

Liquidity, Asset Prices, and Market Eff

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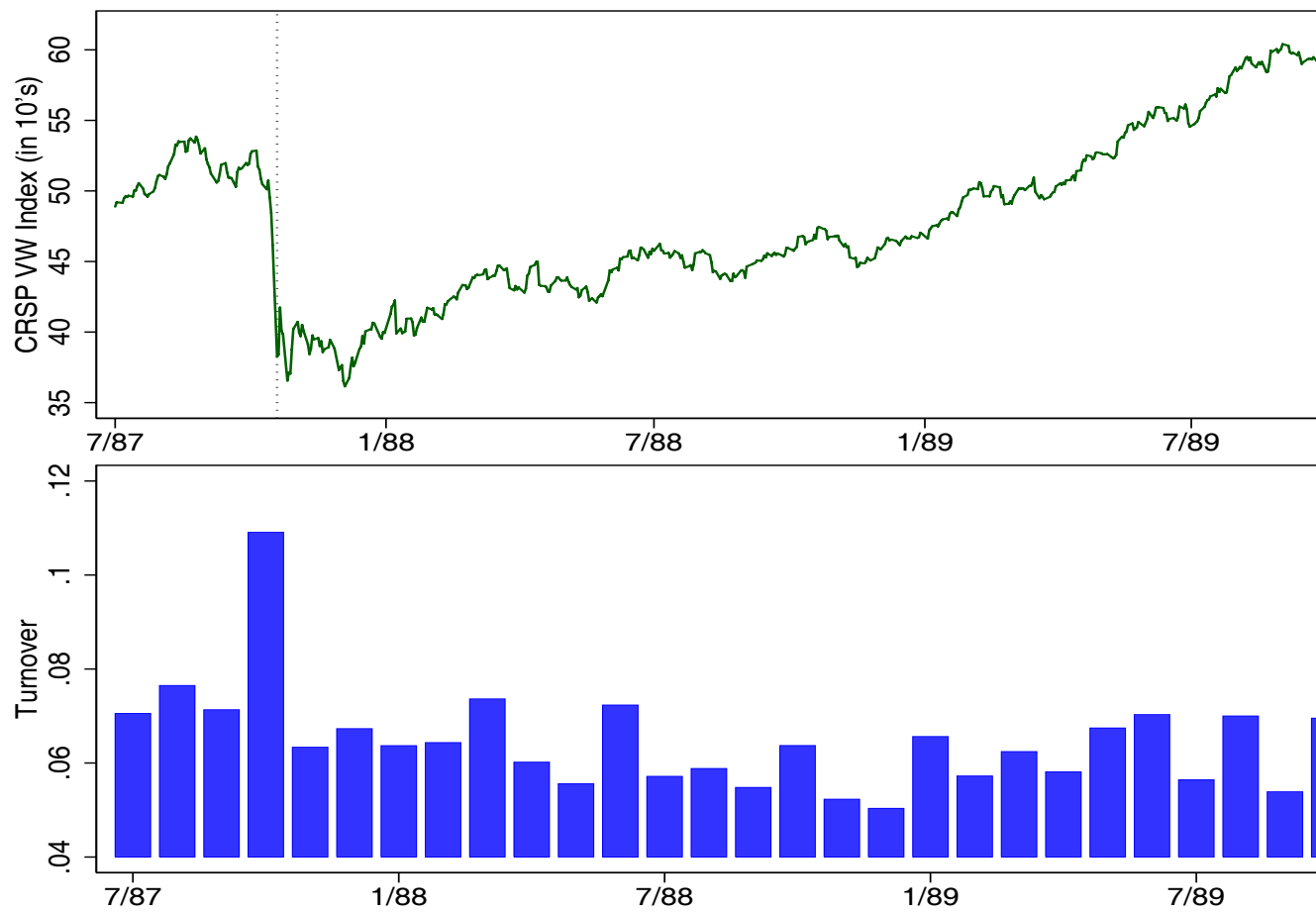
Importance of Market Liquidity

- ▶ Efficient allocation of assets
- ▶ Asset prices
- ▶ Market stability
- ▶ Welfare

