# A Model of Fickle Capital Flows and Retrenchment

Ricardo Caballero Alp Simsek

MIT and NBER

ECB, November 2018

# Capital flows are large.... and fickle

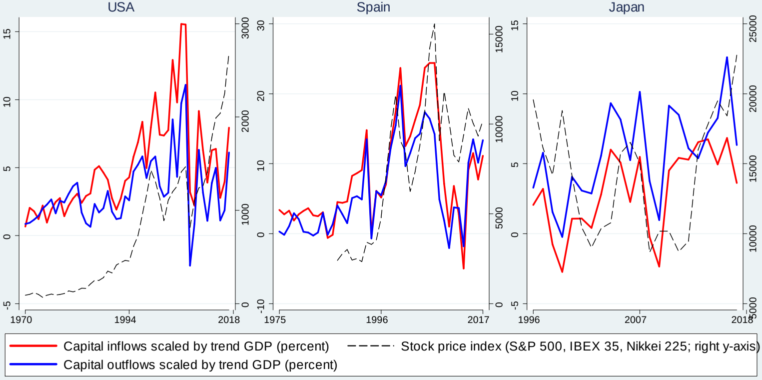
- Capital inflows are large, often exceeding 20% of GDP per year for DM and half of that for EM
- But they are also **fickle**
- **Fickleness:** Foreigners exit at times of local distress (recession/crisis)
- This combination of size and fickleness has made capital flows a perennial source of headaches for policymakers around the world
- And a fertile ground for academic work supporting their regulation (even coordinated by the IMF in 2012!)

# Less noticed but as prevalent.... retrenchment

- **Retrenchment:** Local investors (banks) reduce their foreign investments during local crises and use their global liquidity at home
- Obstfeld (2012):

  Figure ... illustrates the example of the United States over the two quarters of intensive global deleveraging following the Lehman Brothers collapse in September 2008.... Gross capital inflows, which in previous years had been sufficient to more than cover even a 2006 net current account deficit of 6 percent of GDP, went into reverse, as foreigners liquidated $198.5 billion in U.S. assets. In addition, the U.S. financed a current account shortfall of $231.1 billion... Where did the total of nearly $430 billion in external finance come from? It came from U.S. sales of $428.4 billion of assets held abroad....

# Fickleness and retrenchment




- As Broner et al note: Hard to reconcile with standard macroeconomic models without frictions because shocks (e.g. local productivity) typically affect foreign and domestic investors in parallel.

- We formalize fickleness by assuming that during crises foreigners' required return on risky assets rises more than domestics',

Table 1: Return prediction regressions using capital flows

| | Average log stock return in next 5 years (local currency) | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Inflows/trend GDP (std) | -0.032*** | | -0.015*** | |
| | (0.005) | | (0.005) | |
| Outflows/trend GDP (std) | | -0.034*** | | -0.014** |
| | | (0.005) | | (0.006) |
| Year FE | No | No | Yes | Yes |
| Country FE | Yes | Yes | Yes | Yes |
| Country specific linear trend | Yes | Yes | Yes | Yes |
| Observations | 743 | 716 | 743 | 716 |
| $R^2$ (adjusted) | 0.42 | 0.44 | 0.61 | 0.64 |

# Our contribution: A model of fickleness and retrenchment

We develop a liquidity-centric model to analyze gross flows and their implications for financial stability & regulation.

**Crises:** Asset fire sales driven by liquidity shortages.

**Banks:**

- Unconstrained in local market: Arbitrage capital during local crisis.
- **Fickle in foreign market:** By assumption, sell in foreign crisis. We take this as given (captures asymmetric info/Knightian uncertainty, asymmetric property rights, asymmetric regulation...)

# Main result: Retrenchment dominates fickleness

For *symmetric* locations (DM-DM flows):

- **Main positive result:** Flows **mitigate fire sales** despite their fickleness.
  - Past outflows have higher return than fire-sold fickle inflows (and flows are symmetric)
- **Main normative result:** In uncoordinated equilibrium, planners restrict flows.
  - Liquidity is a public good/external. Fickleness costs are local/internal.

With *asymmetries* in liquidity or returns (DM-EM flows):

- **Reach-for-yield and safety** qualify the normative conclusions.
  - Safety: DM sells insurance to EM and behaves as "venture capitalist"
  - Yield: Creates imbalances in size of flows (and outflows "backfire")

*Comparative statics* of flows (safe asset scarcity & crisis correlations).

