Monetary Easing and Financial Instability

Viral Acharya
NYU Stern, CEPR and NBER

Guillaume Plantin
Sciences Po

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Introduction

- Since 2008, unprecedented monetary easing by major central banks, including "unconventional" purchase of private assets
- The objective is to restore loss in aggregate demand
- Institutional investors responded by "searching for yield"
  - They resorted to funding long-term assets with short-term claims, hoping to refinance these claims until maturity
- Concern: too much of the latter, too little of the former

The unintended effects of unconventional policies

" If effective, the combination of the "low for long" policy for short term policy rates coupled with quantitative easing tends to depress yields... Fixed income investors with minimum nominal return needs then migrate to riskier instruments such as junk bonds, emerging market bonds, or commodity ETFs... [T]his reach for yield is precisely one of the intended consequences of unconventional monetary policy. The hope is that as the price of risk is reduced, corporations faced with a lower cost of capital will have greater incentive to make real investments, thereby creating jobs and enhancing growth."

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The unintended effects of unconventional policies

"There are two ways these calculations can go wrong. First, financial risk taking may stay just that, without translating into real investment. For instance, the price of junk debt or homes may be bid up unduly, increasing the risk of a crash, without new capital goods being bought or homes being built...
Second, and probably a lesser worry, accommodative policies may reduce the cost of capital for firms so much that they prefer labor-saving capital investment to hiring labor."

Rajan (23 June 2013, BIS)
"A step in the dark: unconventional monetary policy after the crisis"

Evidence on "reaching for yield" behavior...

E.g. Stein, 2013

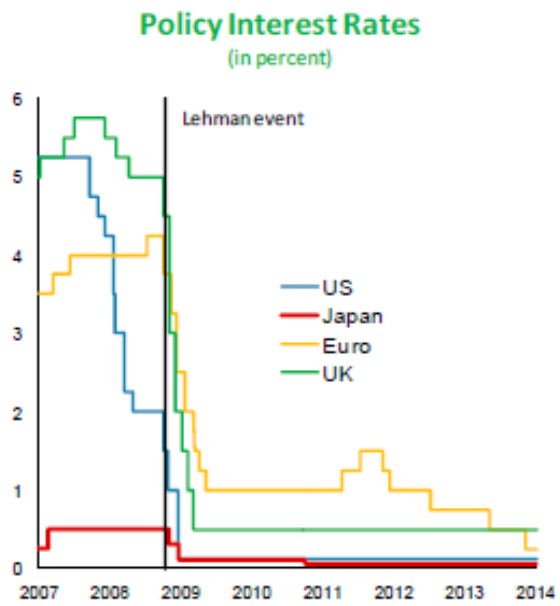
- Junk debt, covenant-lite loans
- Homes, MBS
- Stock market, margin lending
- Capital outflows into emerging markets
- Sizeable impact on term premia (Hanson and Stein, 2014)

...leading to future financial distress

- 2013 "taper tantrum"
  - Federal Reserve announced a "taper" of expansionary monetary policy in May 2013
  - Emerging market debt securities experienced liquidations by foreign institutional investors
  - These liquidations ceased only when the Federal Reserve back-tracked on tapering
- Earlier example: "blood bath" in U.S. bond markets following tightening in 1994

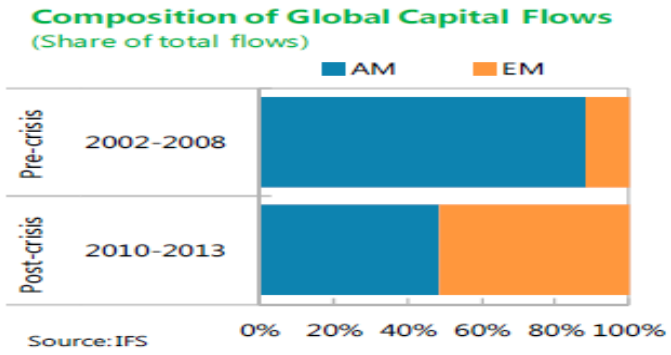
Monetary easing->EM capital flows

Rock-bottom interest rates...

