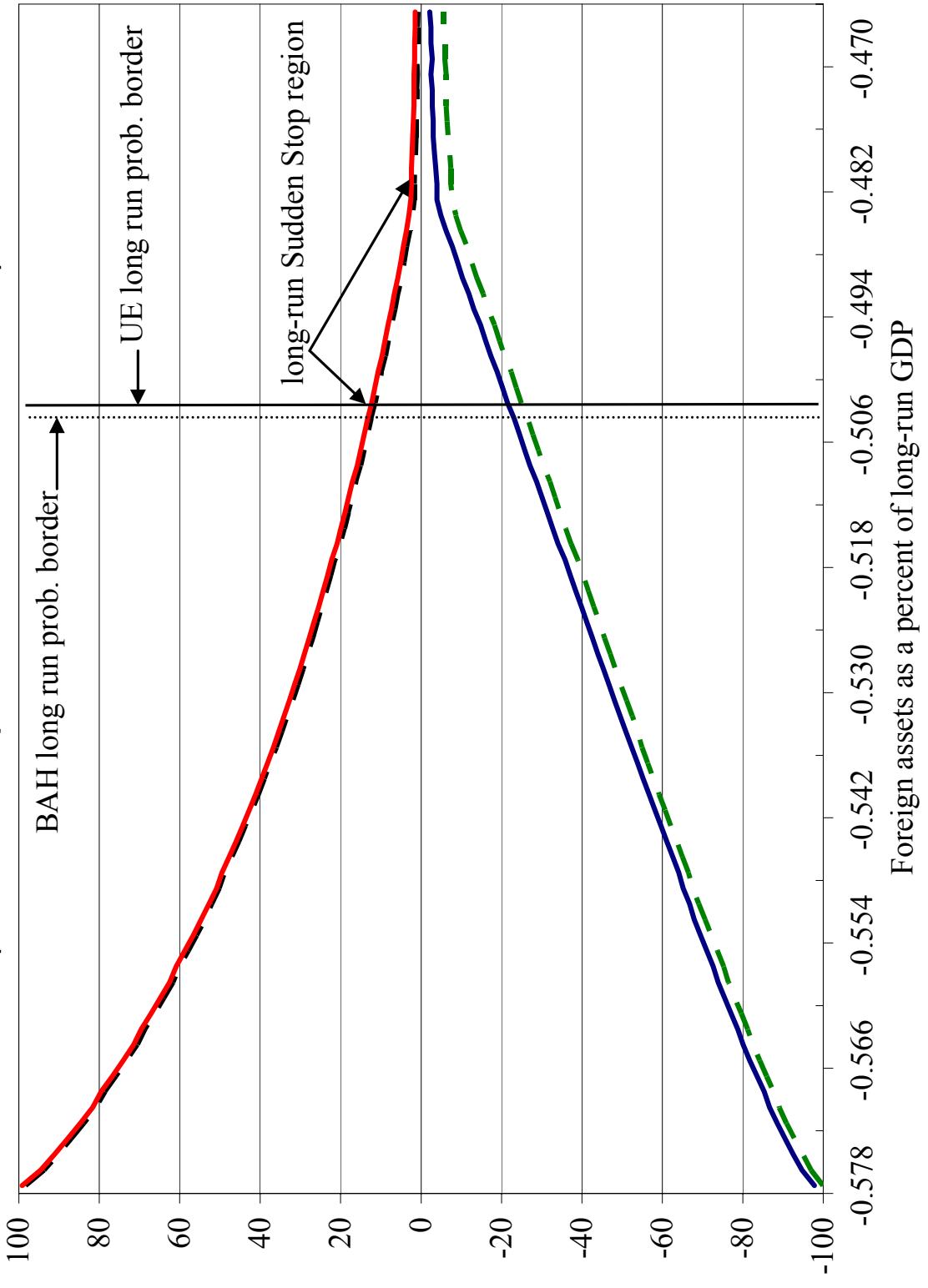
- Price of Nontradables: UE setup
- Price of Nontradables: BAH setup
- Current account-GDP ratio: UE setup
- Current account-GDP ratio: BAH setup

