Swing Pricing for Mutual Funds: Breaking the Feedback Loop Between Fire Sales and Fund Redemptions

Agostino Capponi
IEOR Department

Paul Glasserman[1]
Business School

Marko Weber
IEOR Department

Columbia University

2018 Financial Stability: Markets and Spillovers Conference
Office of Financial Research and Federal Reserve Bank of Cleveland
Washington, D.C. — November 29–30, 2018

[1]Work done while under contract with the OFR. Views and opinions expressed are those of the authors and do not necessarily represent official positions or policy of the OFR or U.S. Department of the Treasury.

Why Talk About Mutual Funds at a Financial Stability Conference?

Two broad financial stability concerns:

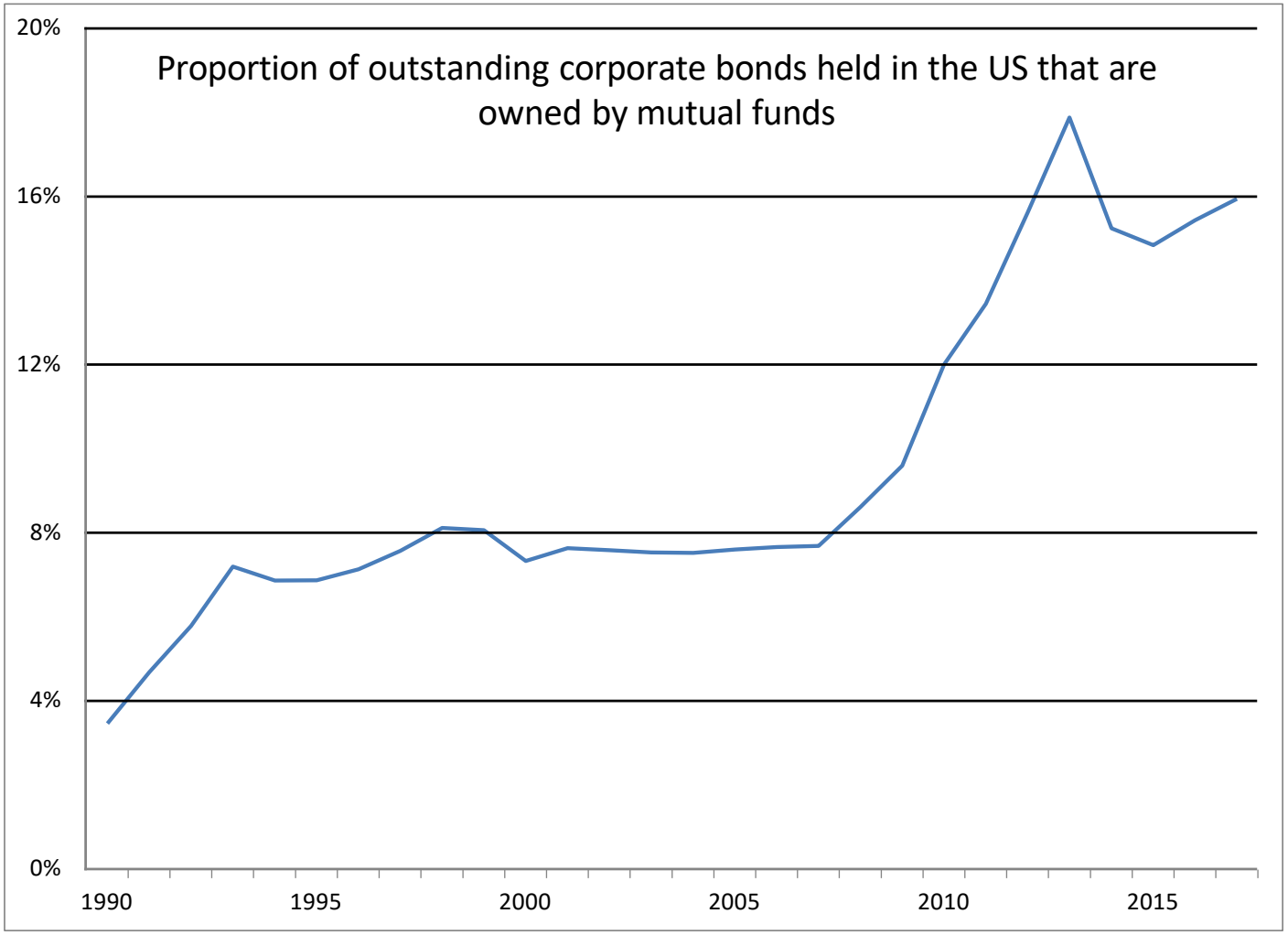
- **Liquidity transformation**
  - Where do investor expectations of market liquidity exceed the liquidity available in a crisis?
- **Amplification of fire sales**
  - Where do structural features of the financial system amplify shocks?

