

# “Liquidity Requirements, Liquidity Choice and Financial Stability”

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# Basel III and Liquidity Regulation

- Significant debate about bank capital.
- Much of new regulation around the world is about liquidity.
- Historically, quantitative regulation was mainly of liquidity or required reserves.
- What is the goal of liquidity regulation?
  - Why won't banks hold the proper amount otherwise?
  - Is more disclosure a better answer?

# Our perspective

1. Most analysis of liquidity requirements asks: how much liquidity is needed to meet extreme withdrawals (as in a crisis)?
2. Rather, a key goal should be to **provide incentives** for banks to choose to hold the proper amount of liquidity, in excess of the required amount.
3. This extra liquidity is to **deter** runs.
4. Unregulated banks may not hold enough liquidity.
5. Regulation that forces banks to hold more liquidity than they prefer **can** potentially improve outcomes.

# Assets and Deposits

- 1 invested at date 0 in:
 

	at date 1 pays	at date 2 pays
• Liquid asset	$R_1 > 1$	$R_1 * R_1$
• Loan	$\theta R_2 < 1$	or $R_2 > R_1 * R_1$
• Deposit	$r_1 = 1$	$r_2 = 1$

**Runnable if a sufficient fraction is in Loans.**

*General case in the paper has  $r_1$  and  $r_2$  not necessarily equal to 1.*

# Investor Demand for Liquidity

- Investors face an uncertain need for liquidity. Each will need their money (to consume) either **early** at date 1 or **late** at date 2, and does not know which date as of date 0. Each begins with 1 unit to invest on date 0 .
- If bank will be **sure to be solvent** all the time, (even during a partial run) only those who are **early** will withdraw at date 1.

# Our Variant of Diamond-Dybvig (1983)

t=0

Riskless loan and safe assets are funded by deposits

t=1

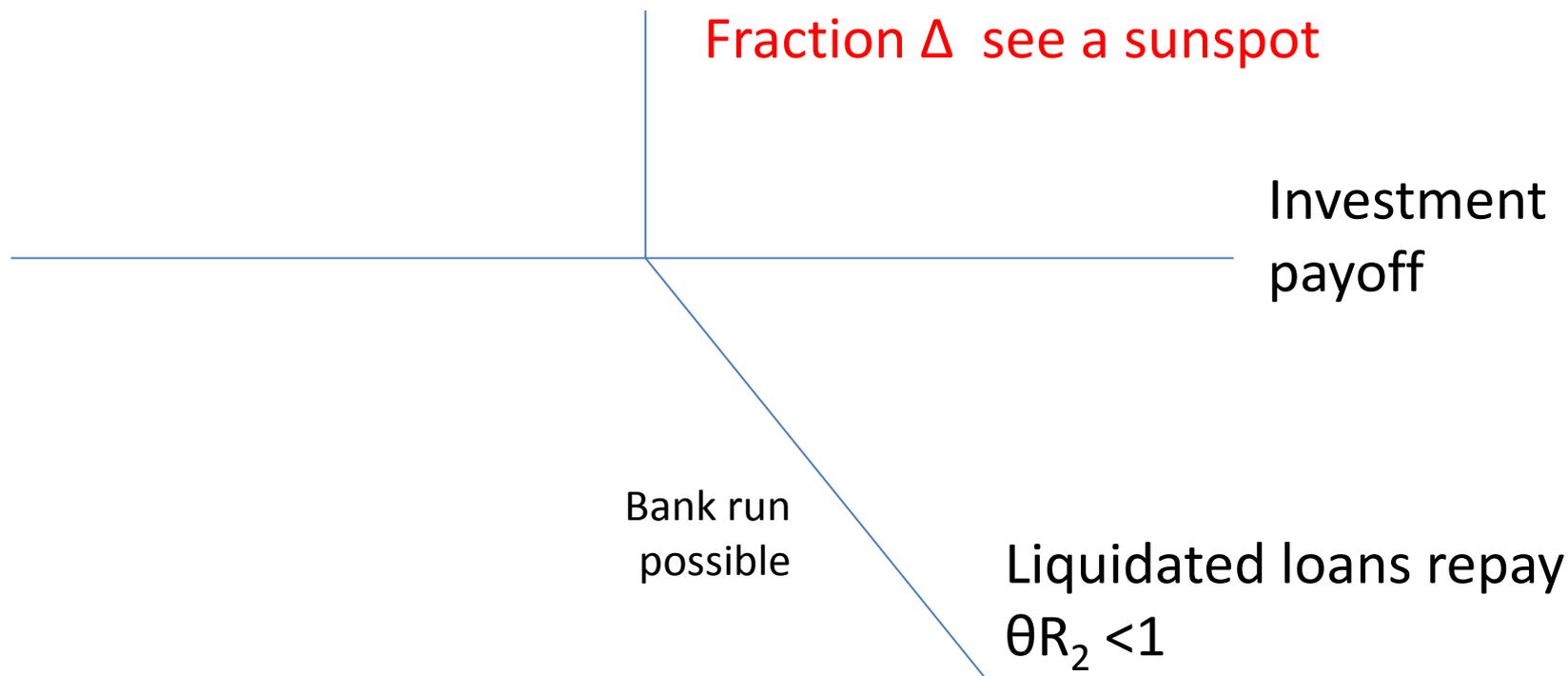
Idiosyncratic need for liquidity

t=2

Unliquidated  
Loans repay  $R_2 > 1$

Fraction  $t_s$  (who are early) will withdraw

Fraction  $\Delta$  see a sunspot



# Details on deposits withdrawals

- A fraction  $t_s$  of depositors will need to withdraw,  $t_s$  varies and is known only by the bank.
- In addition, a fraction  $\Delta < 1$  of depositors see a report that can make them expect others to run (see a “sunspot” or some news). **This may or may not make them run in response.**
- $\Delta$  measures how “hot” is the money deposited. Core deposits:  $\Delta = 0$  vs. Wholesale deposits:  $\Delta > 0$ .

To be run free, bank must hold some extra liquidity (last taxi remains)

- Enough liquidity so if a fraction  $t_s + \Delta$  show up, the bank will still be solvent.
- If the bank holds the extra amount, and all know it, there will not be runs.
- Once there are no runs, this is unused liquidity (extra taxicabs at the train station). Goodhart (2008), Milton Friedman before that.
- How to implement run-free banking with maximum lending?