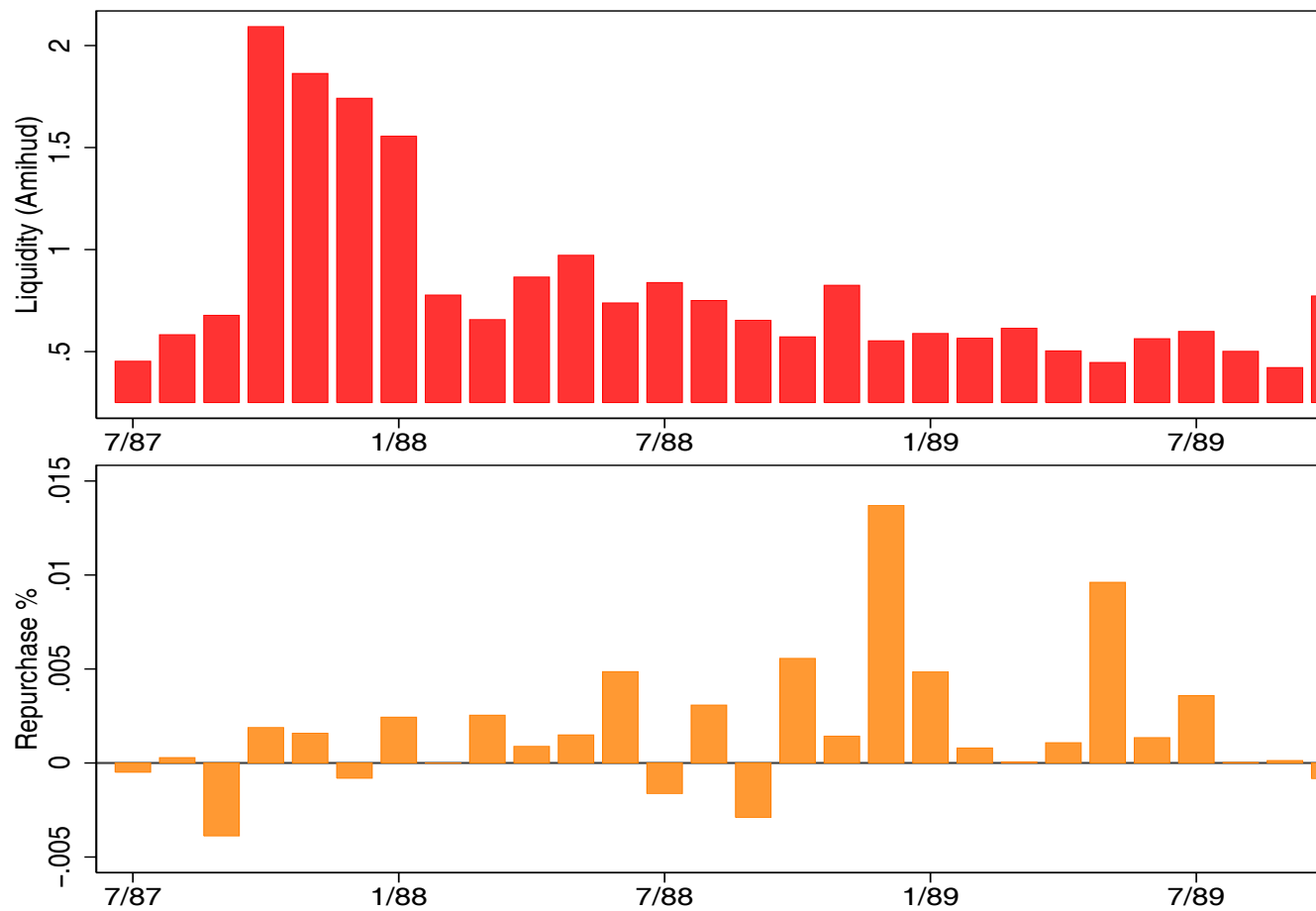
Recent liquidity events and government interventions:

- ▶ 1987 stock market crash
- ▶ 1998 Long Term Capital Management (LTCM) crisis
- ▶ Y2K
- ▶ 9.11

