Liquidity and the Threat of Fraudulent Assets

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fraudulent behavior in asset markets

in this paper:

• Expending effort to sell, or borrow against, some “bad” asset

• Example:

  - counterfeiting money
  - cherry picking bad collateral to secure credit transactions for consumer loans
    for OTC credit derivatives
  - securitizing bad mortgages
what we do

• Setup a model with many assets differing in vulnerability to fraud

• Solve for terms of collateralized trade
  
  main finding: assets differ in collateralizability or liquidity
  i.e., how much of it can be used as collateral or means of payment

• Solve for asset prices: implications for liquidity premia
results: cross-sectional liquidity premia

- **Liquid assets**, with low vulnerability to fraud
  - sell above fundamental value
  - prices rise with shock to aggregate liquidity demand

- **Partially liquid assets**, with intermediate vulnerability to fraud:
  - sell above fundamental value, but for less than liquid assets
  - prices fall with shock to aggregate liquidity demand
  - however:
    - contribute as much to aggregate liquidity than liquid assets
    - policies targeting these assets can reduce welfare

- **Illiquid assets**, with high vulnerability to fraud
  - sell at fundamental value, irrespective of liquidity demand
  - the same policies targeting these assets increase welfare
related literature

- Macro models in which assets have limited re-salability

- Private information and money
  Williamson Wright (1994), Nosal Wallace (2007) among many others

- Asset pricing when moral hazard generates limited pledgeability
  Holmstrom Tirole (2011) among many others

- Asset pricing with adverse selection
  Rocheteau (2009), Guerrieri Shimer (2011) among many others
the economic environment
a model with monetary frictions

- Two periods, continuum of risk neutral agents, discount $\beta \in (0, 1)$: measure one of buyers, measure one of sellers

- $t = 0$: buyers and sellers trade assets in a competitive market

- $t = 1$: buyers and sellers trade goods in a decentralized market
  - a buyer is matched with a seller with probability $\sigma$
  - the buyer likes goods that the seller can produce but lack of commitment, limited enforcement
    - $\Rightarrow$ no unsecured credit
    - $\Rightarrow$ assets become useful as means of payment or collateral

- End of $t = 1$: assets pay off their terminal value
assets and the threat of fraud

Assets come in (arbitrary) finitely many types $s \in S$

- supply of $A(s)$ shares, with terminal value normalized to 1
- type-specific vulnerability to fraud
- at $t = 0$, for a fixed cost $k(s)$, can create type-$s$ fraudulent assets
  - zero terminal value zero
  - may be used in decentralized trades
  - undistinguishable from their genuine counterpart

high cost $k(s) \Rightarrow$ low vulnerability to fraud
some interpretations

- **Counterfeiting of money**
  
  \[ k(s) = \text{cost of printing equipment} \]

- **Fraudulent or bad collateral**
  
  houses used as collateral in consumer loans
  assets used as collateral for credit derivative contracts
  
  \[ k(s) = \text{cost of stealing identity} \]
  
  or informational cost to identify bad assets

- **Securitization fraud**
  
  bad mortgages bundled inside mortgage-based securities
  
  \[ k(s) = \text{fee and/or bribe to rating agencies} \]
  
  or cost of producing false documentation
bilateral trade under the threat of fraud
For now take asset prices $\phi(s) \geq \beta$ as given

- $t = 0$: buyer chooses a portfolio of assets
  - genuine assets of type $s$ at price $\phi(s)$
  - fraudulent assets of type $s$ at fixed cost $k(s)$

- $t = 1$: buyer matches with seller and makes an offer specifying that
  - the seller produces $q$ units of goods for the buyer
  - the buyer transfers a portfolio $\{d(s)\}$ of assets to the seller

- The seller accepts or rejects. If accepts:
  - the buyer enjoys $u(q)$
  - the seller suffers $c(q) = q$
equilibrium concept and refinement

- Perfect Bayesian equilibrium
- A standard difficulty: PBE puts little discipline on sellers’ beliefs
  ... lots of equilibria, some of them arguably unreasonable
- In and Wright’s (2011) refinement: the “reverse order game”
  the buyer first commits to an offer \((q, \{d(s)\})\)
  then the buyer chooses:
  - how much genuine and fraudulent assets to bring
  subject to offer \(\{d(s)\}\) feasible
- This pins down beliefs
- And this selects the best equilibrium for the buyer
equilibrium asset demands and offers

After an equilibrium offer:

- no fraud in equilibrium
- the seller accepts the offer with probability one

Moreover, equilibrium asset demand and offer maximize

\[- \sum_{s \in S} [\phi(s) - \beta] a(s) + \beta \sigma [u(q) - \sum_{s \in S} d(s)]\]

with respect to \(q, \{a(s)\}, \{d(s)\} \geq 0\), and subject to

- Seller’s IR: \(q \leq \sum_{s \in S} d(s)\)
- Buyer’s no-fraud IC: \([\phi(s) - \beta + \beta \sigma] d(s) \leq k(s)\), for all \(s \in S\)
- Feasibility: \(d(s) \leq a(s)\), for all \(s \in S\)
No fraud IC constraints