We will argue that mutual funds are relevant to both

Summary of the Paper

- When prices are falling, investors who exit a mutual fund first get out at better prices
  - The liquidation costs they impose on the fund are borne by investors who stay in the fund longer
- This first-mover advantage creates a positive feedback loop between falling prices and asset sales, particularly in less liquid markets — potentially destabilizing
- Swing pricing can break the cycle, internalize transaction costs, reduce transaction costs, and enhance financial stability
  - If properly implemented

Mutual Funds' Share of Corporate Bond Market



Source: Federal Reserve Flow of Funds data

Recent Experience: Taper Tantrum

Taper Tantrum 2013:

- May 2013: Fed suggests possibility of QE tapering.
- Summer 2013: market turbulence — fixed income fund outflows and spike in bond yields.
- September 2013: Fed delays QE tapering, markets calm.

- Feroli, Kashyap, Schoenholz, and Shin (2014), “Market Tantrums & Monetary Policy”:
  - Competition among (unleveraged) fund managers can amplify shocks
  - A different mechanism from ours, but focus on how ownership through funds can make a difference

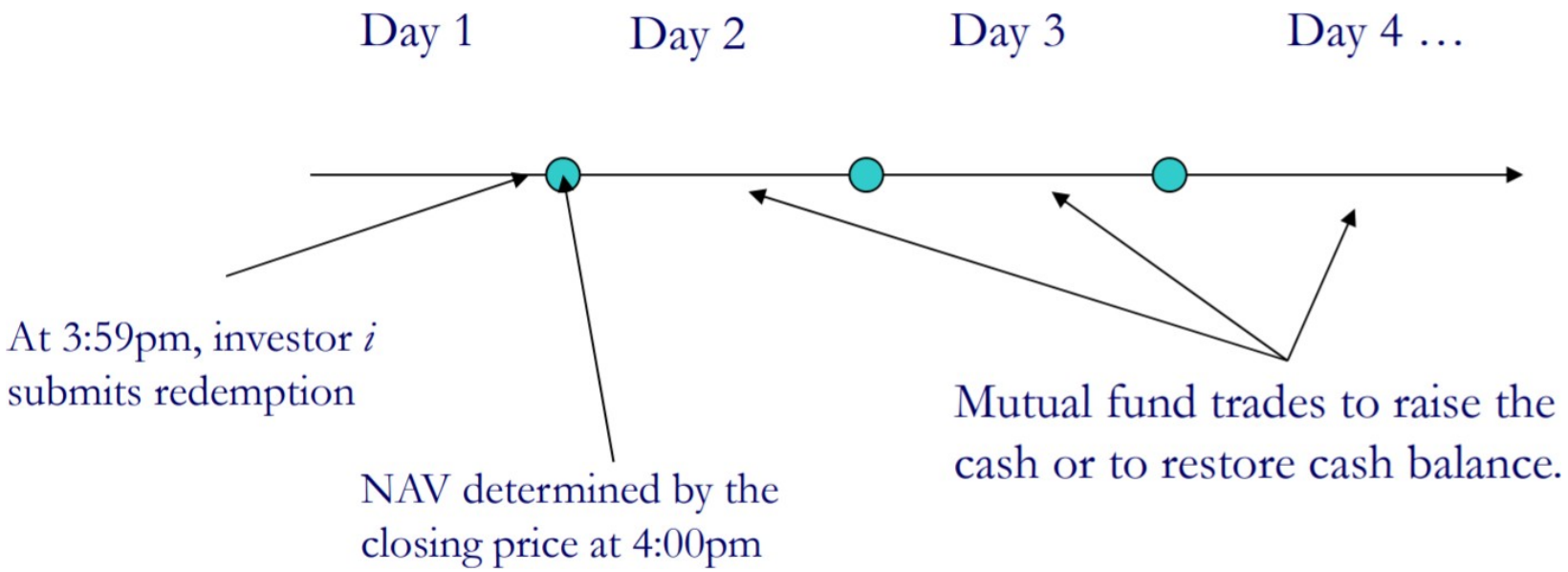
Recent Experience: Third Avenue Focused Credit