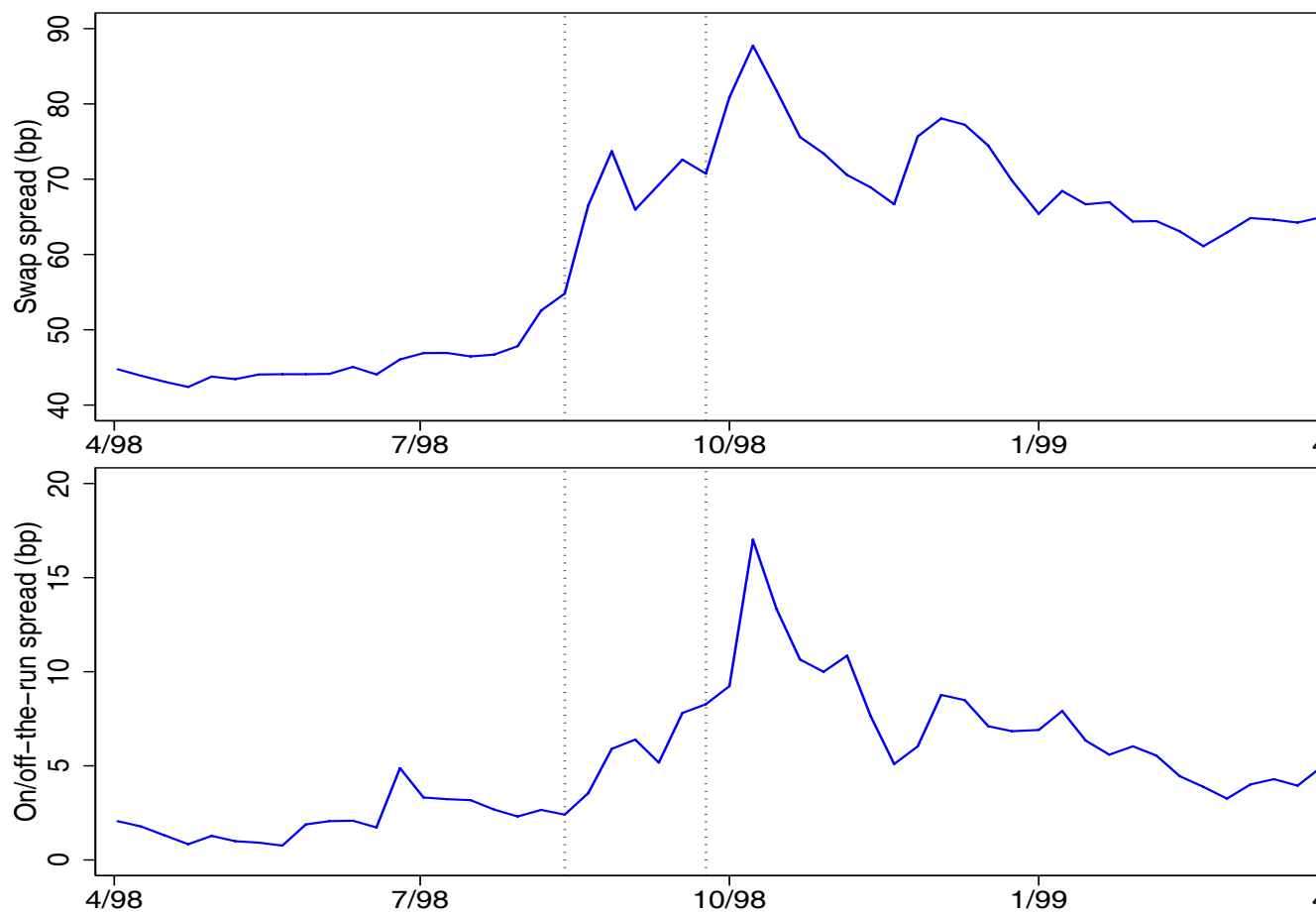
1987 Stock Market Crash (1/2)