- Eliminates buyers’ incentives to bring fraudulent assets
  \[
  (\phi(s) - \beta + \beta \sigma) d(s) \leq k(s)
  \]
  net cost of offering \(d(s)\) genuine assets \quad cost of fraud

- Asset specific

- Create endogenous limits to assets resalability
  foundations for the constraints in Kiyotaki Moore (2001)
asset prices and liquidity
asset prices at $t = 0$

- $k(s)/A(s) = \text{cost of fraud per unit of asset}$
asset prices at $t = 0$

- illiquid
- partially liquid
- liquid

- $k(s)/A(s) =$ cost of fraud per unit of asset
asset prices at $t = 0$

\[ k(s) / A(s) = \text{cost of fraud per unit of asset} \]

\[ \xi = \beta \sigma (u'(q) - 1) \]
asset prices at $t = 0$

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- $\xi = \beta\sigma (u'(q) - 1)$
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liquidity at $t = 1$

output = $q = \text{aggregate liquidity}$, $L \equiv \sum_{s \in S} \theta(s)A(s)$

as long as $L < q^*$ s.t. $u'(q^*) = 1$, otherwise $q = q^*$

- Liquid assets: $\theta(s) = 1$
  
  IC constraint doesn't bind when buyers hold and spend $A(s)$

- Partially liquid assets: $\theta(s) = 1$
  
  IC constraint binds when buyers hold and spend $A(s)$

- Illiquid assets: $\theta(s) = \frac{k(s)}{\beta \sigma} < 1$
  
  IC constraint binds, buyers hold $A(s)$ but spend less
partially liquid assets

- Have the same \( \theta(s) \) as liquid assets!
- Yet, they have a lower price

\[ \text{partially liquid asset prices} < \text{social value of their liquidity services} \]

Why?
partially liquid assets

- Have the same $\theta(s)$ as liquid assets!
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\[ \text{partially liquid asset prices} < \text{social value of their liquidity services} \]

Why?
- Because: pecuniary externality running through the IC constraint
  - a high price reduces asset demand in two ways
    - through the budget constraint (no externality with that one)
    - through the IC constraint, b/c raise incentive to commit fraud
- Welfare calculations in reduced-form models are inaccurate
some applications
balanced budget open market operations

think of quantitative easing:
the NY Fed sells Treasuries from its portfolio to purchase MBS

- Using liquid assets to purchase partially liquid assets
  liquid assets have higher prices
  ⇒ one share of liquid asset ...
  ... buys more than one share of partially liquid assets
  marginally liquid and partially liquid assets contributes equally to $L$
  ⇒ $L, q, \text{ interest rates, and welfare go down}$

- Using liquid assets to purchase illiquid assets
  marginally illiquid assets do not contribute to $L$
  $L, q, \text{ interest rates, and welfare go up}$
regulatory measures

retention requirement:

• in the time $t = 1$ market, have to retain $\rho(s) \%$ of assets offered

• for this exercise: assume cost of fraud is $k_f(s) + k_v(s)d(s)$

the trade off:

• the bad: mechanical reduction in asset re-salability

• the good: increases the cost of committing fraud

... b/c, for any given offer, need to produce more fraudulent assets
regulatory measures (cont’d)

• Negative impact on liquid assets
  the no-fraud IC constraint is not binding

• Negative impact on partially liquid assets
  partial equilibrium: relax the no-fraud IC constraint
  general equilibrium: offer ↑, asset demand ↑, asset price ↑
  ⇒ tightens back IC constraint
  in the end... just a reduction in resalability

• Positive impact on illiquid assets
  general eq effect does not operate
  because offer < asset demand
flight to liquidity

congestion of demand towards liquid assets, widening of yield spreads

- Increase in $\sigma$ the frequency of trade in the $t = 1$ market
  interpretation: need for collateral $\uparrow$

- Two effects going in opposite directions
  - liquidity demand increases: dominates for liquid assets, price increase
  - fraud incentives increase: dominates for partially liquid assets price decrease so no-fraud IC constraint binds

- The set of liquid assets shrinks
  The set of partially liquid and illiquid assets expands
flight to liquidity

asset price

illiquid partially liquid liquid

$\beta + \xi$

$\beta$

0

$\beta\sigma$

$\beta\sigma + \xi$

$k(s) / A(s)$
time varying liquidity

- with quasi-linear preferences à-la Lagos Wright

- model easily extendable to a multiperiod-multiple assets economy
  terminal value becomes cum dividend price next period

- expectations of future liquidity premia matter
  they feed back into current liquidity premia

- our main result: excess volatility
  self-fulfilling fluctuations can arise
  but they are confined to liquid assets
• A fraud-based model of liquidity premium
• An explanation for price and liquidity differences
• Implications
  open-market operations
  regulatory measures
  flight to quality
  time varying liquidity