# A Simplified Sketch of the Symmetric Model

- Three periods, $t \in \{0, 1, 2\}$. Single consumption good.
- Continuum of locations (countries) $j \in [0, 1]$.
- In period 1, a share $\pi$ of locations is hit by a liquidity shock
- **Assets (within each location):**
  - *Risky/Illiquid*: Linear investment technology in period 0 in each location. One unit in period 0 generates $R$ units, but timing depends on liquidity shock:
    - If $\omega^j = g$, then early payoff in period 1.
    - If $\omega^j = b$, then payoff delayed to period 2. In period 1, traded at endogenous price $p^j \equiv p$ (symmetry). **Fire sales**, $p < R$.
  - *Risk-free asset:* Pays 1 unit in period 1.
    - Fixed supply: $\eta$ units in each location (endowed to local banks).
    - In period 0, traded at an endogenous price $q_f$.

# Two types of agents

1. "Distressed sellers" with preferences $E\left[\tilde{c}_{2,s}\right]$
   - Endowed with $e$ units of the local risky asset in period 1.
   - Can invest in (nonpledgeable) technology with return $\lambda$.
   - We assume $\lambda$ is large so that they sell endowed assets to reinvest.
   - (Introduces balance-sheet channel and fire sales.)
2. Main agents are "banks" with preferences $E\left[u\left(c_0\right)+c_{1,s}+c_{2,s}\right]$.
   - Endowed with one unit of consumption good in period 0, and all $(\eta)$ of the safe asset.
   - Choose an investment strategy, $x^{j,j}, \left(x^{j',j}\right)_{j'\neq j}, y$, subject to:

$$c_0+x^{j,j}+x^{out,j}+yq_f=1+\eta q_f, \text{ where } x^{out,j}=\int_{j'\neq j} x^{j',j}\,dj'.$$

   - **Fickleness:** If $\omega^{j'}=b$, then banks must sell investments in $j'$.

# Banks' payoff from investment

- Banks collect $x^{out,j}\overline{R}$ from foreign investments, where,

$$\overline{R} = (1 - \pi) R + \pi p < R.$$

- They also collect $y = \eta$ from safe assets
- If there is a liquidity shock, they reinvest into assets so that:

$$c_1 \left(\omega^j = b\right) = 0; \qquad c_2 \left(\omega^j = b\right) = \left(x^{j,j} p + x^{out}\overline{R} + \eta\right) \frac{R}{p}.$$

  - Outflows motive in the model: $p < \overline{R}$
  - **Main lemma:** this effect always dominates so $x^{j,j} = 0$ and there is foreign investment despite extreme fickleness

# Market clearing conditions and equilibrium

- Market clearing for risky asset in period 1 (with liquidity shock):

$$\left(e + x^{in,j}\right) p = \overbrace{x^{out}\overline{R}_s + y}^{\textbf{net worth of local banks}},$$

where $x^{in,j} = \int_{j' \neq j} x^{j,j'} dj'$.

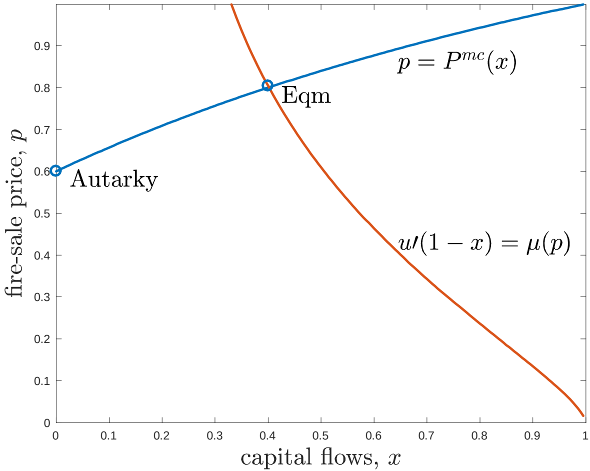
- Symmetric equilibrium features $x^{out} = x^{in} = x$.
- **Assume:** $\eta < eR$ (to generate fire sales).