# Sudden Stop dynamics at a 49% debt ratio
(excess responses to 1 s.d. shocks)

Current Account-Output Ratio

Price of Nontradables

CES Consumption

Total Output in Units of Tradables
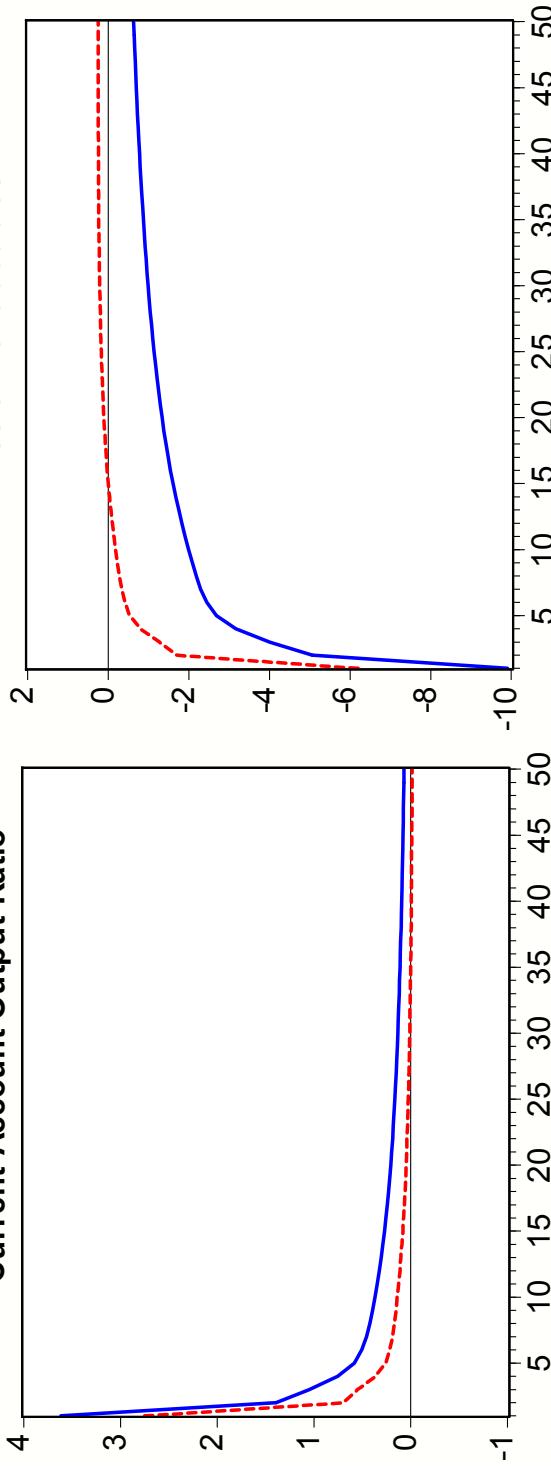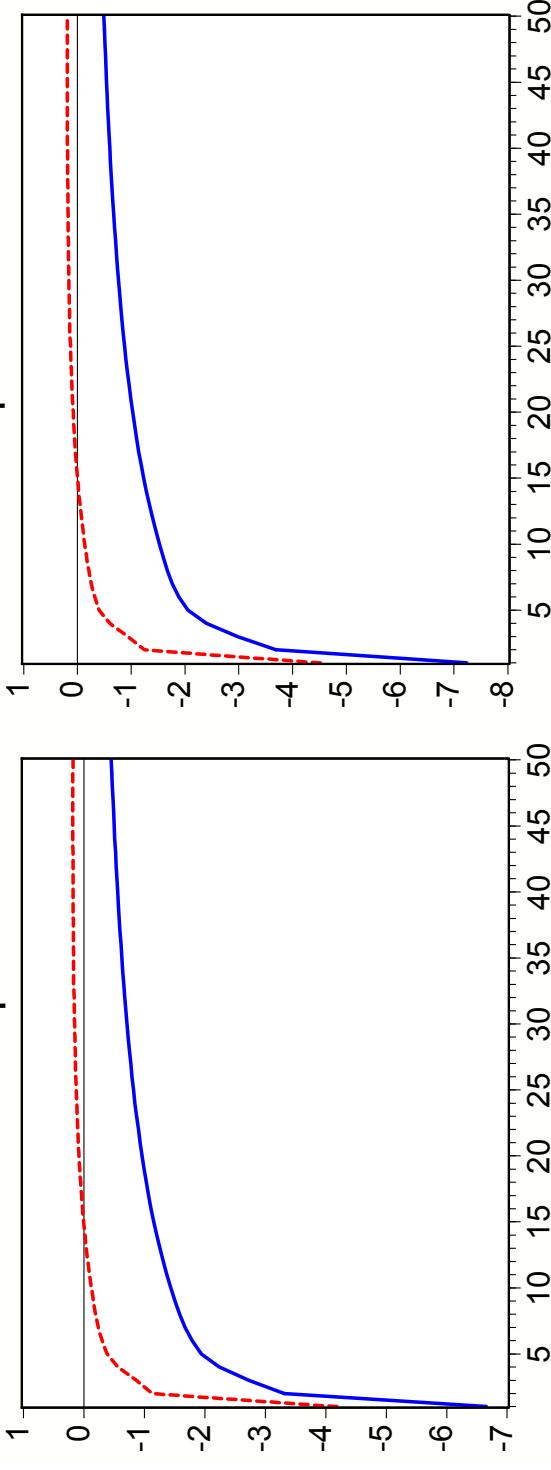
Bewley-Aiyagari-Hugget Preferences

Uzawa-Epstein Preferences

The magic of precautionary savings

Mean foreign assets and probability of a Sudden Stop at a -48.7% debt ratio

| | BAH setup | | UE setup | |
	Prob. of Sudden Stop	Mean foreign assets	Prob. of Sudden Stop	Mean foreign assets
Economy with credit constraints				
year 0	100.0%	-48.7%	100.0%	-48.7%
year 2	40.0%	-48.2%	21.0%	-48.2%
year 15	4.7%	-41.7%	3.4%	-42.9%
long run	0.9%	-24.3%	1.1%	-37.8%
Frictionless economy				
long run	0.0%	-44.7%	0.0%	-42.4%
Change in mean foreign assets		20.4%		4.6%