The Third Avenue Focused Credit Fund invested in low grade corporate debt.

- 2009 to mid-2014, total return $\approx$ 80%.
- 2015: portfolio losses and heavy outflows, fund shrinks from \$2 billion to \$789 million.
- December 16, 2015: the fund requests SEC approval to block further redemptions:

> *If the relief is not granted, and the Fund is unable to suspend redemptions, the institutional investors would likely be best positioned to take advantage of any redemption opportunity, to the detriment of those investors – most likely, retail investors – who remain in the Fund. These remaining investors would suffer a rapidly declining net asset value and an even further diminished liquidity of the Fund's securities portfolio. The relief would help avoid such an outcome.*

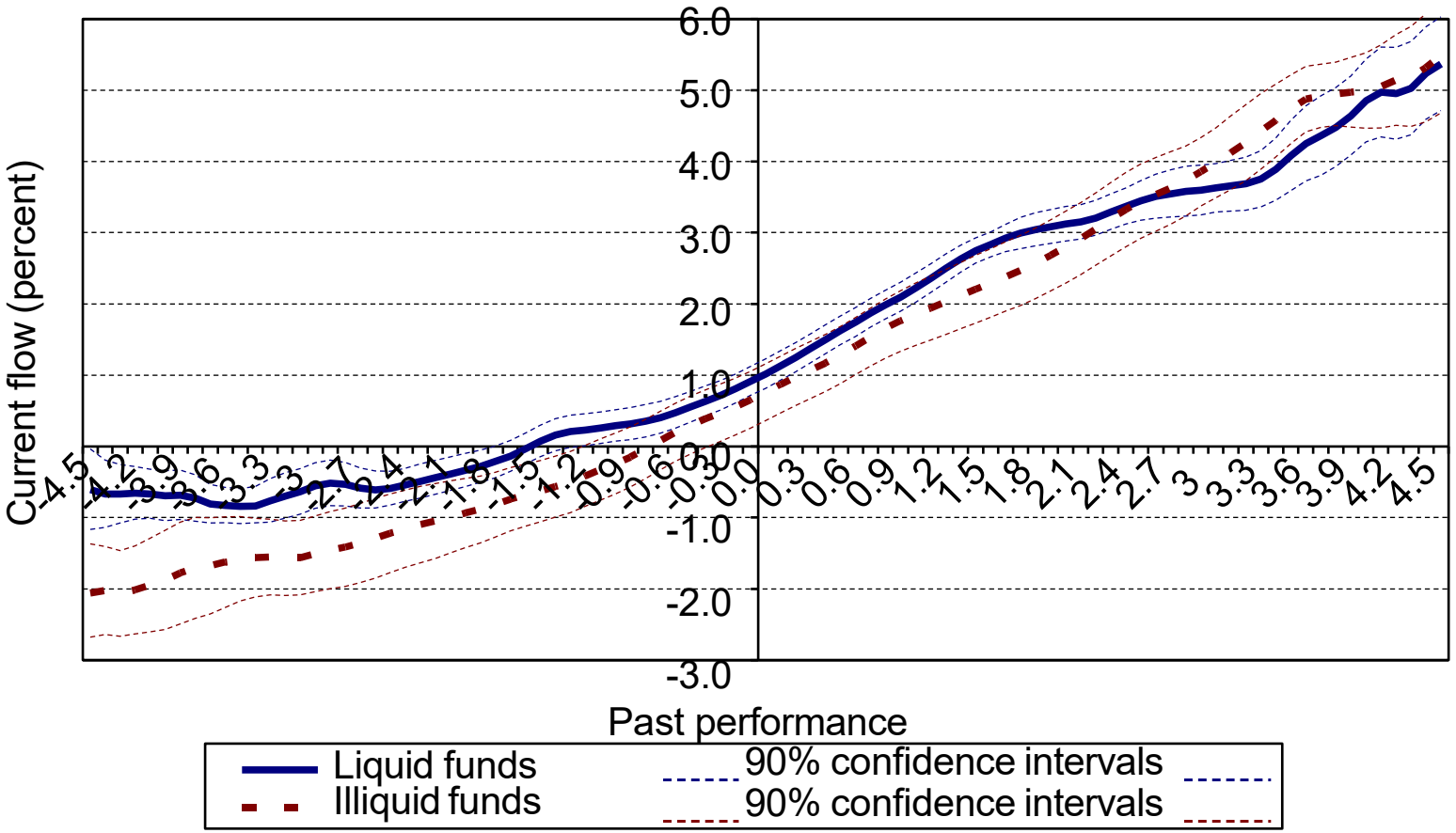
Institutional Structure of Open-End Mutual Funds