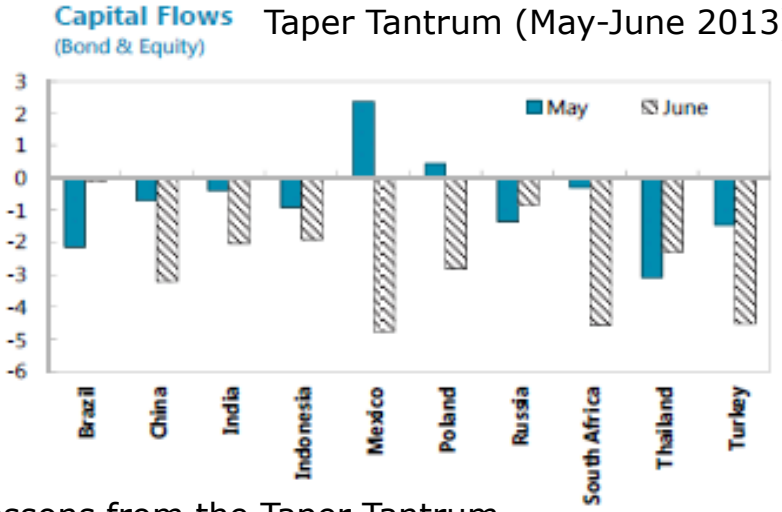


Source: IMF staff estimates.

Emerging markets received close to half of global inflows after the crisis compared with less than 20 percent before...

