

Predictable Interest Rate Movements and Their Implications for Emerging Markets

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Motivation

- US FRB broadly *expected* to raise rates 6+ times in 2022, by 25-50bps each.
- Implications for emerging market borrowers? Perceived as *bad news*.

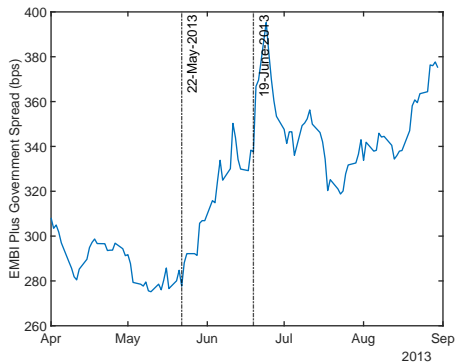
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 - depress output, slow/reverse capital flows,
 - and increase spreads (Kalemli-Özcan 2019 Jackson Hole)

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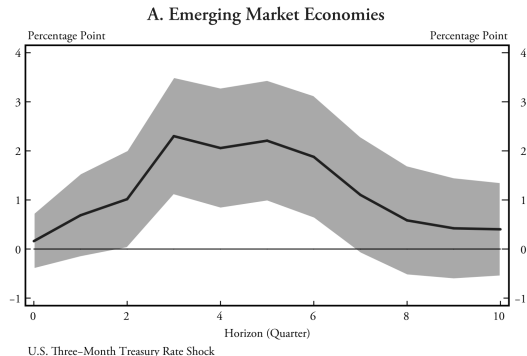
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- Our contribution: Sovereign default model with. . .
 - News about persistent dynamics of lenders' opportunity cost
 - Domestic financial frictions
- News of higher risk-free rates: recessionary, increase spreads
- Bonus: endogenously no “consumption boom before default” puzzle

Motivating Evidence



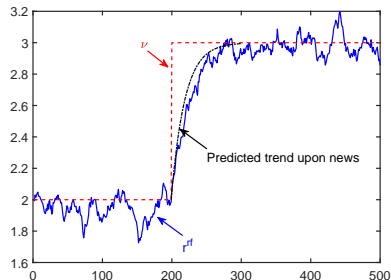
2013 “taper tantrum” and EMBI spread

Responses of 12-Month Government Bond Rate Differentials I



Source: Kalemli-Özcan (2019)

Predictable Risk-free Rate Dynamics



Sample episode

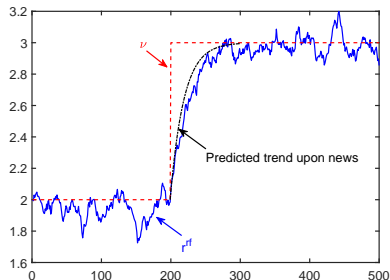
Allow for slow-moving, predictable dynamics in the risk-free rate using regime-switching AR(1) with regime-specific intercept

$$r_{t+1}^{\text{rf}} = (1 - \rho_r)v_t + \rho_r r_t^{\text{rf}} + \sigma_{r,\varepsilon}\varepsilon_{t+1}$$

$$v_{t+1} \sim F(v_{t+1}|v_t)$$

v_t : known at t , shifts mean from $t + 1$.

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Long-term risk-free bond price:

$$q_t^{\text{rf}} = \frac{1}{1 + r_t^{\text{rf}}} \left[\kappa + (1 - \delta) \mathbf{E}_t q_{t+1}^{\text{rf}} \right]$$

- Domestic Economy
 - Households: labor supply
 - Producers: labor demand, working capital demand
 - Domestic Financial Intermediaries: working capital supply
- Fiscal Authority (Sovereign)
 - Operates in international bond markets
 - Transfers net proceeds lump sum to household
 - Default: temporary exclusion, haircut/recovery, productivity loss
- International Financial Intermediaries
 - Stochastic & predictable opportunity cost of funds, r^{rf}

Domestic Economy: Households

Static labor supply problem

$$\max_{\ell_t} u(c_t, \ell_t) \text{ s.t. } c_t = w_t \ell_t + \Pi_t + \Pi_t^f + T_t$$

given

- wage rate w_t
- profits of producers Π_t
- profits of domestic financial intermediaries π_t^f
- lump sum tax or transfer from fiscal authority T_t

Discount with β .

Domestic Economy: Producers

Hire labor subject to a working capital constraint

$$\Pi_t = \max_{\ell_t} \{A_t \ell_t^\alpha - [(1 - \theta) w_t \ell_t + \theta (1 + i_t) w_t \ell_t]\}$$

given aggregate productivity level A_t , and where a share θ of the wage bill must be paid before production takes place. *Intra-period* loan rate i_t .

Compare to Mendoza Yue (2012) and Fuerst (1992).

Productivity penalty in default $A_t^d = h(A_t) \leq A_t$.

Domestic Economy: Financial Intermediaries

Extend intra-period working capital loans

$$\Pi_t^f = -a_t + (1 + i_t) a_t = i_t a_t,$$

and in equilibrium firms demand $a_t = \theta w_t \ell_t$.