- The fund is obliged to repay investors at the first NAV determined after the submission of the redemption order
- It may take several days to liquidate enough assets to raise the required amount of cash
- Creates an incentive to get out early

Investor Flows in Response to Fund Performance

From Chen, Goldstein, and Jiang (2010)



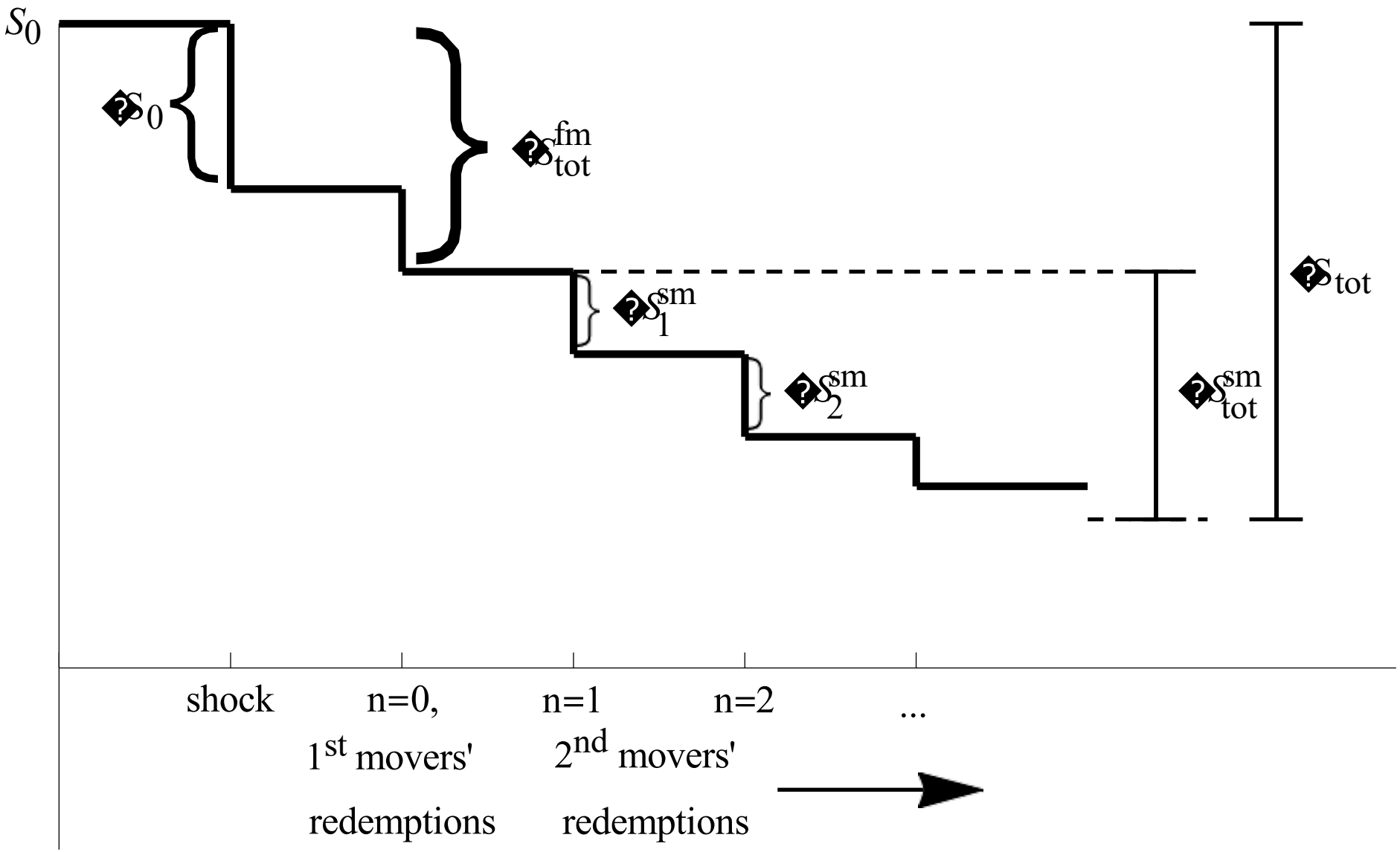
Conditional on low past performance, funds that hold illiquid assets experience more outflows than funds that hold liquid assets

Model Description

- Asset price impact is linear: $\underbrace{\Delta P}_{\text{price change}} = \underbrace{\gamma}_{\text{illiquidity}} \times \underbrace{\Delta Q}_{\text{traded assets}}$
- Outflow is linear in performance: $\underbrace{\Delta R}_{\text{redemptions}} = -\underbrace{\beta}_{\text{sensitivity}} \times \underbrace{\Delta S}_{\text{fund's performance}}$
- Fund sells assets to raise cash to pay redeeming investors

- **First movers** (fraction π): redeem in proportion to anticipated decline ΔS in fund's NAV
- **Second movers** (fraction $1 - \pi$): redeem in proportion to realized decline ΔS in fund's NAV

Model Timeline



Model Implications

- Second movers behave the same way they would if they owned the asset directly: *fire sale, yes; amplification, no*
- First movers sell more than they otherwise would because of the mutual fund structure: amplification
- Result is a *nonlinear* impact on the market value of the asset
- Nonlinearity is more pronounced with less liquid assets (larger γ)