**Table A2: Bank Funding Structures in Selected Countries(a)**

June 2012, per cent

	<b>Wholesale funding ratio(b)</b>	<b>Customer deposit funding ratio(b), (c)</b>	<b>Foreign funding ratio(d)</b>	<b>Loan-to-deposit ratio</b>
Australia	34	49	24	135
Canada	23	67	10	103
Euro area	23	41	15	110
<i>France</i>	<i>20</i>	<i>32</i>	<i>19</i>	<i>110</i>
<i>Germany</i>	<i>20</i>	<i>46</i>	<i>18</i>	<i>107</i>
Japan	21	72	12	73
Sweden	33	40	34	129
Switzerland	21	55	27	97
United Kingdom	24	59	48	138
United States	13	73	24	77

(a) Funding ratios across banking systems are subject to definitional differences; certificates of deposits are classified as wholesale funding in all countries except Canada and the United States, where these instruments are eligible for deposit insurance

(b) Expressed as a share of funding liabilities (total liabilities including equity less derivatives and other non-debt liabilities)

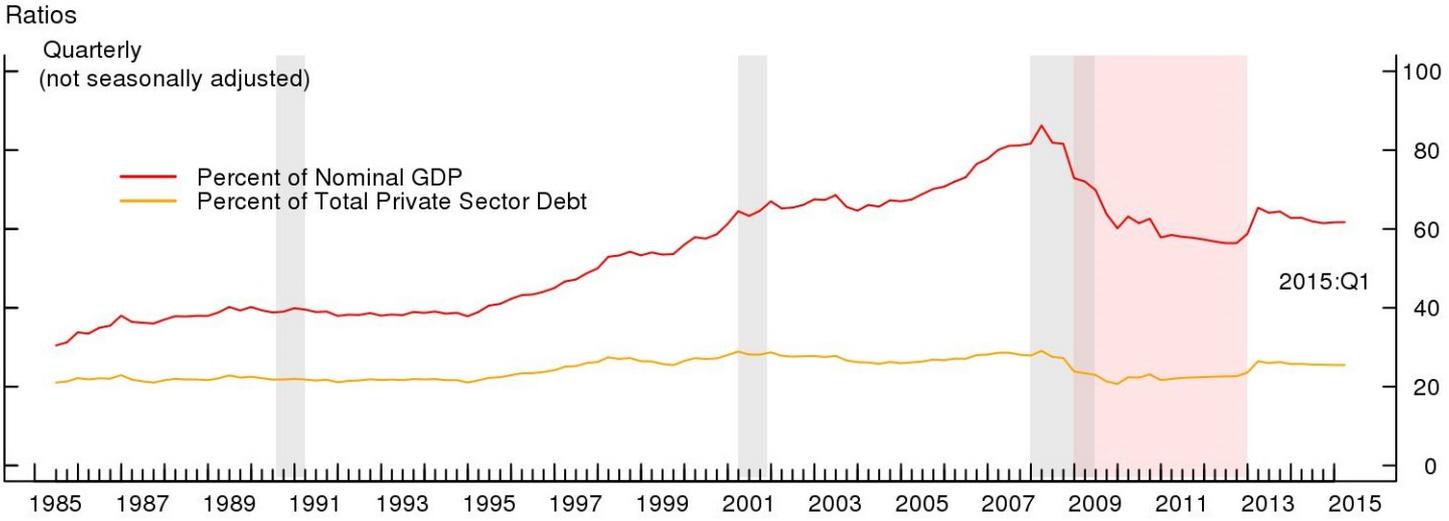
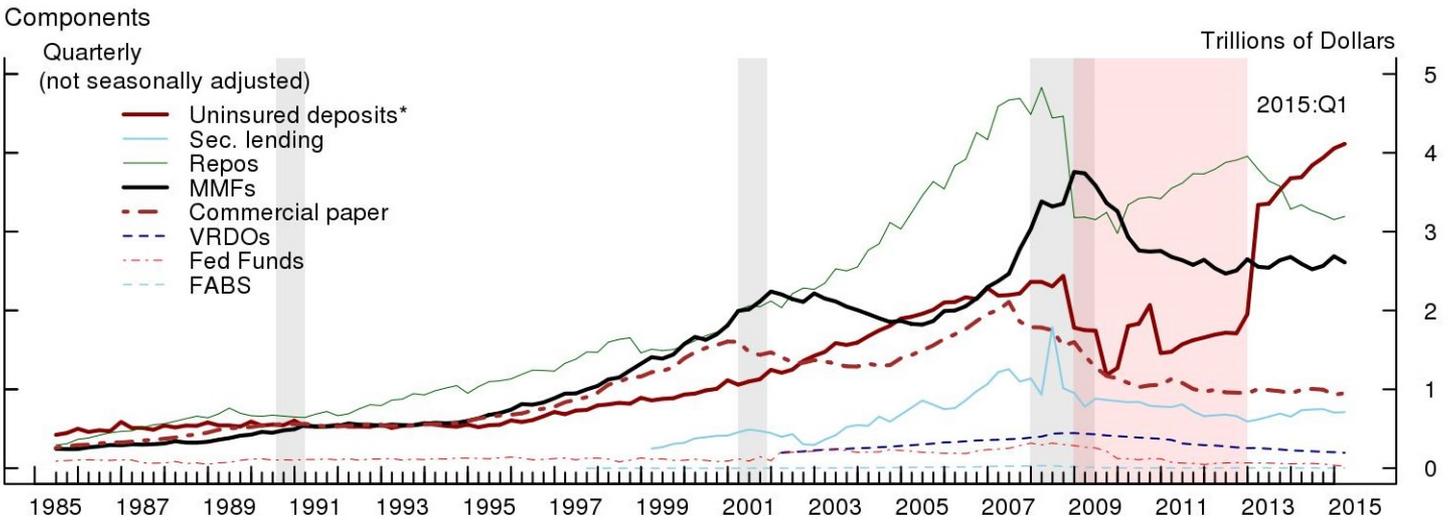
(c) Customer deposits are total deposits minus deposits from banks and other monetary financial institutions

(d) Gross foreign liabilities of BIS reporting banks on a locational basis, expressed as a share of total liabilities and equity; data as at 31 March 2012

Sources: APRA; BIS; Bloomberg; FDIC; OSFI; RBA; central banks

Source: <http://www.rba.gov.au/publications/fsr/2012/sep/html/tables.html#table-a2>