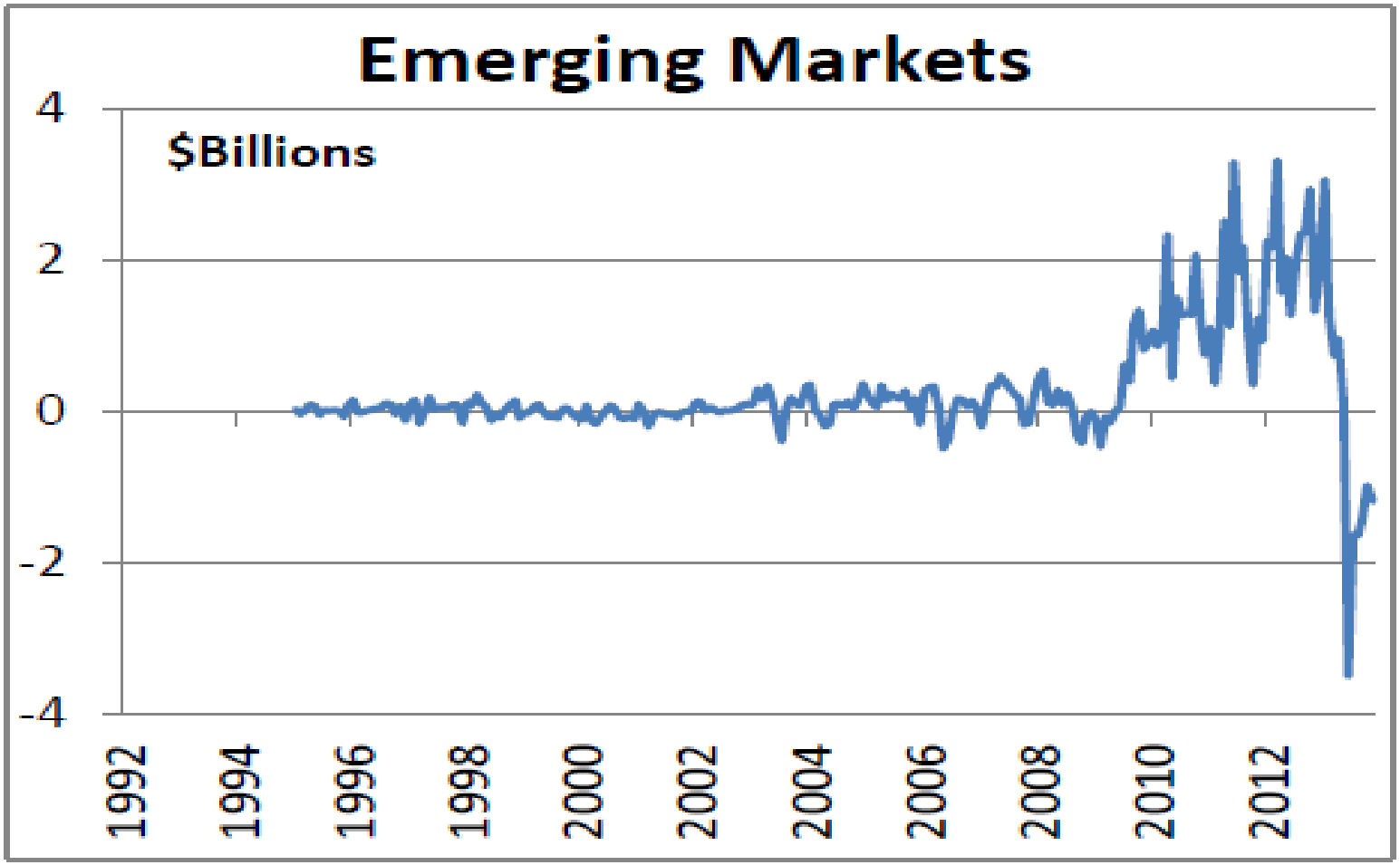


Taper Tantrum (May-June 2013)



Source: Emerging Market Volatility – Lessons from the Taper Tantrum, IMF Staff Discussion Note, September 2014

QE, Taper Tantrum, EM MF Flows



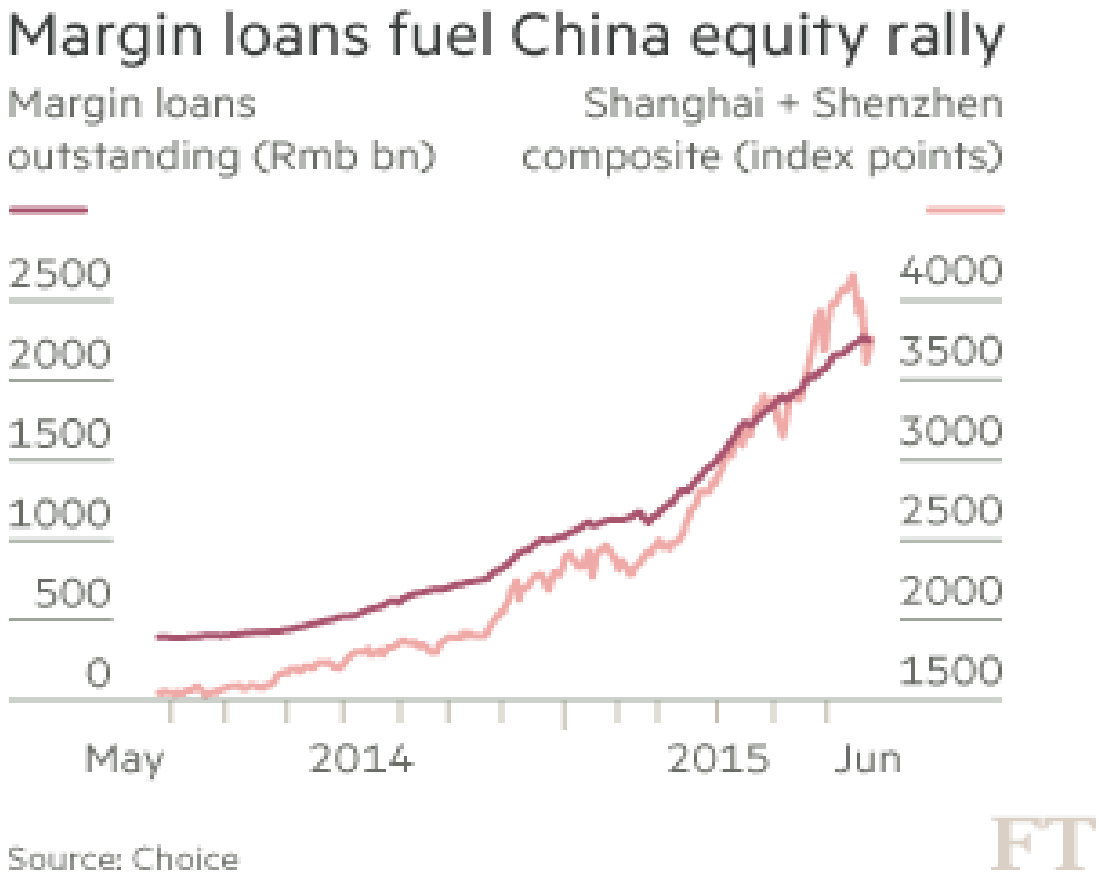
Source: Market Tantrums and Monetary Policy by Feroli, Kashyap, Schoenholtz and Stein (Feb 2014)