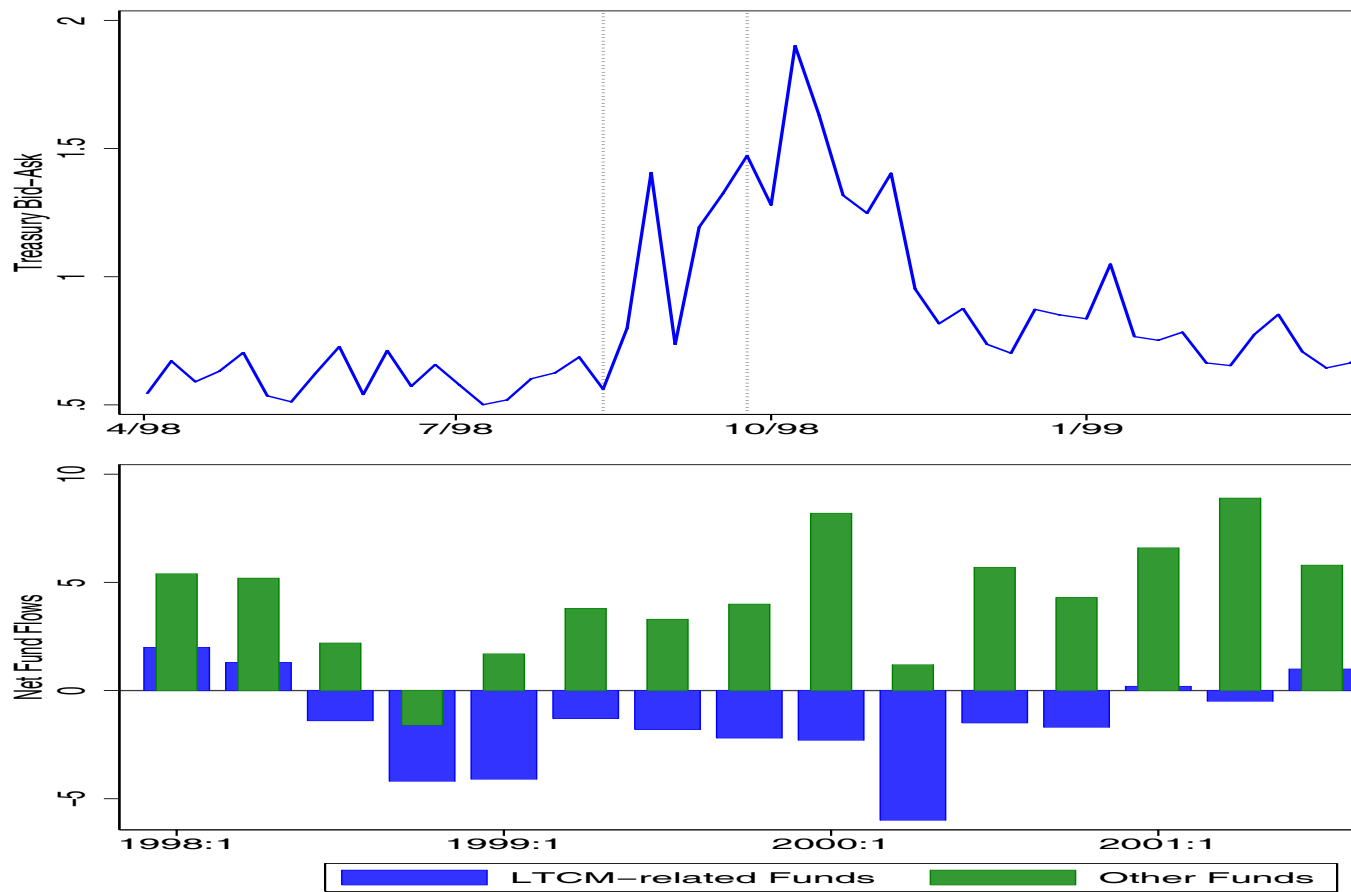
1987 Stock Market Crash (2/2)