# Runnable Liabilities



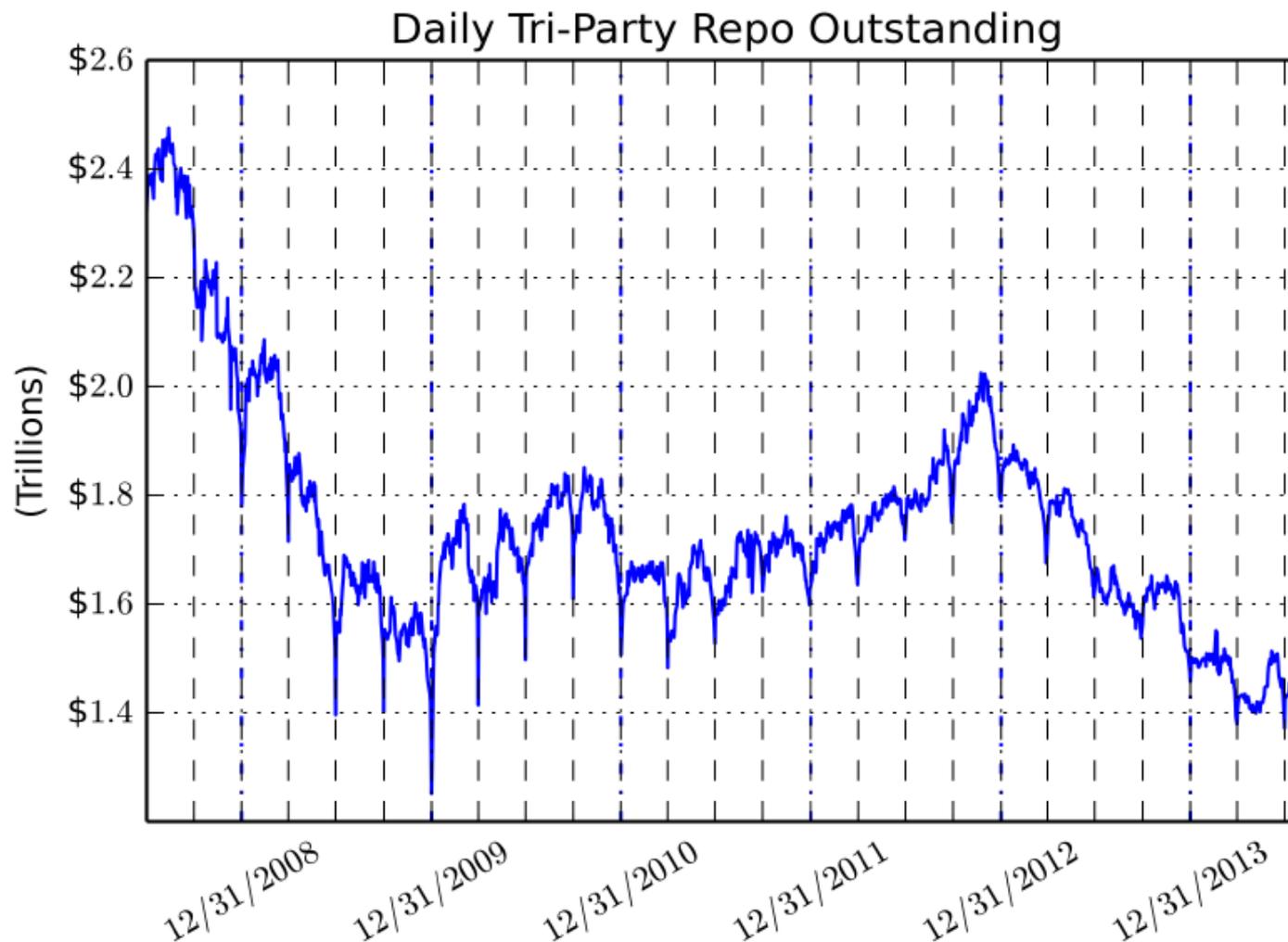
\* Uninsured deposits equal the difference between total deposits and insured deposits. The quarterly insured deposits series between 1985 and 1990 is obtained by interpolating the available annual data. For 2008:Q4-2012:Q4 (red shades), insured deposits increased due to the Transaction Account Guarantee (TAG) Program. For 2008:Q4-2009:Q2, some insured deposits were not accounted for because the FDIC did not collect data on insured amounts for those TAG accounts with balances between \$100,000 and \$250,000.

Note: The gray shades, which overlap the red shades, indicate NBER recession dates.

Source: Staff calculations using data from RMA, DTCC, SIFMA, Call Reports, Financial Accounts, M3 monetary aggregates, and Bloomberg Finance LP.

# Why do we need to provide incentives and not just disclosure?

- Disclosure need not allow depositors to determine if there is “enough liquidity.”
- Disclosed numbers are difficult to interpret because:
- **Bank has information about varying needs for liquidity (this is our model).**
- Also: Disclosing temporarily low liquidity could cause a run on its own.
- Also: A snapshot on a date may be stale (hold liquidity on December 31, invest it the next day).



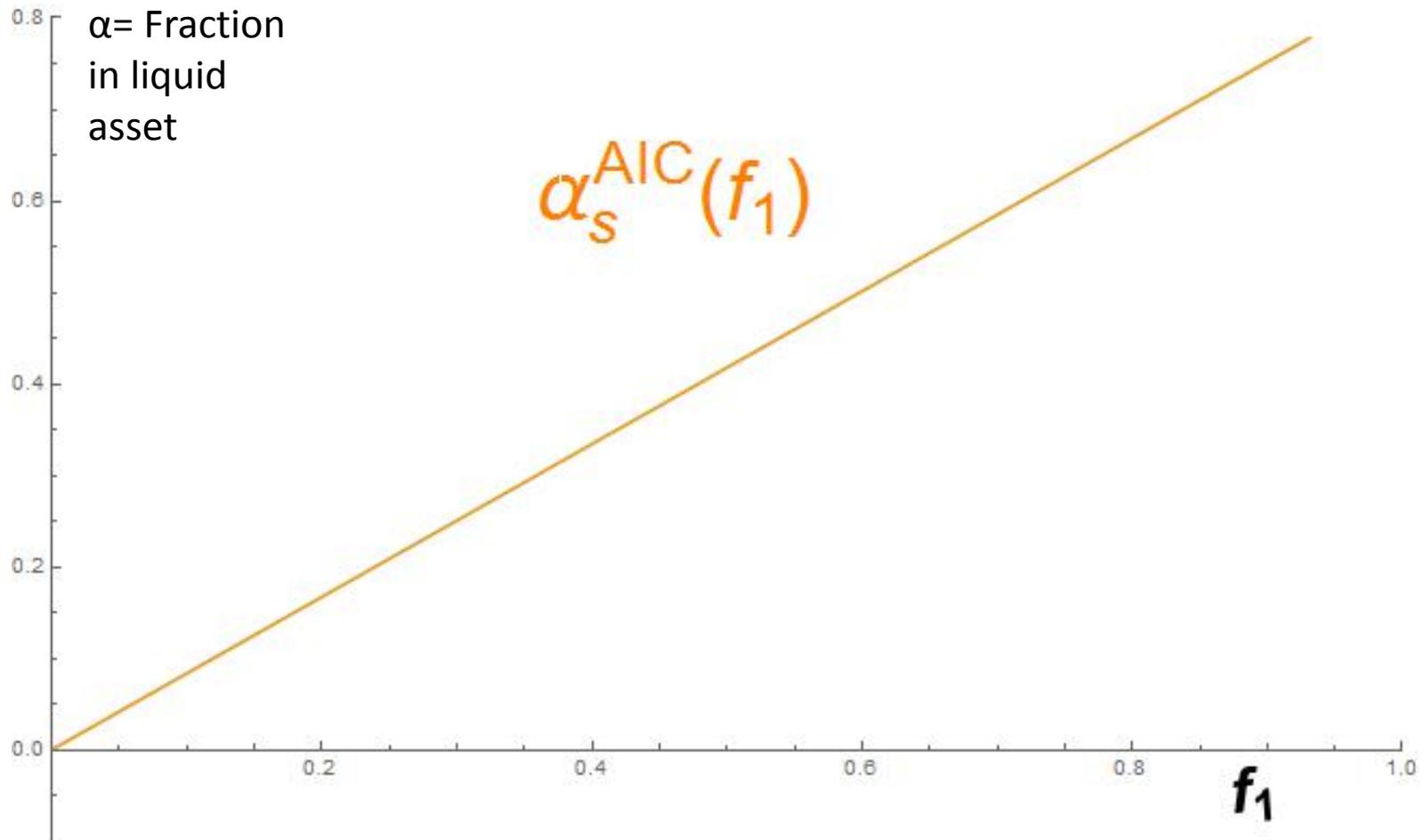
**Figure 1. Daily Tri-Party Repo Outstanding**

*Notes:* The vertical axis represents the value in trillions of dollars of collateral outstanding pledged in repo each day from July 1, 2008 to July 31, 2014. Quarter-ends are marked with vertical dashed lines, and year-ends are marked with heavier dash-dotted lines. I exclude repo borrowing by the Federal Reserve Bank of New York, and I exclude the dates of 7/17/2008 and 4/11/2013 because of missing data from one of the clearing banks.