Taper Tantrum and EM Currencies

Source: CAFRAL, India

Interest-rate cuts and margin lending

Rise in margin lending in stocks



Modelling issues

In order to obtain inefficient carry trades in equilibrium, one needs

- Multiple assets. At least 2, long-term and short-term
- Multiple agents. Heterogeneous agents, so that there are agents on each side of the carry trade
- Some financial market imperfection

On the other hand,

The most analytically tractable workhorse monetary model features

- One nominal bond
- One representative agent
- A frictionless bond market
- And yet not so "tractable": log-linearization around the steady-state

Here we try to preserve the essence of mainstream monetary models but with dramatic simplifications that yield clear qualitative insights

This paper

- Builds a simple model to integrate the stimulative effects of monetary easing with the instability risks that arise from carry trades
- Sticky prices send the wrong signal to producers in an interest-sensitive sector (real estate, manufacturing)
- The central bank can make up for this wrong price signal in the goods market by distorting the real interest rate and shifting investment towards this interest-sensitive sector
- However, this creates incentives for financial institutions to enter into carry trades — issue short-term debt against long-term cash flows
- Such maturity transformation has only private benefits (stealing refinancing gains that would otherwise accrue to the public sector) but social costs (inefficient liquidations)

Related literature

- Farhi, Emmanuel and Jean Tirole. 2012. "Collective Moral Hazard, Maturity Mismatch and Systemic Bailouts." American Economic Review
- Benmelech, Efraim and Nittai Bergman. 2012. "Credit Traps." American Economic Review

- Same focus on impact of monetary policy on financial stability
- In common: fixed good prices imply that the central bank can affect the real interest rate (tax on storage in FT, real value of bank capital in BB, OMO here)

Related literature

- Not in common: these papers rely on limited pledgeability of banks' assets, we don't (if anything, this could help...)
- Not in common: FT study a situation in which the central bank cannot commit not to implement ex-post efficient bail-outs, we suppose full commitment

2 frictions:

- Nominal rigidity lead to temporarily wrong relative price signals in goods markets
- The central bank cannot observe the details of financial institutions' portfolio choice

Roadmap

1. Steady-state interest rate
2. Monetary easing
3. Inefficient carry trades
4. Endogenous liquidity and optimal monetary policy

1. Steady-state interest rate

Steady-state interest rate

- Time is discrete
- 3 types of agents:
  - Households
  - Firms
  - Public sector

Households

- A unit mass of households born at each date and live for two dates
- Find two goods desirable, a numéraire good and firms' output. Perfect substitutes
- Households value consumption only when old. Risk neutral

Households

- Each household receives an endowment of w units of the numéraire good at birth, where $w > 0$
- Households need to store their endowment over one period in order to consume
- Two storages are available: corporate bonds and government bonds

Firms

- Continuum of identical firms
- Produce their output using a technology that transforms an investment of I units of the numéraire good at date t into $f(I)$ units of output at date $t+1$, where f is strictly concave
- Firms finance their investments by issuing bonds
- Competitive in the output and capital markets
- Maximize their profits and rebate them to old households as a lump sum

Public sector

- Announces at each date an interest rate at which it is willing to trade one-period bonds denominated in the numéraire good with households
- Balanced budget at each date. Net bonds issuances matched with lump sum rebates/taxes to current old households
- Maximizes total households' consumption discounting that of future generations with a factor arbitrarily close to 1

Comments

Monetary model of a "cashless" economy where

- Money serves only as a unit of account
- The public sector sets the nominal interest rate
- and this affects the real interest rate in the presence of nominal rigidities

Simplification here: extreme nominal rigidity—fixed price level for one good

Benchmark where the central bank would have a free hand at controlling the economy with a policy rate absent financial stability concerns exposed later