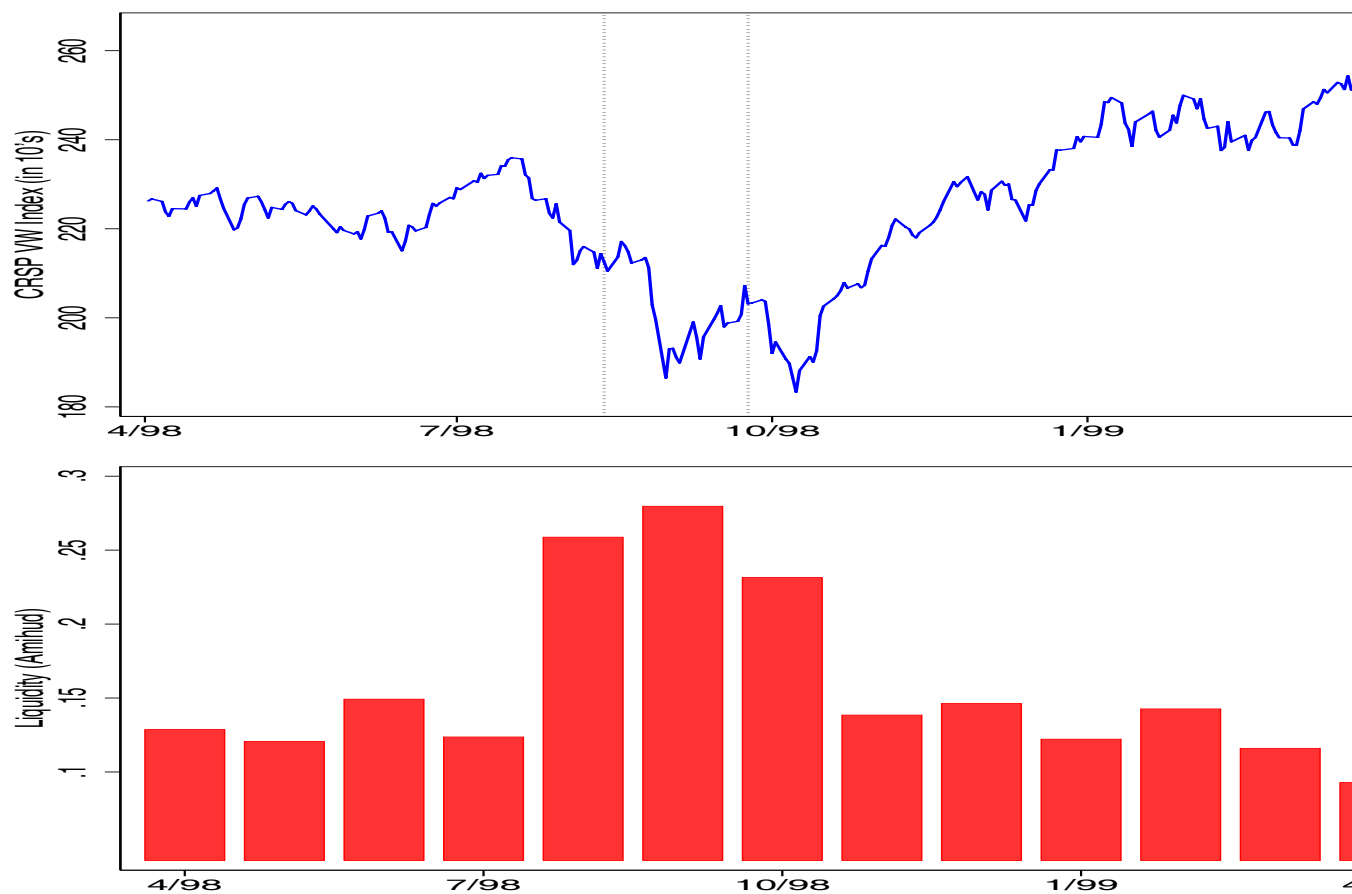
1998 LTCM Crisis (1/3)



1998 LTCM Crisis (2/3)



1998 LTCM Crisis (3/3)



Properties of Liquidity (Or the Lack of)

- ▶ Differs across markets
- ▶ Varies over time
- ▶ Exacerbates market crises
- ▶ Rare but big
- ▶ One-sided
- ▶ Endogenous
- ▶ Systemic
- ▶ Transitory

Basic Questions about Liquidity

- ▶ What is liquidity?
- ▶ What determines the demand/supply of liquidity?
- ▶ What determines market structure?
- ▶ How does liquidity influence asset prices?
 - Levels
 - Dynamics
- ▶ How does liquidity affect welfare/market efficiency?
- ▶ Any roles for policy?

What Is Market Liquidity?