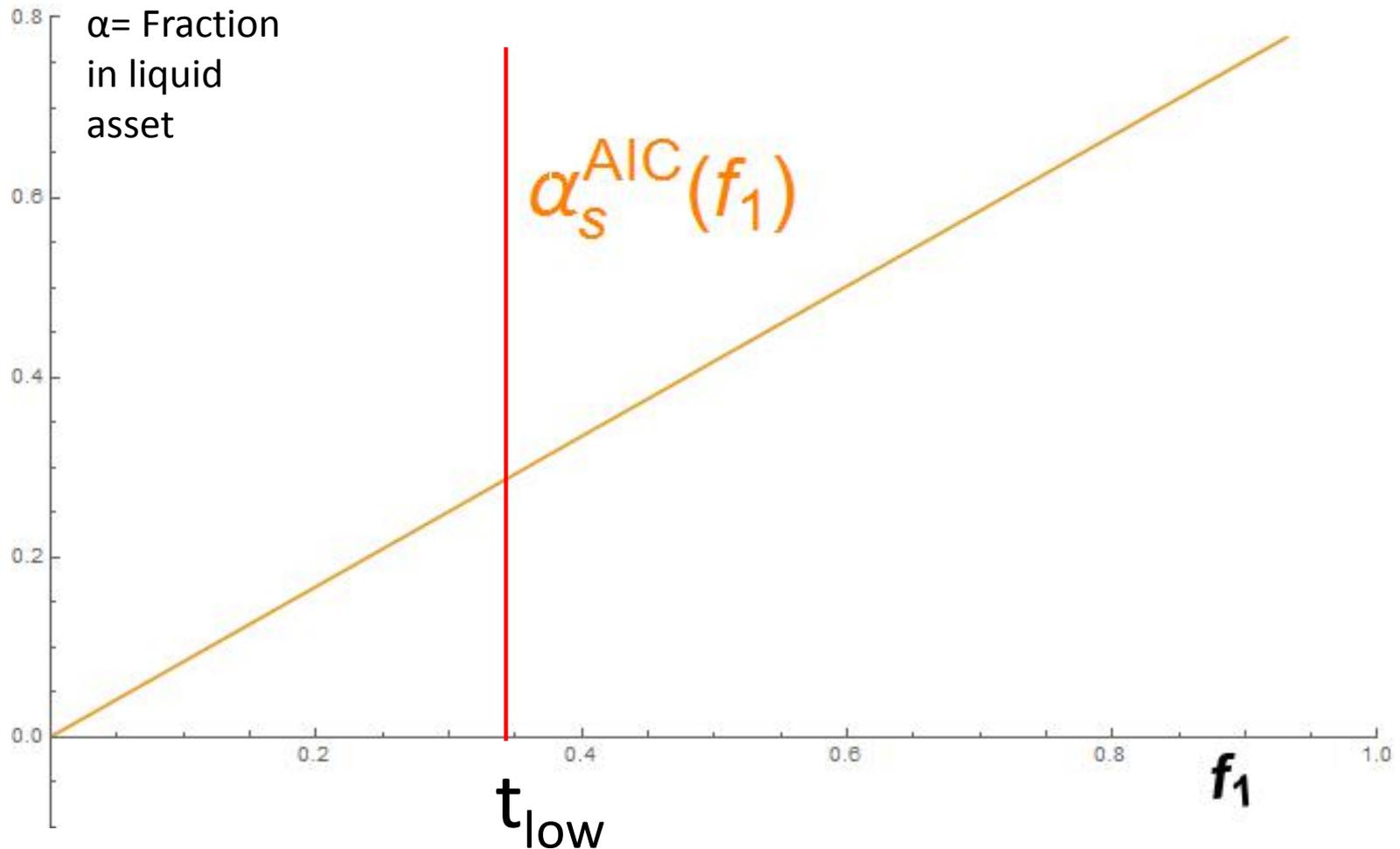
# Privately optimal choices for the bank

- **Fraction of liquid assets ( $\alpha$ )** is chosen to equate available funds ( $\alpha$ ) to deposit outflows (1 each to the **fraction  $f_1$  that withdraw**): (total outflow of  $f_1$ ).
- This profit maximizing amount is “Automatically Incentive Compatible.” **(AIC)**
- Because the bank never plans to make illiquid loans only to liquidate them at a loss.
- **Withdrawals differ: without a run,  $f_1 = t_s$ ,  
or in a run,  $f_1 = t_s + \Delta$ .**

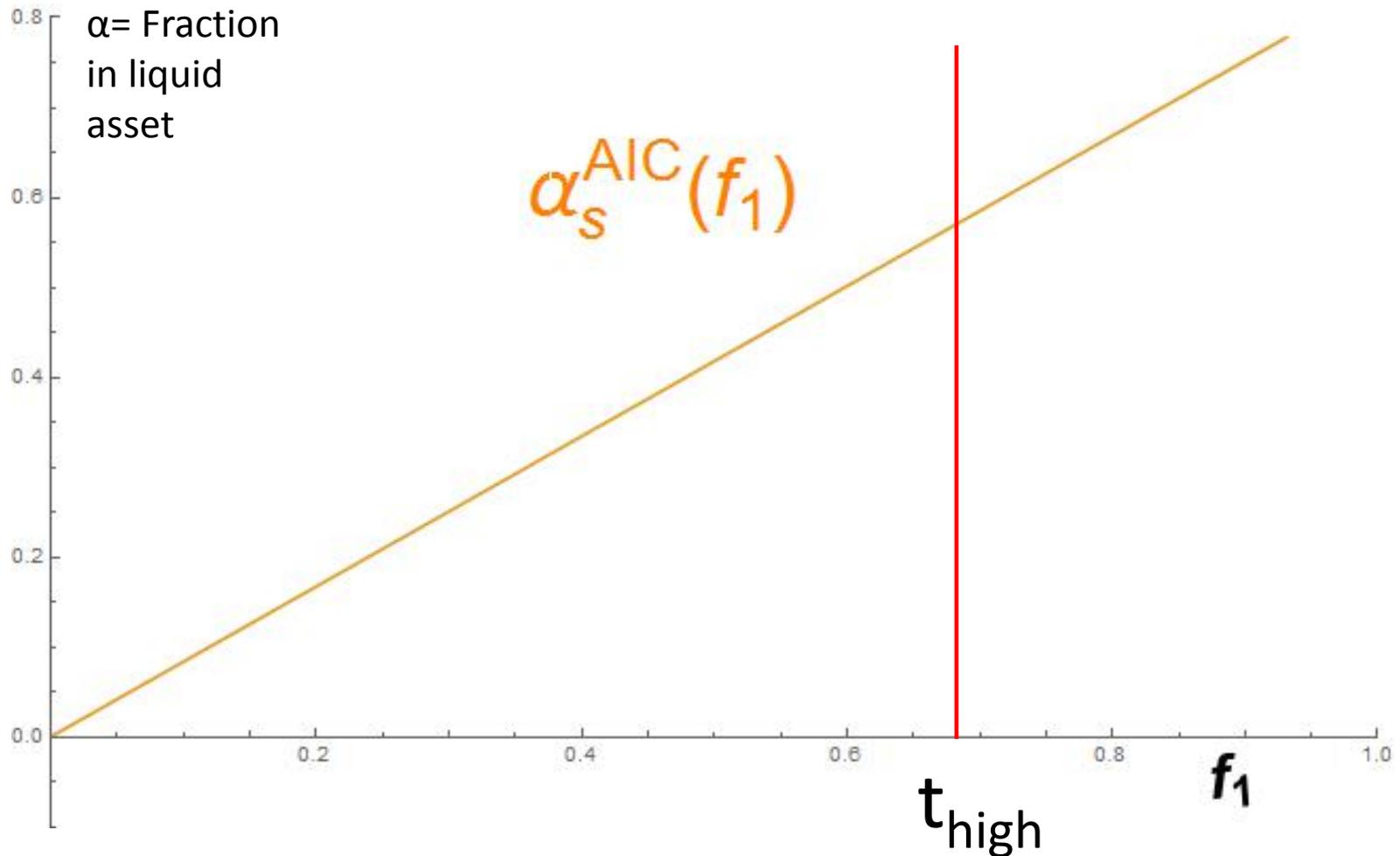
# Automatically Incentive Compatible Liquidity, for given $f_1$ withdrawals.