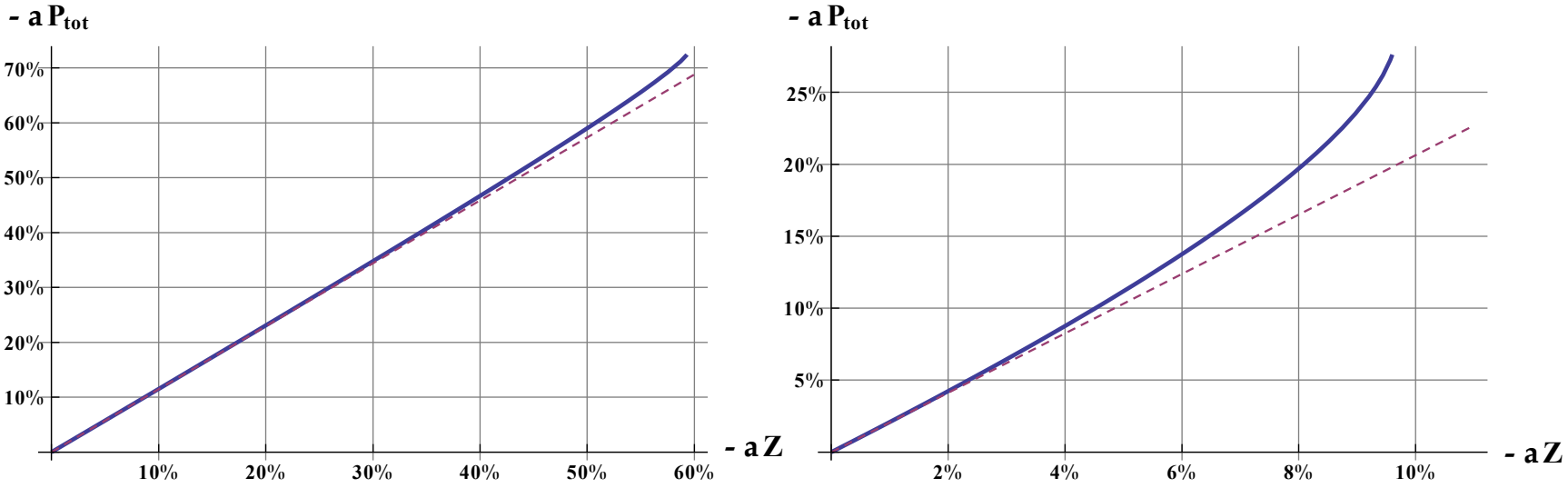


Figure: Total price impact versus initial price shock, without first movers (dashed) and with (solid), for a fund holding more liquid assets (left) or less liquid assets (right)

Swing Pricing

October 2016: SEC announced amendments to Rule 22c-1 to promote liquidity risk management in the open-end investment company industry.

From November 19, 2018, open-end funds are allowed to use *swing pricing*: funds will be allowed to adjust ("swing") their net asset value per share to effectively pass on the costs stemming from redemption activity to the shareholders associated with that activity.

Swing pricing has been applied for over 15 years in Luxembourg and more recently in other European countries

Swing Pricing: Our Version

Have first-movers internalize their liquidation costs:

Definition

The adjustment ΔS^{sw} is a swing price if the aggregate change in value of a fund share ΔS_{tot} is equal to the change in value of a fund share in the absence of first movers (that is, with $\pi = 0$).

Proposition

The swing price is

$$\Delta S^{sw} = \frac{\pi\beta\gamma\Delta Z}{1-\beta\gamma}.$$

Swing Pricing: Our Version

Depends on

- asset liquidity (γ)
- investor sensitivity to performance (β)
- sophistication of investor base (π)
- size of initial market shock

If properly designed, swing pricing

- removes the incentive to redeem immediately
- doesn't just transfer liquidation costs to redeeming investors — it reduces these costs and the first-sale impact
- Because of the nonlinear amplification, a small adjustment can have a large benefit in reducing amplification

Swing Pricing in Practice

- Usually specified by two numbers, a threshold and a cap
  - If net outflows exceed 5% of the fund, the NAV will be swung by up to 2%
  - Also for net inflows
- Our analysis argues for a larger swing factor at larger outflows
  - Our swing price is proportional to first-mover redemptions
  - Fixed factor may be inadequate
- Threshold is typically secret
- Investors don’t know if NAV was swung (or how much) even after the fact
- Our analysis argues for transparency

BIS Empirical Study

- Lewrick and Schanz (2017) compare Luxembourg funds with swing pricing to matched U.S. funds without
- They find that swing pricing generally reduces flow sensitivity to performance. . . but not during the Taper Tantrum
- They conclude that swing factor in extreme conditions needs to be larger, consistent with our analysis