“More certainly realisable at short notice without loss” – Keynes

- ▶ Two key elements:
 - Need to trade
 - Cost to trade
- ▶ Partial vs. full demand/supply
- ▶ The price difference measures illiquidity

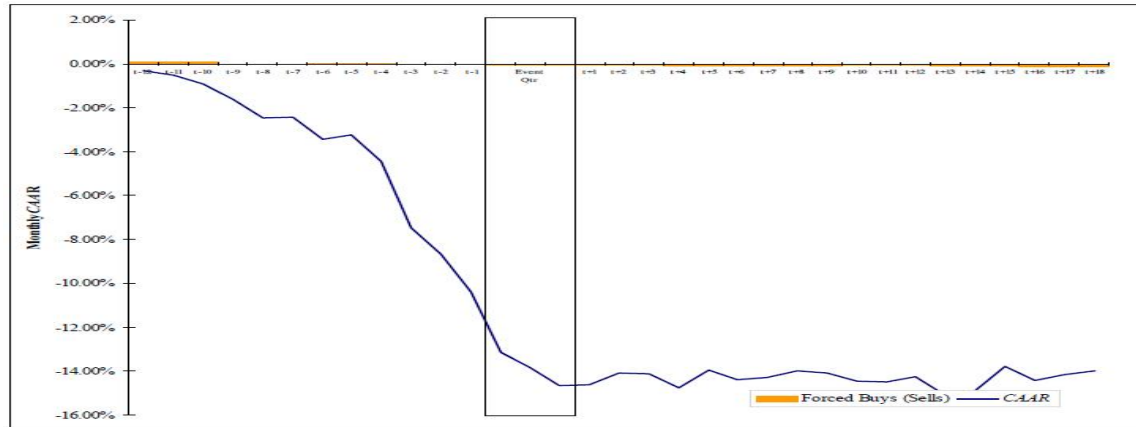
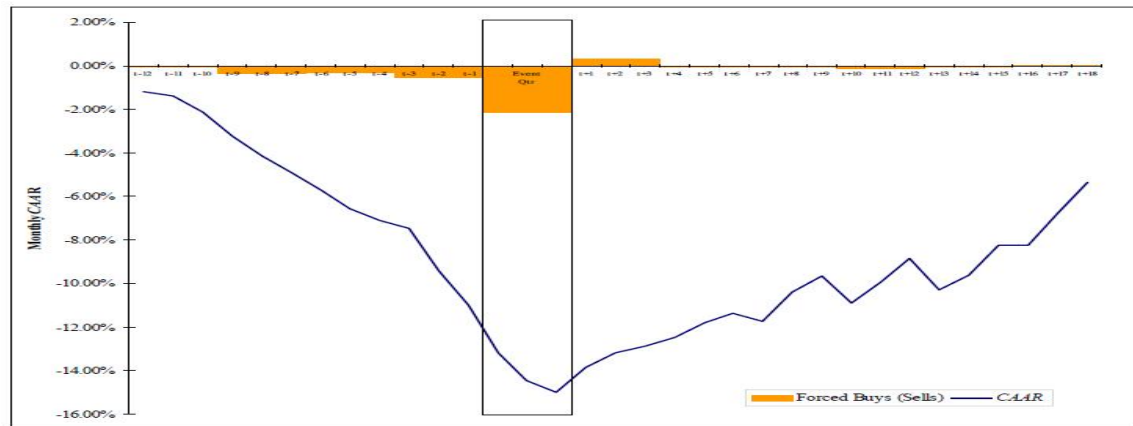
Factors Influencing Liquidity

- ▶ Costs of trading/market presence/moving capital
- ▶ Risk
- ▶ Risk appetite
- ▶ Information asymmetry
- ▶ Other frictions/constraints
- ▶ Institutional rigidities and incentive structures, ...