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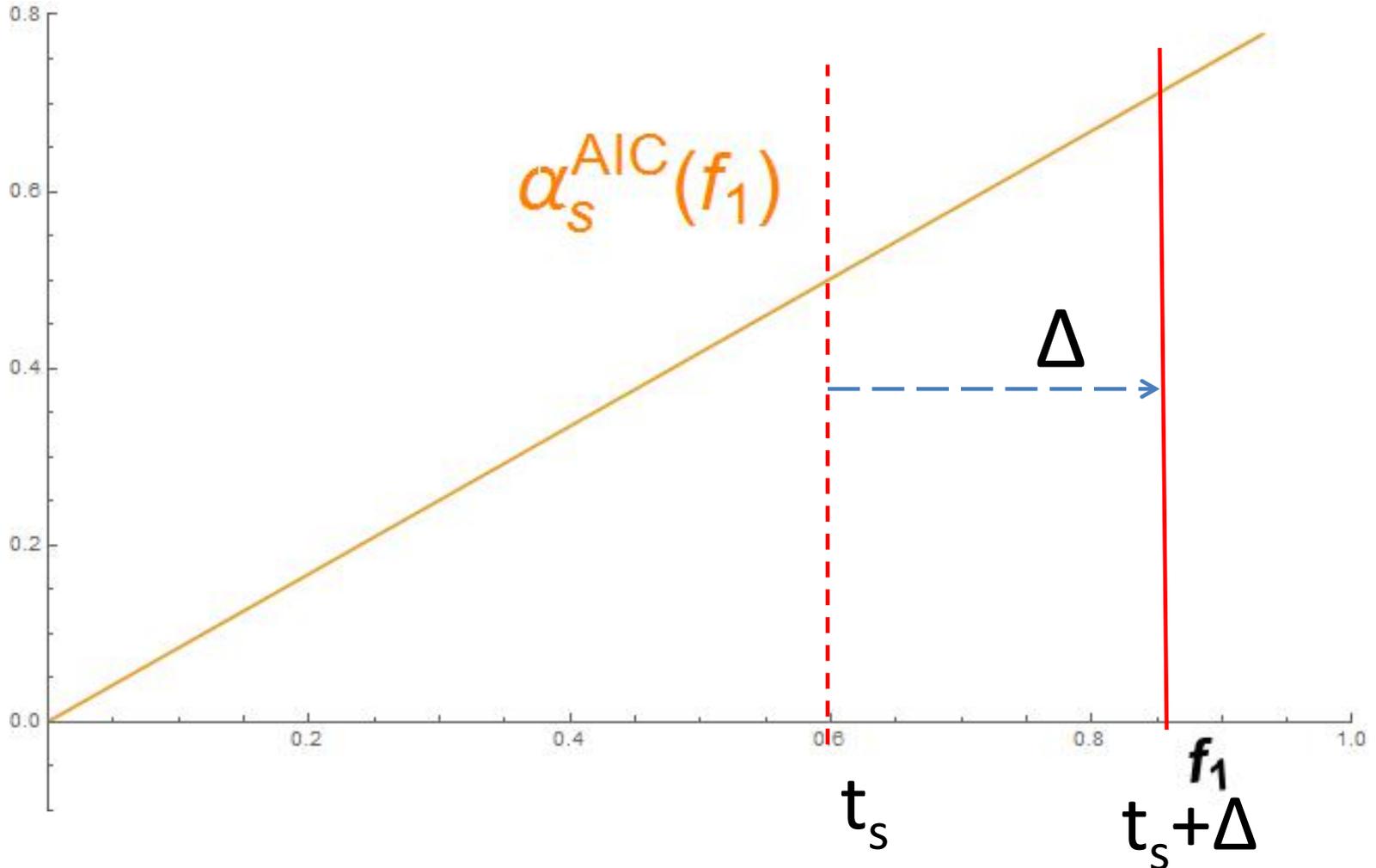