Operate on behalf of their owners, the households, and use the *domestic interest rate*

$$i_t = \frac{u_c(c_t, \ell_t)}{\beta \mathbf{E}_t u_c(c_{t+1}, \ell_{t+1})} - 1$$

to price the loans. In equilibrium $\mathbf{E}_t u_{c,t+1}$ reflects default risk.

The GHH Domestic Economy, Summary

In good credit standing...

$$\left[c_t - \psi \frac{\ell_t^{1+\mu}}{1+\mu} \right]^{-\sigma} = \beta(1 + i_t) \overbrace{\mathbf{E}_t u_c(c_{t+1}, \ell_{t+1})}^{H_t(b_{t+1})}$$

where

$$c_t = A_t \ell_t^\alpha + T_t(b_{t+1})$$

and

$$\ell_t = \left[\frac{\alpha}{\psi} \cdot \frac{A_t}{1 + \theta i_t} \right]^{1/(1-\alpha+\mu)}.$$

In default, same, except $T_t^d = 0$ and productivity loss $A_t^d = h(A_t) \leq A_t$.

Conditional on not defaulting, chooses b_{t+1} and thus determines

$$T_t = -\kappa b_t + q_t [b_{t+1} - (1 - \delta) b_t]$$

Understands how b_{t+1} choice impacts

- the bond price q_t
- this period's domestic economy $c_t, \ell_t, i_t, w_t, \dots$
- next period's domestic economy, for $\mathbb{E}_t u_{c,t+1}$ purposes.

In default: $T_t^d = 0$ and productivity penalty $A_t^d = h(A_t) \leq A_t$.

Centralized borrowing, centralized default. Market segmentation.

Bond prices in good credit standing

$$q_t = \frac{1}{1 + r_t^{\text{rf}}} \mathbf{E}_t \left\{ (1 - d_{t+1}) [\kappa + (1 - \delta)q_{t+1}] + d_{t+1}q_{t+1}^d \right\}$$

and secondary market value in default

$$q_t^d = \frac{1}{1 + r_t^{\text{rf}}} \mathbf{E}_t \left\{ (1 - \lambda) q_{t+1}^d + \lambda \phi \left[d_{t+1} q_{t+1}^d + (1 - d_{t+1}) (\kappa + (1 - \delta)q_{t+1}) \right] \right\}$$

The risk-free rate in the financial center $r_{t+1}^{\text{rf}} = (1 - \rho_r)v_t + \rho_r r_t^{\text{rf}} + \sigma_{r,\varepsilon}\varepsilon_{t+1}$

Yield-to-maturity spreads $\kappa/q_t - \kappa/q_t^{\text{rf}}$, but also in default, with q_t^d

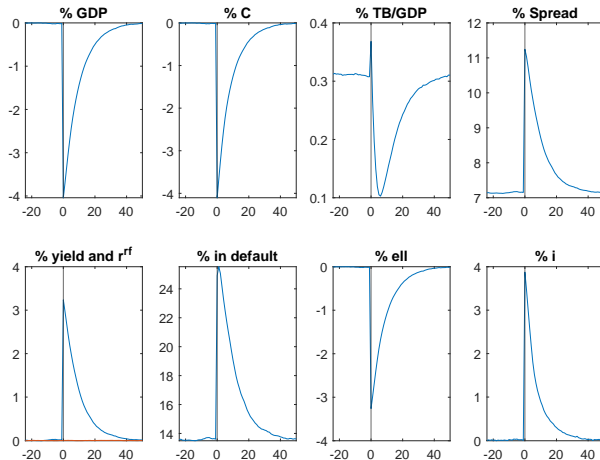
Skipped today...

- Recursive formulation with states $\langle s = \langle A, r^{\text{rf}}, v \rangle, b \rangle$, sov choice b'
- Markov Perfect Equilibrium definition
- Calibration and functional forms (w.i.p.)
- Methods for construction of stochastic IRFs (Koop et al., 1996)

Coming up...

- IRFs for A_t , r_t^{rf} , and v_t shocks
- Policies, as functions of b_{t+1} , counterfactual capital flows
- Policies, as functions of b_t , indebtedness and default risk on eq'm path

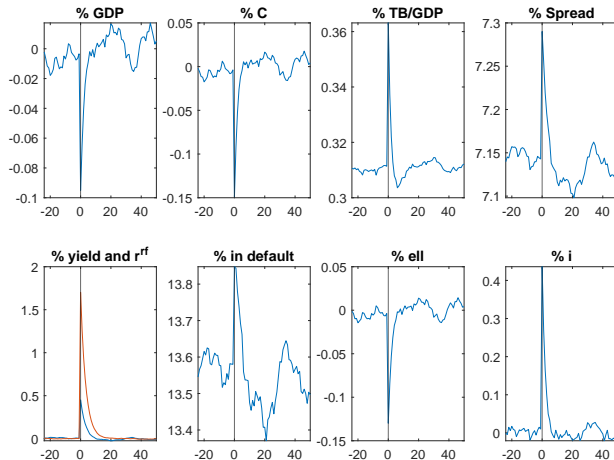
IRF: Productivity Shock $A \downarrow$



Standard behavior

- Low output and consumption
- Depressed labor input
- Tight domestic financial conditions
- CA reversal
- High spread