# With symmetric flows, retrenchment dominates fickleness

$$p = \frac{\eta + x^{out}\overline{R}}{e + x^{in}} \Longrightarrow p = P^{mc}(x) \equiv \frac{\eta + x(1-\pi)R}{e + x(1-\pi)}. \qquad (1)$$

- **Lemma:** $P^{mc}(x)$ is strictly increasing in $x$ (when $\pi < 1$).
- Inflows liquidated at low return, $p < \overline{R} = (1-\pi)R + \pi p$.
- Gross symmetric flows provide net liquidity despite their fickleness!
  - Note: This does **not** mean that fickleness is good

# Market Equilibrium



# Constrained (global) planner increases capital flows

- Consider a constrained (by market clearing) utilitarian global planner that can dictate $x$..
- **Proposition:** Planner chooses greater $(x, p)$ than $(x^{eq}, p^{eq})$ iff,

$$\overbrace{\frac{e\lambda + x^{eq}(1-\pi) + x^{eq}\pi(R/p^{eq})}{e + x^{eq}}}^{\text{average marginal utility of sellers}} > \overbrace{\frac{R}{p^{eq}}}^{\text{marginal utility of buyers}}.$$

- In the limit $\lambda \to \infty$ (strong balance sheet effects) $x > x^{eq}, p > p^{eq}$.

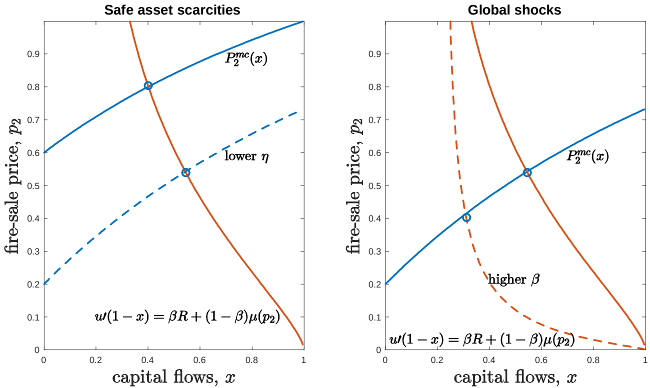
# Absent coordination, (local) planners restrict capital flows

- Now consider *local* planners that set policies in decentralized fashion.
- Suppose $\lambda \to \infty$ so local planners' objective is to raise local price, $p^j$.
- Planners can ban capital inflows ($b^j = 1$) or allow them ($b^j = 0$).
- **Coordinated solution: Free capital flows** (as it raises $p^j \equiv p$)
- Equilibrium in which fraction $B \in [0, 1)$ of locations ban capital flows,

$$\begin{aligned} p^{ban} &= \frac{\eta + (1 - B)\, x^{ban} \overline{R}^{free}}{e}, \\ p^{free} &= \frac{\eta + (1 - B)\, x^{free} \overline{R}^{free}}{e + Bx^{ban} + (1 - B)\, x^{free}}, \end{aligned}$$

- Since $p^{ban} > p^{free}$, **unique Nash equilibrium is to ban inflows.**
- Intuition: **Liquidity is a public good**. Individual planners internalize fickleness cost of inflows but not liquidity benefits to senders.

# Safe Asset Scarcity and Global Shocks




- Lower $\eta$ (pre-GFC) increases $x$, reduces $p_2, p_3, E\left[\overline{R}_s\right], R_f$.
- Greater $\beta$ (post-GFC) reduces $x, p_2, E\left[\overline{R}_s\right], R_f$. Less liquidity and worse fire sales even if the global shock is not realized.

# The model with a special location

- **An infinitesimal special location with parameters** $(R^*, \eta^*)$.
- **Case 1 (reach-for-safety):** Suppose $\eta^* > eR > \eta$ (e.g., the U.S.).
  - Location runs a current account deficit (capital account surplus) until it becomes as fragile as the rest of the world
  - Its gross flows are leveraged (sell safe assets to foreigners and buys risky assets from them)
- **Case 2 (reach-for-yield):** Suppose $R^* > R$ (high-yielding EMs).
  - More severe fire-sales than regular locations, $p_s^*/p_s < 1$ for each $s$,
  - Precaution by accumulating assets (reserves), but (partially) backfires, $x^{in,*} > \overline{x}^{out,*} > x$.

# Conclusion: Fickle flows, retrenchment, and global liquidity

Model of flows to analyze fickleness vs diversification/retrenchment.

- **Retrenchment dominates fickleness**: Fickle flows mitigate crises.
- Regulating capital flows: Coordination is necessary since liquidity is a public good. *Fickleness* exacerbates the coordination problem.

Asymmetries generate other rationales for flows than diversification:

- **Reach for safety**: Safe asset-driven imbalances. Mixed bag.
- **Reach for yield:** Return-driven imbalances. Exacerbate crises.

Positive implications consistent with some recent trends in gross flows.

Long Appendix. In particular, see:

- Endogenize fickleness via Knightian uncertainty
- An alternative model with distress banks (closer to Kiyotaki-Moore / Holmstrom-Tirole)