# Automatically Incentive Compatible Liquidity, for given $f_1$ withdrawals.



# Withdrawals differ without a run, $f_1 = t_s$ , and in a run, $f_1 = t_s + \Delta$

$\alpha$  = Fraction in liquid asset



# Will bank choices deter runs?

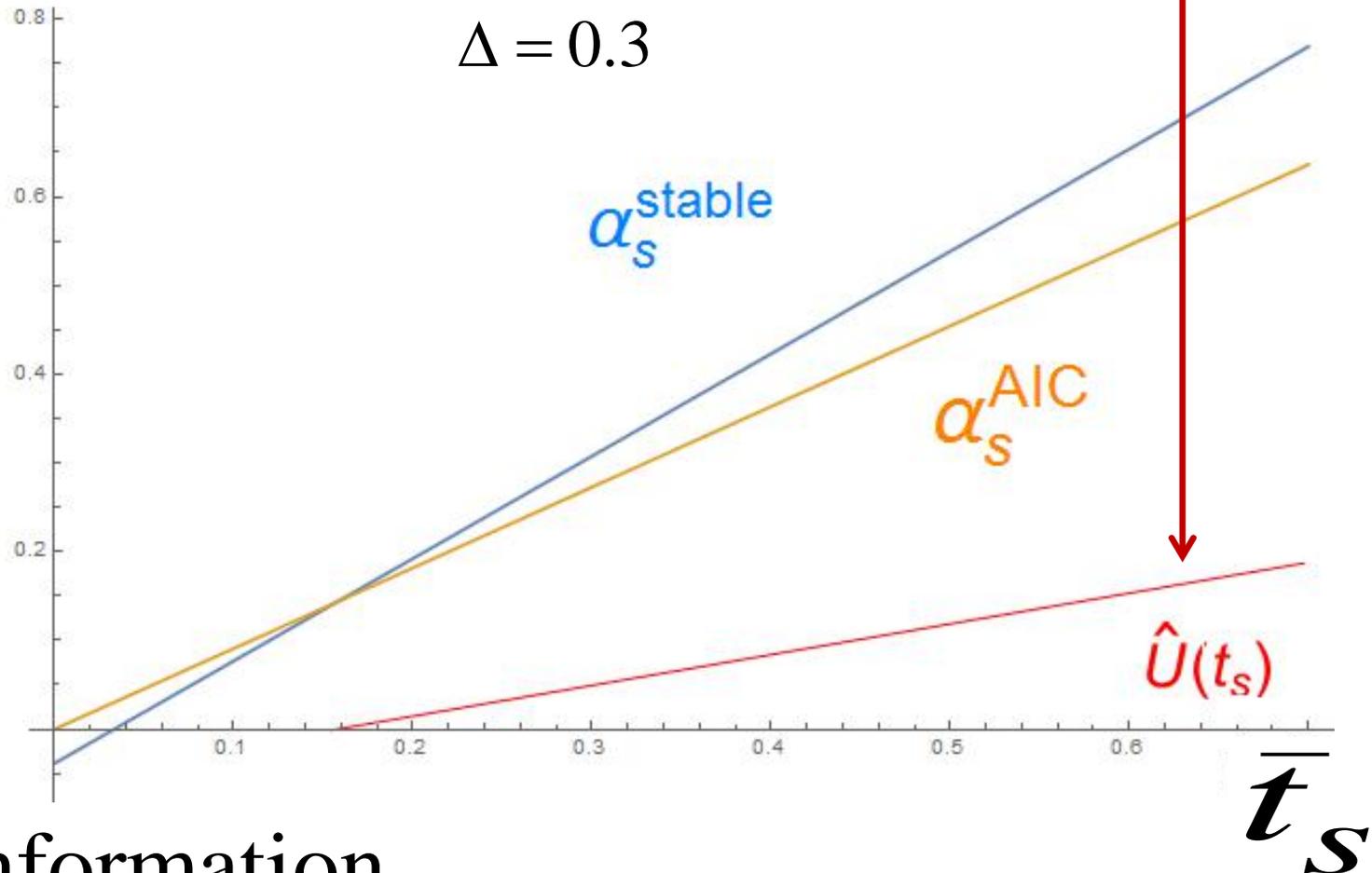
- If the bank can cover withdrawals of  $f_1$  in all cases without failing, the hot money never runs.
  - Will bank choose enough liquidity for normal withdrawals  $f_1 = t_s$ , or to stay solvent even during a run,  $f_1 = t_s + \Delta$ ?
  - These could be the same  $\alpha$  (if fire sale losses are less than net worth without a run because  $\theta$  is high), or they could differ.

# Stability Requires Some Unused Liquidity

$\alpha$  = Fraction  
in liquid  
asset

(With Full Information about  $t_s$ )

$$\Delta = 0.3$$



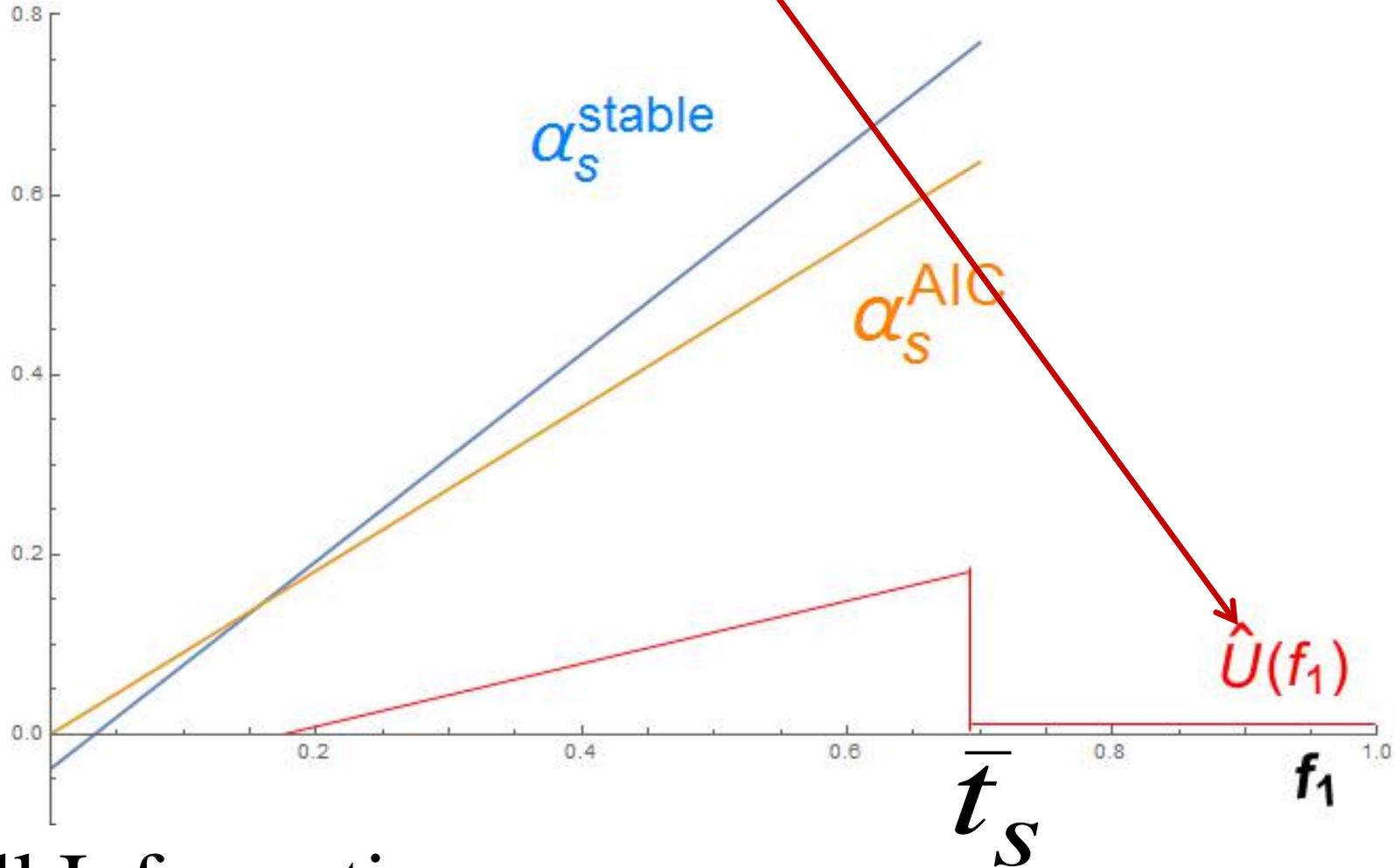
Full Information

Does simply requiring excess liquidity overcome private information about  $t_s$  ?

- Not generally:
- When there is full information, all liquidity is released in any run ( $f_1 > t_s$ )
- If a regulator does not know  $t_s$ , releasing this liquidity only in a run may not be feasible.