Steady-state interest rate

- We study steady-states in which the public sector announces a constant interest rate r and firms' output is priced at the equilibrium level of 1
- At this rate, firms optimally invest I such that

$$f'(I) = r,$$

and make a net profit

$$f(I) - rI.$$

- Young households invest I in corporate bonds and $w - I$ in public bonds
- Old households receive a lump sum from the government equal to the net issuance $(1 - r)(w - I)$

Steady-state interest rate

- The consumption of a generic household is therefore equal to

$$\underbrace{rI}_{\text{Return on corporate bonds}} + \underbrace{r(w-I)}_{\text{Return on public bonds}}$$
$$+ \underbrace{f(I)-rI}_{\text{Rebated profits}} + \underbrace{(1-r)(w-I)}_{\text{Rebated public surplus}}$$
$$= f(I) - I + w,$$

  maximized at

$$f'(I^*) = r^* = 1.$$

- Note: a version of the "golden rule" (interest rate=population growth rate)

2. Monetary easing

Monetary easing

Temporary preference shock that is not reflected in the relative good price:

- The cohort of households born at date 0 do not have the same preferences as that of their predecessors and successors
- Unlike the other cohorts, they value the consumption of one unit of output as much as that of $1/\rho$ units of numéraire, where $\rho \in (0, 1)$
- The output price is fixed, however, equal to one
- In other words, we suppose that consumers have a large but temporary preference shock that the price system is too rigid to track

Interpretation

- "Firms" here consist in the most interest-sensitive sectors of the economy (real estate, manufacturing,...)
- Monetary policy affects investment in these sectors to a larger and faster extent
- We could also assume stable preferences and an exogenous temporary drop in the relative price of the output

Monetary easing

- With flexible prices, the output would be priced at $1/\rho$ at date 1 and date-0 investment given $r^* = 1$ would be

$$\frac{1}{\rho} f'(I_0) = 1,$$

  optimal

- With sticky output price, the public sector can make up for the absence of appropriate price signals in the date-1 goods market by distorting the date-0 capital market

- Monetary easing in the form of an interest rate equal to ρ between dates 0 and 1 boosts date-0 productive investment to the optimal level I_0

Monetary easing

The total utility of the date-0 cohort becomes in this case:

$$\underbrace{\frac{f(I_0)}{\rho} - f(I_0)}_{\text{Surplus from consuming the output}} + \underbrace{\rho(w - I_0)}_{\text{Return on public bonds}} + \underbrace{\rho I_0}_{\text{Return on corporate bonds}}$$

$$+ \underbrace{f(I_0) - \rho I_0}_{\text{Rebated profits}} + \underbrace{w - I^* - \rho(w - I_0)}_{\text{Rebated public surplus}}$$

$$= \underbrace{\frac{f(I_0)}{\rho} - I_0 + w}_{\text{Surplus created by the date-0 cohort}} + \underbrace{I_0 - I^*}_{\text{Subsidy from other cohorts}}$$

The subsidy $I_0 - I^*$ to the date-0 cohort at date 1 is matched by a tax paid by the date--1 cohort at date 0 (the public sector cannot refinance the entire old debt with new debt)

2. Inefficient carry trades

Inefficient carry trades

- Suppose that financial institutions (FIs) must intermediate the financing of firms by households
- To fix ideas, households supply funds to FIs competitively and FIs supply funds to firms competitively. FIs long-lived, maximize payoffs to current and future old households using the same discount factor as that of the public sector
- FIs own legacy assets at date 0 with a payoff that occurs at a random date with probability p
- These assets can also be "liquidated:" generating 1 before the paying date at the cost of a reduction $1 + \lambda$ in the final payoff
- Each FI is shut out of the private bond market with probability q at each date (independent across FIs)

- Absent outside options, FIs make zero profit when intermediating between households and firms
- FIs may enter into carry trades at date 0, however, when the interest rate is $\rho < 1$:
  - Borrow from young households at date 0 and immediately pay the proceeds to the date-0 old households
  - Rollover the debt until their legacy assets pay off

Inefficient carry trades

Carry trades involve transformation risk:

- Costly liquidation if shut from the market before the asset pays off
- Expected repayment for a unit borrowed against the legacy assets:

$$\rho \sum_{k \geq 1} (1-q)^{k-1}(1-p)^{k-1}[p + (1-p)q(1+\lambda)] = \rho(1+\Lambda),$$

where

$$\Lambda = \frac{\lambda}{1 + \frac{p}{(1-p)q}}$$

Λ is increasing in λ, $1-p$, and q. It thus measures the overall magnitude of the transformation risk induced by carry trades

Inefficient carry trades

If

$$\rho(1+\Lambda) \geq 1,$$

then carry trades not profitable

- FIs raise I_0 and lend to firms
- Public sector raises $W - I_0$
- First-best reached, FIs make zero profits

Inefficient carry trades

If

$$\rho(1+\Lambda) < 1,$$

then carry trades profitable

- FIs raise W
- Enter into carry trades with size $W - I^{**}$
- Lend I^{**} to firms, where $I^* < I^{**} < I_0$ solves $f'(I^{**}) = 1 - \rho\Lambda$
- Public finance crisis at date 0: the public sector does not raise funds and the old households get nothing
- But they get a big special dividend $W - I^{**}$ from FIs

Inefficient carry trades

- Carry trades are socially inefficient. The loss from costly liquidation is social whereas the "carry" $1-\rho$ is a private gain that would otherwise accrue to the public sector
- The redistribution between cohorts is overall smaller with the carry trade than without due to the special dividend rebated to old households at date 0. They lose $I^{**}-I^{*}<I_0-I^{*}$
- Here we assumed that the public sector set the rate at ρ. Optimal rate?

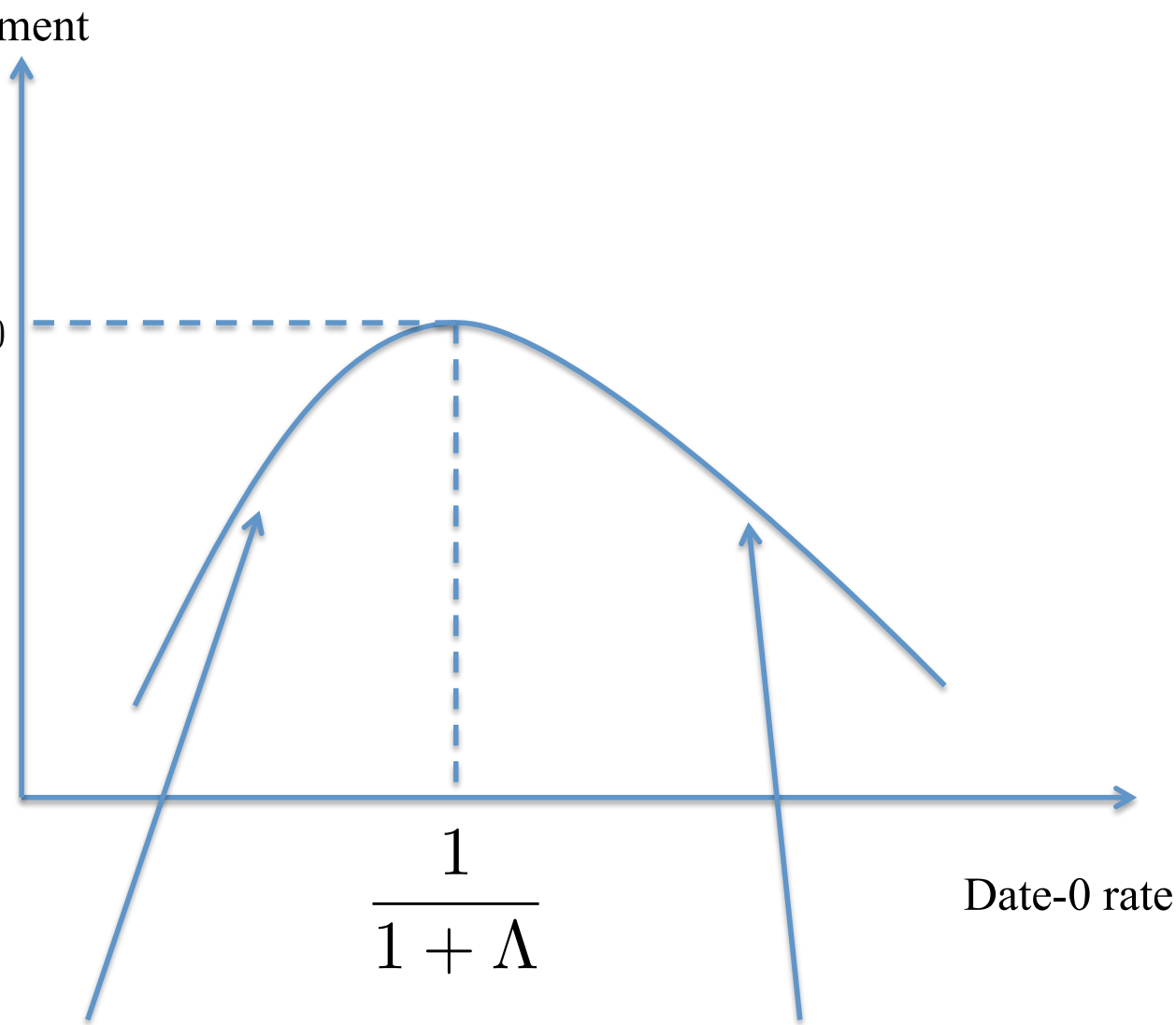
Optimal date-0 rate in the presence of carry-trade risk