Costs of Market Presence

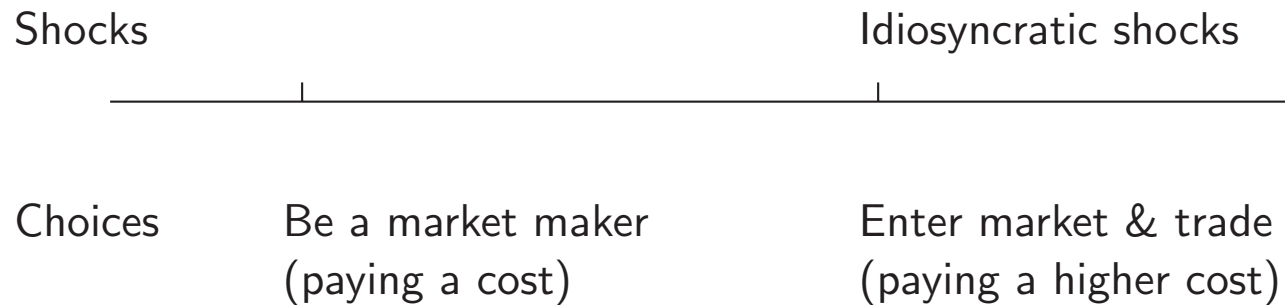
- ▶ Setting up and maintaining trading operations
- ▶ Information gathering and processing
- ▶ Implement trading strategies
- ▶ Raising capital
- ▶ Mitigating constraints
- ▶ . . .

Mutual Funds Fire Sales



[Source: Coval and Stafford (2006)]

Modelling Demand/Supply of Liquidity



- ▶ Idiosyncratic shocks generate trading
- ▶ Idiosyncratic shocks sum to zero—Trading needs always match
- ▶ Absent of costs, trades are synchronized—no need for liquidity
- ▶ Prices depend only on fundamentals not on trading needs

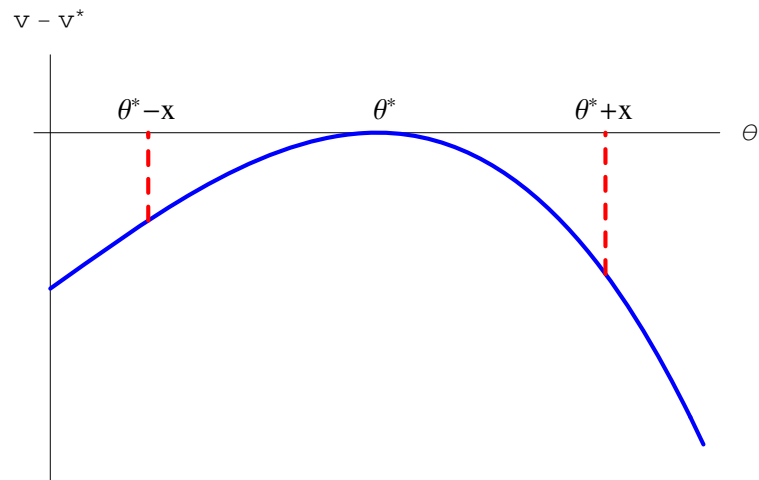
Demand of Liquidity

When market presence is costly:

- ▶ Trading is infrequent
- ▶ Gains from trading are asymmetric between buyers and sellers
- ▶ Off-setting trades are non-synchronized
- ▶ Endogenous order imbalance gives rise to demand for liquidity
 - Infrequent
 - Large when occurs
 - One-sided

Asymmetric Trading Gains

Let $v(\theta) \equiv E[u(\theta, \cdot)]$ and θ^* be the optimal holding, i.e., $v'(\theta^*) = 0$.



- ▶ For small deviations from optimum, trading gains are symmetric

$$v(\theta^*) - v(\theta^* + x) \simeq -\frac{1}{2}v''(\theta^*)(x)^2 = -\frac{1}{2}v''(\theta^*)(-x)^2 \simeq v(\theta^*) - v(\theta^* - x)$$

- ▶ With costs, traders trade only when they are far away from optimum
- ▶ Trading gains differ between traders with offsetting trading strategies
- ▶ Sellers enter market before buyers when aggregate risk is positive

Supply of Liquidity

- ▶ The demand of liquidity calls for its supply
- ▶ Interaction between liquidity demand and supply determines structures
 - Sustainable liquidity supply
 - Dealer versus trader markets
- ▶ Trading and market making generates positive externalities
- ▶ Market mechanism fails to yield efficient liquidity supply

Asset Prices

The equilibrium stock price is

$$P_t = \text{Fundamental value} - \text{Illiquidity discount} \\ + \text{Impact of order imbalance}$$