Transitional distributions in Sudden Stop economies
(foreign assets in percent of mean GDP)

UE setup

BAH setup

Legend: 2 years — 5 years — 10 years — 15 years — Long-run distribution
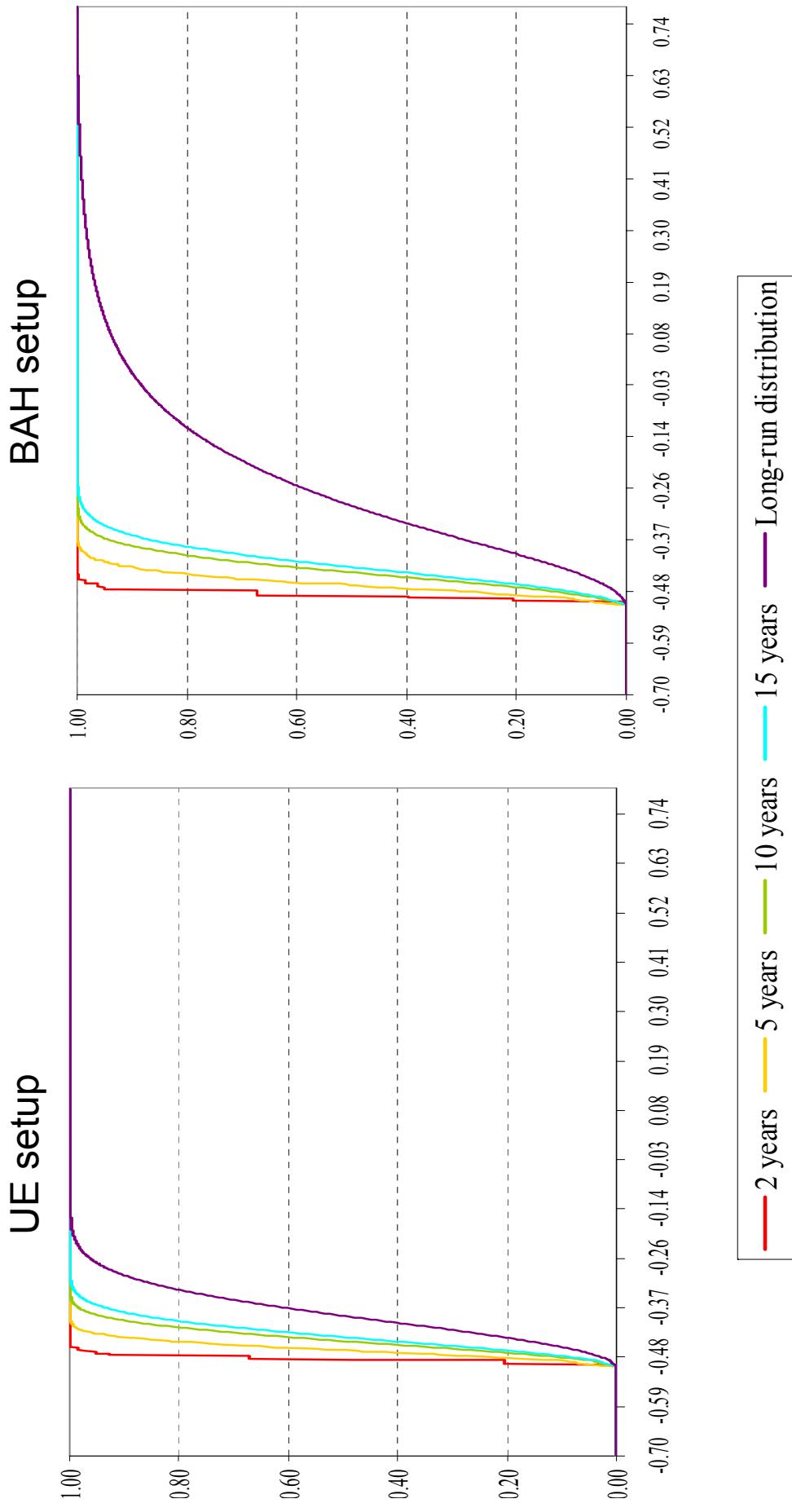
Conclusions

- New Merchantilism is only partially right:
  - Volatility explanation fails
  - Sudden Stop risk explains some of the surge in reserves
  - …but so does financial globalization even without Sudden Stops

- Slow transition after Sudden Stops or fin. globalization
  - Persistent surpluses and undervalued exchange rates (not necessarily due to exchange rate management)

- Normative implications pose challenges
  - Precautionary savings are suboptimal, but how suboptimal? and what feasible second-best arrangement can dominate?
  - Financial globalization without financial development reduces welfare because of adverse distributional effects of prec. savings