

Discussion of: Trade Dynamics in the Market for Federal Funds

Emiliano S. Pagnotta, NYU Stern

LSE, June 9th, 2011

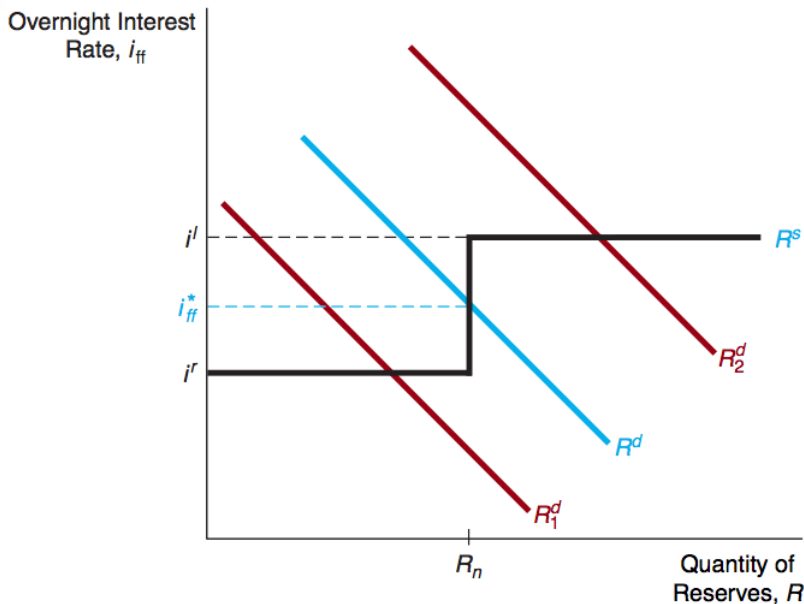
MOTIVATION

- The Federal Funds Market is central to three key areas in Economics
 - ▶ Finance
 - ▶ Banking
 - ▶ Monetary Policy
- Surprisingly little theoretical work
- Goal: to provide the first microfounded model of the intraday dynamics of this market

IMPORTANT ISSUES

- Positive:
 - ▶ How is the Fed Fund rate determined?
 - ▶ Deviations from target

FIGURE: Determination of the Fed Fund Rate



IMPORTANT ISSUES

- Positive:
 - ▶ How is the Fed Fund rate determined?
 - ▶ Deviations from target
 - ▶ Relationship between the federal fund rate and closely related short-term rates? (e.g. Repo rates, commercial paper, LIBOR, etc.)

IMPORTANT ISSUES

- Positive:
 - ▶ How is the Fed Fund rate determined?
 - ▶ Deviations from target
 - ▶ Relationship between the federal fund rate and closely related short-term rates? (e.g. Repo rates, commercial paper, LIBOR, etc.)
- Normative:
 - ▶ Efficiency?
 - ▶ How can monetary authority achieve a target most effectively?

THE MODEL

- Single day $t \in [0, T]$. Continuum of banks in $[0, 1]$
- A bank state is given by time (non-stationary set-up) and reserve balances k (integer)
- Banks derive utility from holding balances during the trading day u_k and at the closing U_k (very flexible: may reflect both regulations and liquidity management)
- Duffie-Garleanu-Pedersen-like trading of loans: banks meet randomly, following Poisson driven contact, and bilaterally negotiate a loan size and a repayment. States are observable.
- No pure-intermediaries

THE MODEL

- Single day $t \in [0, T]$. Continuum of banks in $[0, 1]$
- A bank state is given by time (non-stationary set-up) and reserve balances k (integer)
- Banks derive utility from holding balances during the trading day u_k and at the closing U_k (very flexible: may reflect both regulations and liquidity management)
- Duffie-Garleanu-Pedersen-like trading of loans: banks meet randomly, following Poisson driven contact, and bilaterally negotiate a loan size and a repayment. States are observable.
- No pure-intermediaries
- Analysis delivers:
 - ▶ equilibrium characterization of loan sizes and loan rates
 - ▶ Efficiency result
 - ▶ Rich positive implications that match previous evidence
 - ▶ Simulation of monetary policy intervention on the fed fund rate