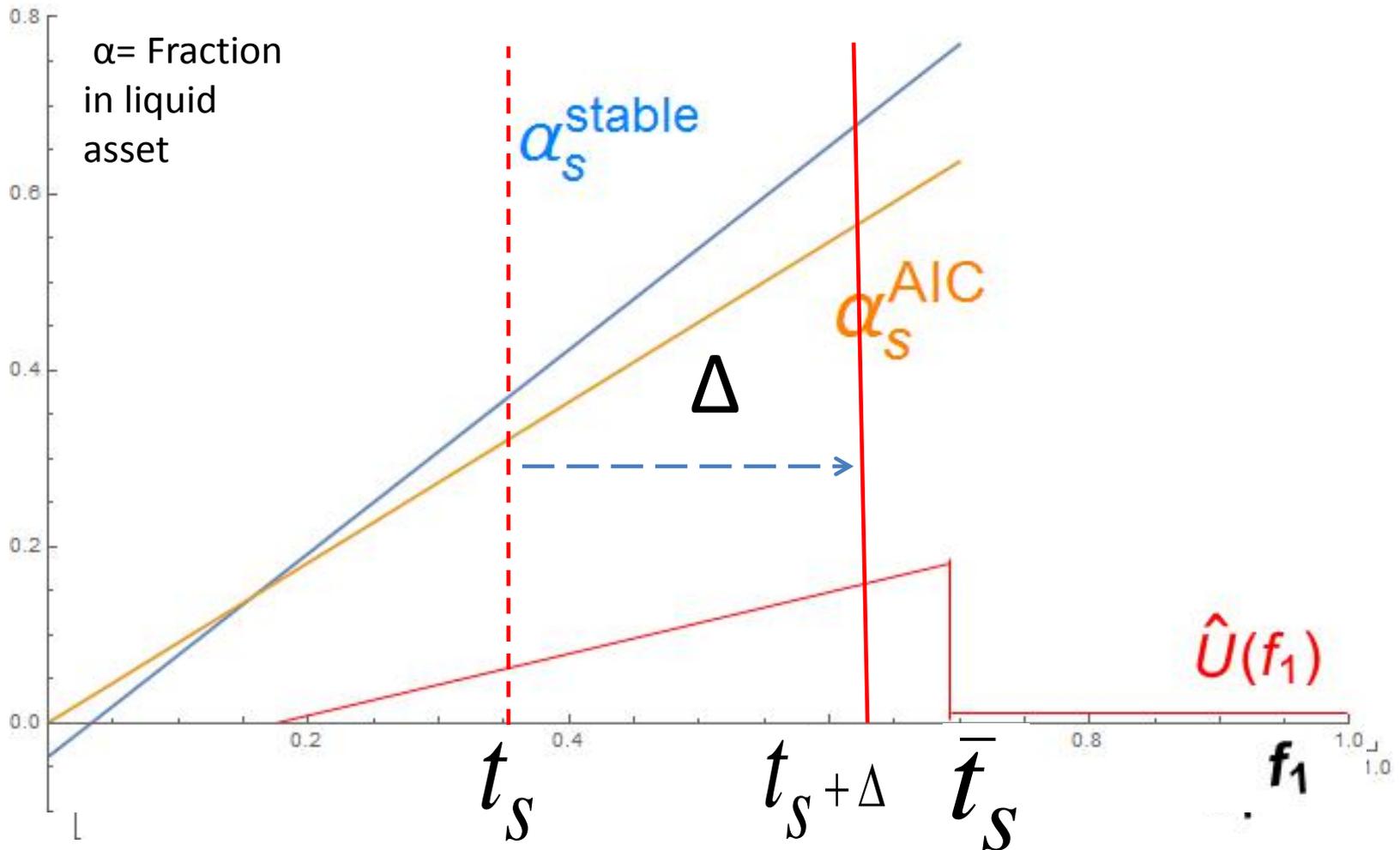
# Liquidity Should be Released in a “Known Run” ( $f_1 > \bar{t}_s$ )

$\alpha$  = Fraction  
in liquid  
asset



Full Information

Not all liquidity (taxicabs) can be released in all runs (if  $t_s$  is not known)



Without Full Information

# Evaluation of Basel III regulations

- We can show that the Basel regulations are NOT optimal regulations (constrained only by requiring honest reporting of the bank's private information).
- They require more liquidity and less lending than the optimal mechanism.
- We can still compare them using our framework.

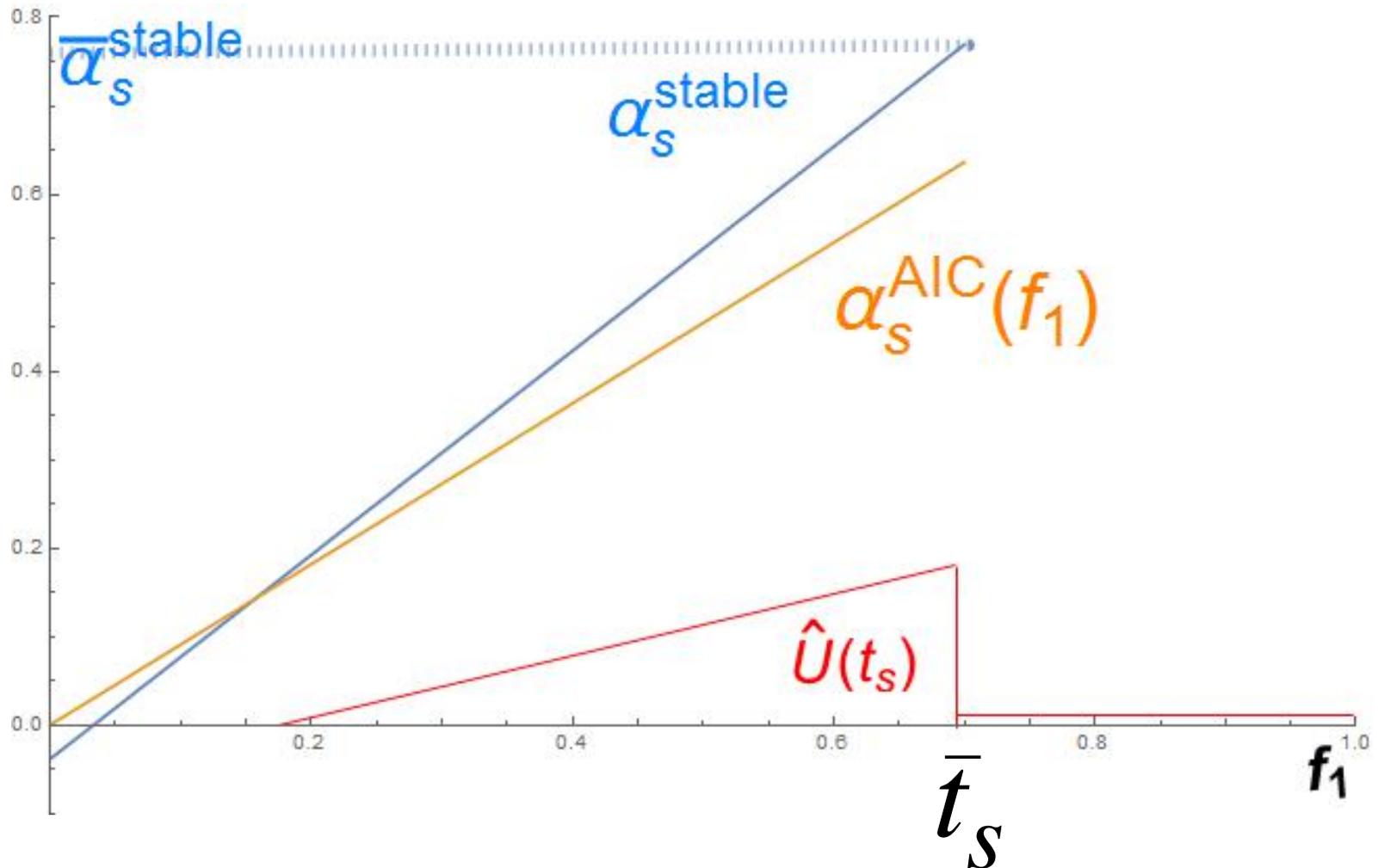
# Liquidity requirements in Basel III (which must hold at all times)