If $\rho(1+\Lambda) \geq 1$, then the optimal policy rate is ρ which implements the first-best date-0 investment level

Otherwise it is $1/(1+\Lambda)$, leading to a smaller second-best level of date-0 productive investment

Optimal date-0 rate in the presence of carry-trade risk

$$I^{**} = f'^{-1}\left(\frac{1}{1+\Lambda}\right) < I_0$$



A rate decrease spurs carry trades that crowd out investment

A rate decrease spurs investment without affecting carry-trade activity

3. Endogenous liquidity and optimal monetary policy

Endogenous liquidity and optimal monetary policy

- Finally, we endogenize the cost of liquidating private assets early as the rate at which the public sector is willing to lend against them (loans financed with lump sum taxes on households)
- Monetary policy then consists in two rates, a rate on public bonds r_P and a LOLR rate r_L (stands for a collateral policy)
- Absent any other ingredient, a public sector with full commitment power can implement the first-best by setting $r_P = \rho$ at date 0 and a LOLR rate sufficiently large that carry trades are unappealing at this rate
- We add another ingredient, an ex-ante socially desirable motive for LOLR

Endogenous liquidity and optimal monetary policy

- FIs' assets lose value if some random liquidity infusions are not met
- At the first date at which it is shut from the market, a FI needs to inject some cash $L(1-q)$ into the asset if it has not paid off yet
  - If the cash is injected, the asset repays it out at the next date
  - If it is not, then the asset's payoff is reduced by $\delta L(1-q)$, where $\delta > 0$
- Let

$$\Delta = \frac{\delta}{1 + \frac{p}{(1-p)q}}$$

Endogenous liquidity and optimal monetary policy

- If $\rho(1+\Delta) \geq 1$, then the public sector can implement the first-best with the policy rate $r_p = \rho$ and a LOLR rate smaller than $1+\delta$ but sufficiently large to deter carry trades
- Otherwise trade-off:
  - If $r_P = \rho$, first-best investment level I_0 but r_L that deters carry trades also deters efficient liquidity injections
    Aggressive monetary policy that comes with financial instability
  - Or set $r_L = 1+\delta$ and $r_P = 1/(1+\Delta)$. Leads to excessively low investment but no subsequent financial instability
    Milder effect on productive investment but no value destruction by FIs

Endogenous liquidity and optimal monetary policy

There are two locally optimal monetary policies. The financially stable one leads to low productive investment but eliminates liquidity risk for FIs through lending of last resort. The financially unstable one leads to more aggressive productive investment but creates material liquidity risk. The former is preferable to the latter if and only if:

$$\log[\rho(1+\Delta)] > \rho(1+\Delta) - \rho L\Delta$$

Note: if the public sector is unable to perform the efficient liquidity injections performed by FIs, then buying up all the assets held by FIs at date 0 comes at the same costs and benefits as setting $r_L - 1 > \delta$. But the price at which the public sector buys assets must reflect the option of each FI to hold on to them and use them for carry trades instead