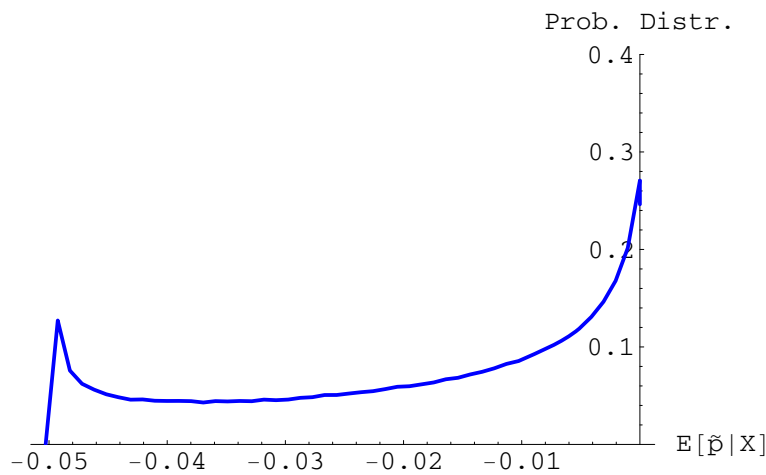
- ▶ Fundamental value depends on expected payoff, risk and risk aversion
- ▶ Illiquidity discount depends on trading costs (and needs).
- ▶ Impact of order imbalance depends on idiosyncratic shocks.

Illiquidity Discount on Asset Prices

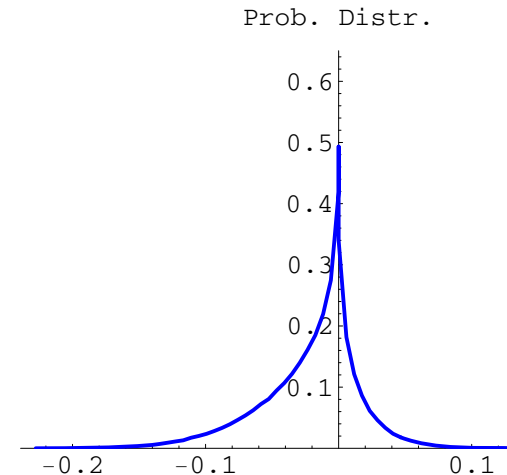
α	0.001	0.010	0.100	0.500	1.000	1.500	2.000
c/\bar{P} (%)	Cost as % of Average Trade Amount						
0.100	0.000	0.000	0.003	0.009	0.015	0.020	0.025
1.000	0.000	0.003	0.015	0.049	0.082	0.111	0.136
5.000	0.002	0.009	0.049	0.162	0.273	0.369	0.450
c/\bar{P} (%)	Annual Turnover (%)						
0.100	8374.52	4708.68	2647.65	1770.29	1488.44	1344.83	1251.89
1.000	4708.68	2647.65	1488.44	994.81	836.14	755.25	702.96
5.000	3149.32	1770.29	994.81	664.26	557.79	503.38	467.50
c/\bar{P} (%)	Illiquidity Discount (% of Price)						
0.100	0.054	0.172	0.546	1.233	1.756	2.161	2.500
1.000	0.172	0.546	1.756	4.042	5.847	7.287	8.333
5.000	0.575	1.233	4.042	9.678	14.443	18.462	22.222

Market Crashes

(a) Liquidity impact on price
— Conditional distribution



(b) Liquidity impact on price
— Unconditional distribution



The liquidity impact on prices has the following properties:

- ▶ Usually negative
- ▶ Large (of finite sizes), when occurs
- ▶ Leading to “fat-tailed” and negative skewed returns.

Welfare and Policy Implications

Policies to improve market efficiency in liquidity supply:

- ▶ Spot injection of liquidity by central banks
- ▶ Coordinated effort by market makers
- ▶ Designated market makers
- ▶ Capital requirements

Concluding Remarks

- ▶ Liquidity is an important aspect of financial markets
- ▶ Costs of trading determine demand and supply of liquidity
- ▶ Trading/market-making generates positive externalities
- ▶ Market mechanism can fail to provide sufficient liquidity
- ▶ Illiquidity leads to substantial price discounts and market crashes
- ▶ Prudent policies are needed