- The Net Stable Funding Ratio:
  - (**Type of funding tied to assets**) Ties the liability structure to the liquidity characteristics of assets. Liabilities are assumed to have varying “stability” given their maturity (based on counterparty, core deposits, etc.) Measured over one year horizon.
- The Liquidity Coverage Ratio (**liquidity min**):

$$\frac{\text{High quality liquid Assets}}{\text{Total net outflows over 30 days of stress}} \geq 1$$

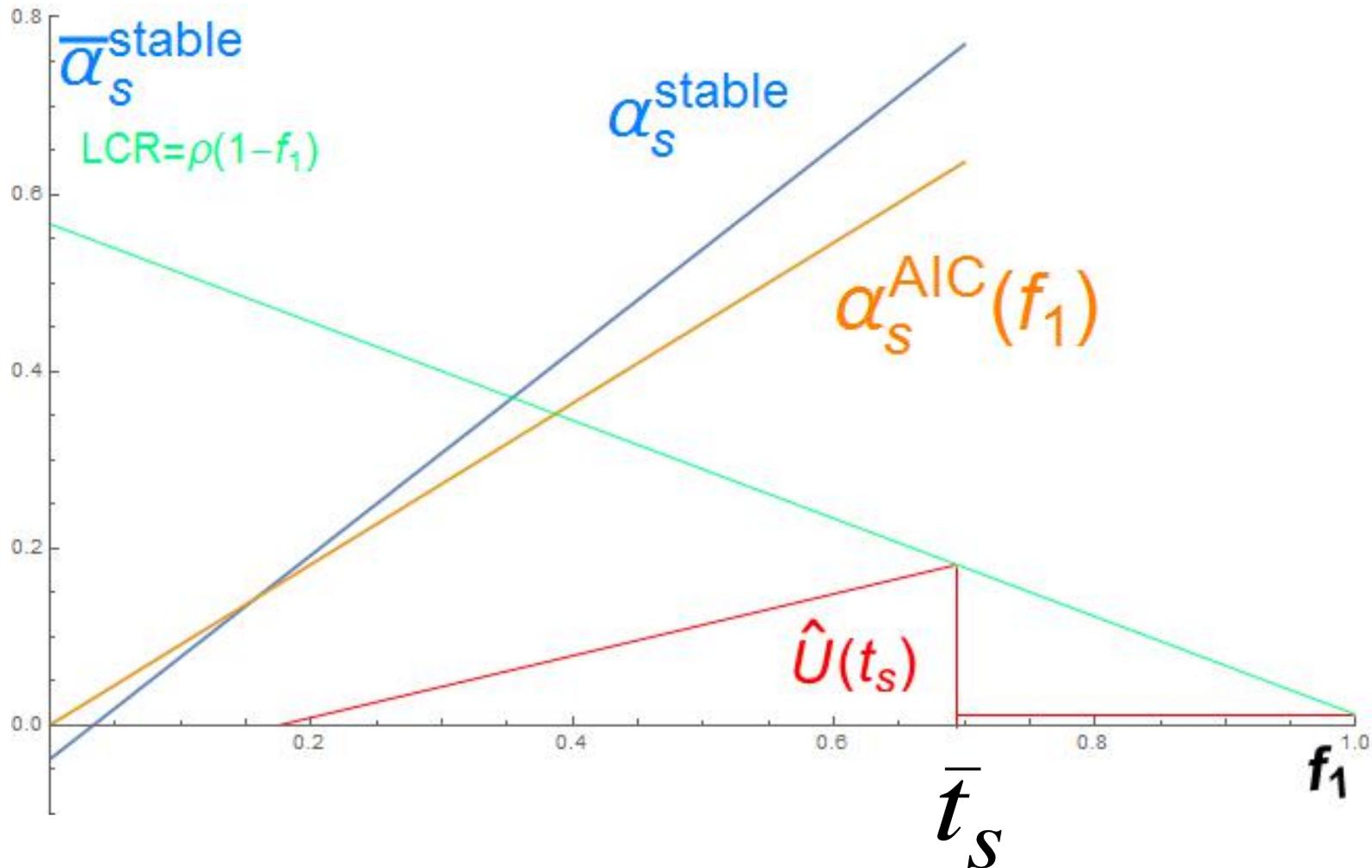
# Run-Proof NSFR Must Cover the Worst Case

$\alpha$  = Fraction in liquid asset



# LCR [of $\rho(1-f_1)$ ] can allow more lending that a NSFR ( $\alpha$ )

$\alpha$  = Fraction  
in liquid  
asset



# There must be excess liquidity

- To enforce the LCR regulation, the regulator need only measure how much liquidity per deposit remains after withdrawals occur.
- There must be a positive fraction of liquidity left unused after fraction  $t_s$  withdraw. **Last taxicab at the train station must not leave.**
- Regulator can't tell if withdrawals are normal or run, but **if the extra liquidity is held, only normal withdrawals will occur.**

# Measurement and Calibration Issues

- The illiquidity,  $\theta R_2$ , can be higher of market or LLR (lender of last resort after a haircut).
- We should not calibrate liquidity requirements just to cover predicted withdrawals, but in instead take account of the **incentive effects** of requiring unused liquidity (LCR).
- Behavior in the near future will be very different with requirements to hold liquid assets with higher interest paid on reserves by central banks (set to induce holdings of reserves).

# Implementing the optimal regulation: Integrate with LLR policy.

- The best regulation (better than the LCR) be implemented by lender of last resort policy tied to the full information unused liquidity requirement  $\hat{U}(f_1)$  .
- If violated (by using it to meet a run), *lend against the liquidity*, but drive compensation to zero (or reduce sufficiently). Integrate LLR with liquidity regulation.
- As in dividend prohibition rules the original Federal Reserve Act.

# What about Capital Requirements alone?

- Require more capital (used to finance more assets / loans) per unit of deposits.
- Works well if assets are reasonably liquid ( $\theta$  is large, loans serve as collateral against a run).
- Works poorly if loans are very illiquid:  
if  $\theta=0$ , adding capital and more loans has no reduction in the threat of runs.

# Summary

1. Unregulated banks with unobservable liquidity needs are unlikely to be run proof.
2. Simply disclosing liquidity at one date is not enough.
3. Liquidity regulation can correct this.
4. Basel style regulations are not the optimal mechanisms. They will typically result in excess liquidity being held.
5. Mandating surplus liquidity is necessary, so the last taxicab can't be released.
6. Lender of last resort policies and liquidity regulation ought to be integrated.