IRF: Risk-free Rate Shock $r^{rf} \uparrow$

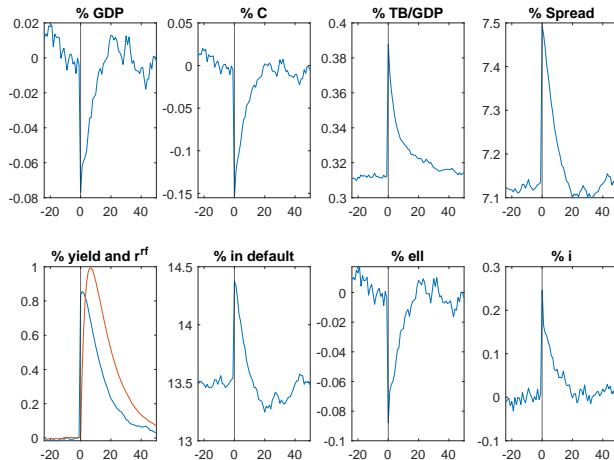


Recession, high spreads

- Low output and consumption
- Depressed labor input
- Tight domestic financial conditions
- CA reversal
- High spread

Fairly transitory.

IRF: Risk-free Rate *News* Shock $\nu \uparrow$

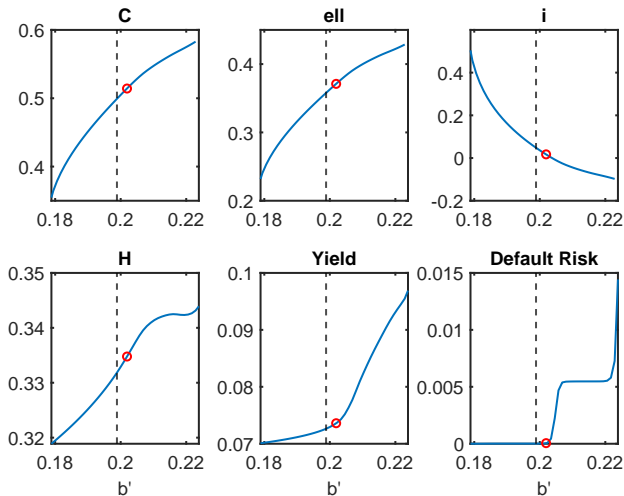


Recession, high spreads

- Low output and consumption
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Persistent. Predictable.

Policy Functions, the Role of b_{t+1}

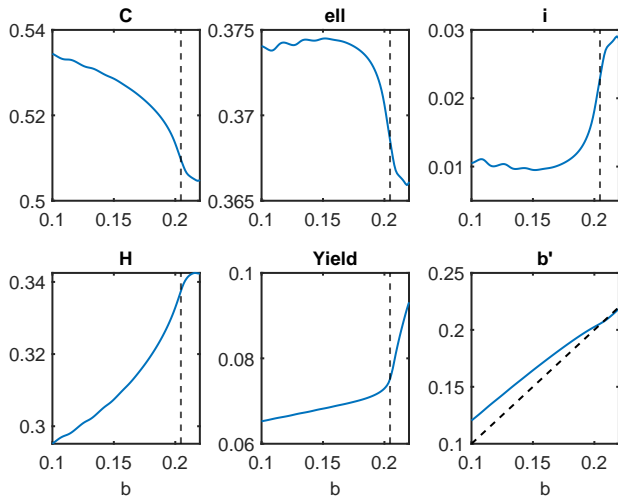


Expansionary capital inflows.

Counterfactual $b_{t+1} \uparrow$

- Higher output and consumption
- Higher labor supply
- Looser domestic financial frictions
- Higher expected MU next period
- Higher default risk

Policy Functions, the Role of b_t



On the equilibrium path,
higher debt implies

- Low output and consumption
- Depressed labor input
- Tight domestic financial conditions
- Lower capital inflows
- High yields

No “Consumption Boom Before Default” aka “Full Dilution”

In standard models, with recovery, instead of defaulting today

- Choose $b_{t+1} \rightarrow \infty$ (highest on grid)
- Lenders transfer to you now $q_t b_{t+1} \rightarrow$ NPV of eventual recovery (level)
- Default next period with probability 1

Some proposed fixes: underwriting standards ($q_t \geq \underline{q}$), portfolio adjustment costs

Not needed in our model. *Domestic labor market distortions discipline borrowing.*

Tentative Conclusions

A near-standard sovereign default model with production exhibits

- low output & high spread in response to (expected) risk-free rate movements
- standard productivity shock dynamics
- expansionary capital inflows
- domestic financial frictions mirror international conditions in eq'm

Missing so far

- Quantitative analysis
- Failure of the standard model ($r^{\text{rf}} \uparrow \Rightarrow \text{spread} \downarrow$)
 - Role of ν persistence
 - Analytic results for one-time “MIT shock” to r^{rf}