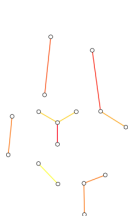
THE MODEL IN PERSPECTIVE I

- Random search model best seen as capturing trade between big financial institutions
 - ▶ “Complete Network” (small banks belong to periphery)
 - ▶ No credit risk (good times? “too big” or “too interconnected” to fail?)
 - ▶ No match-makers
 - ▶ No natural lenders or borrowers (like in Ho Saunders 1985)

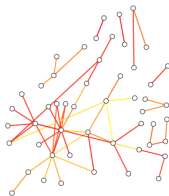
THE MODEL IN PERSPECTIVE I

- Random search model best seen as capturing trade between big financial institutions
 - ▶ “Complete Network” (small banks belong to periphery)
 - ▶ No credit risk (good times? “too big” or “too interconnected” to fail?)
 - ▶ No match-makers
 - ▶ No natural lenders or borrowers (like in Ho Saunders 1985)
- The topology of the market is quite different (Furfine 1999, Duffie Ashcraft 2007) and relationships affect outcomes (Afonso, Kovner and Schoar 2011).

FIGURE: The Market for Federal Funds



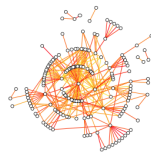
9:01 to 9:30 a.m.



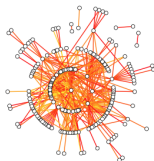
12:01 to 12:30 p.m.



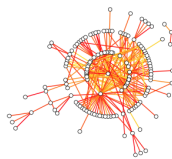
2:31 to 3:00 p.m.



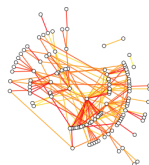
4:01 to 4:30 p.m.



4:31 to 5:00 p.m.



5:01 to 5:30 p.m.



5:31 to 6:00 p.m.



6:01 to 6:30 p.m.

Source: Bech Atalay (2008)

THE MODEL IN PERSPECTIVE I

- Random search model best seen as capturing trade between big financial institutions
 - ▶ “Complete Network” (small banks belong to periphery)
 - ▶ No credit risk (good times? “too big” or “too interconnected” to fail?)
 - ▶ No match-makers
 - ▶ No natural lenders or borrowers (like in Ho Saunders 1985)

THE MODEL IN PERSPECTIVE I

- Random search model best seen as capturing trade between big financial institutions
 - ▶ “Complete Network” (small banks belong to periphery)
 - ▶ No credit risk (good times? “too big” or “too interconnected” to fail?)
 - ▶ No match-makers
 - ▶ No natural lenders or borrowers (like in Ho Saunders 1985)
- The topology of the market is quite different (Furfine 1999, Duffie Ashcraft 2007) and relationships affect outcomes (Afonso, Kovner and Schoar 2011).
 - ▶ Modeling explicit network becomes intractable very easily
 - ▶ Volume concentration is quite high

THE MODEL IN PERSPECTIVE II

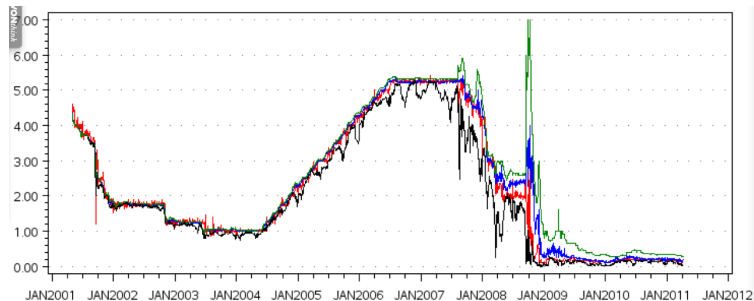
	Endogenous P	Endogenous P and Q
Decentralized Trades	Duffie Garleanu and Pedersen 2005	Afonso and Lagos 2011
Intermediated Trades	Weill 2007	Lagos and Rocheteau 2009

THE MODEL IN PERSPECTIVE II (CONT.)