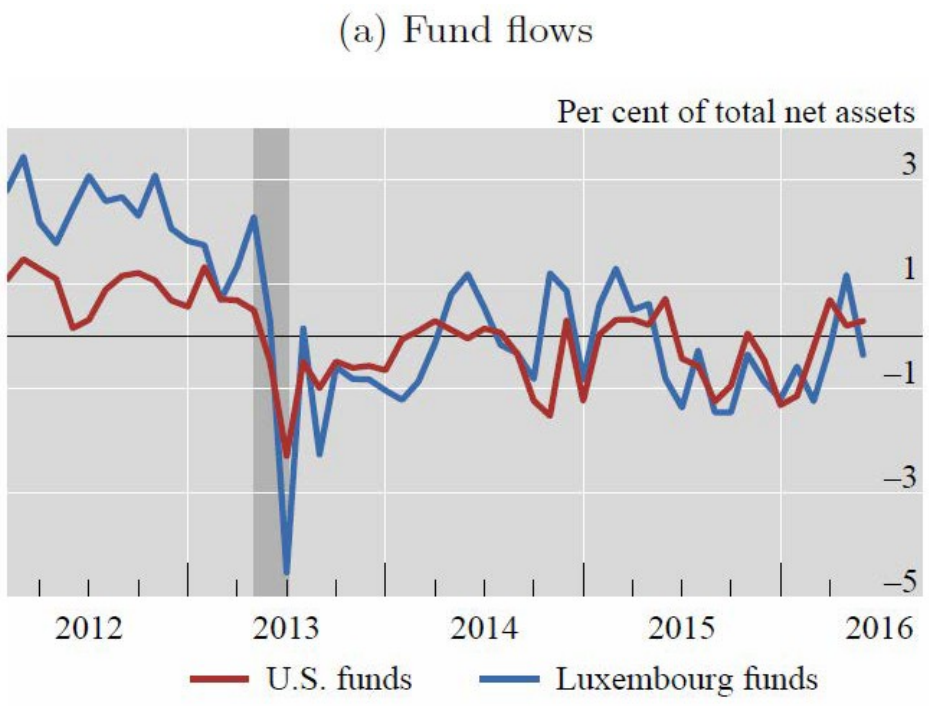


Figure: Shaded period is the Taper Tantrum

Swing Pricing is Great. Will Anybody Use It?

Operational challenges

- U.S. funds usually accept orders up to 4:00pm and seek to value fund shares by 6:00–8:00pm
  - But orders from investment advisors and retirement plans may come later: fund doesn't know net flow when it sets NAV
- In Europe, funds may stop accepting orders at noon or 2:00pm, giving them more time to observe order flow before striking the day's NAV
- For orders in shares (rather than dollars), intermediaries wait until NAV is fixed to process orders

These seem like solvable problems

Multiple Funds

The reinforcing feedback mechanism, and hence the first-mover advantage, is exacerbated if multiple funds have overlapping portfolios.

$$\Delta P_{tot} \approx \Delta Z + (\text{Impact from Fund 1}) + (\text{Impact from Fund 2}) + (\text{Cross-impact}).$$

- Ideal swing pricing should also account for the externalities imposed by first movers of the other fund.
- A fund's swing adjustment is smaller if the other fund also applies swing pricing.
- Information sharing presents a challenge

Conclusions

- The first-mover advantage magnifies the impact of fire sales and introduces a novel *nonlinearity* in the price impact due to asset liquidation
- Swing pricing transfers the cost of liquidation from the fund to the redeeming investors, and – importantly – *reduces* this cost by removing the first-mover advantage.
  - A financial stability benefit as well as an investor protection benefit
- The presence of multiple funds holding the same portfolio exacerbates fire sales losses and therefore increases the benefit of swing pricing.
- Operational challenges are real but should be surmountable