- Search Frictions and Liquidity: Vayanos and Tang (2008), Weill (2008), Vayanos and Weill (2008), Afonso (2008), Lagos Rocheteau Weill (2009) among others
- Risky securities: Duffie Garleanu and Pedersen (2007), Garleanu (2009)
- Beyond search and liquidity
 - ▶ International capital movements: Duffie and Strulovici (2011)
 - ▶ Cognition limits: Biais Weill (2010)
 - ▶ Competition through innovation: Pagnotta and Philippon (2011)

THE EVOLUTION OF THE FFM

FIGURE: Short Term Rates 2001-2011



FF O

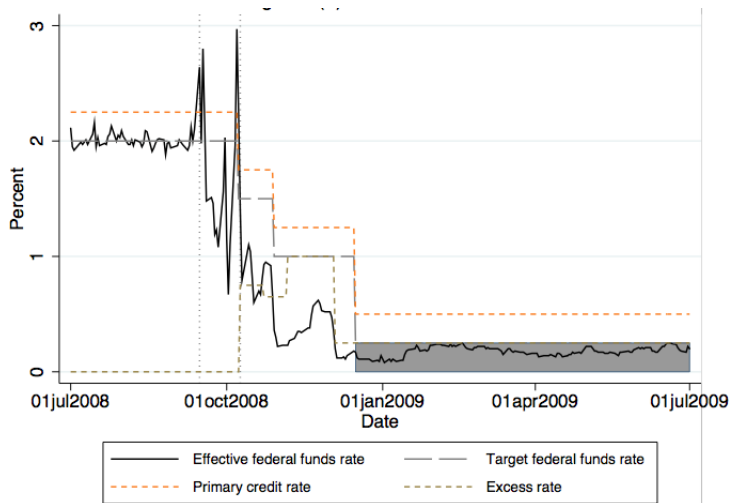
FCP M1

ED M1

TCMNOM M1

THE EVOLUTION OF THE FFM

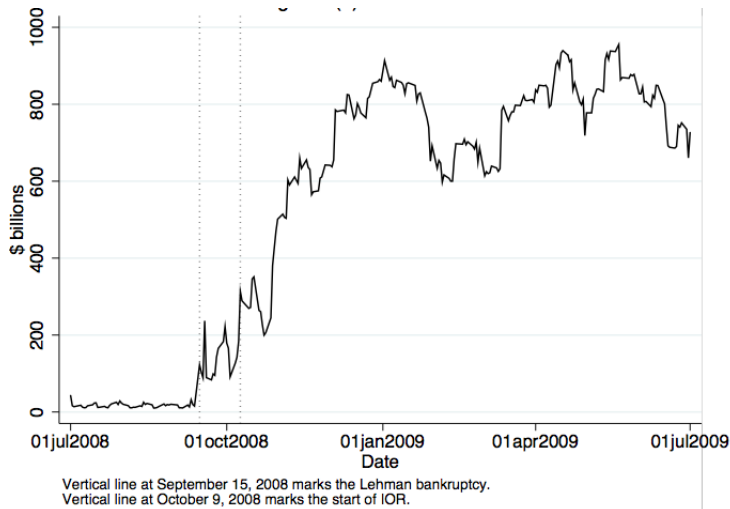
FIGURE: Fed Funds Rate and Fed's Target Rate



Source: Bech Klee (2009)

THE EVOLUTION OF THE FFM

FIGURE: Total Balances



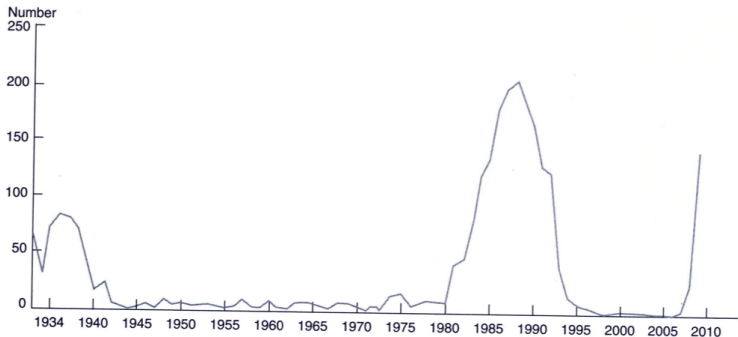
Source: Bech Klee (2009)

EMPIRICAL CONTENT

- Credit terms in the FF market tightened for large banks during the financial crisis (e.g. Afonso, Kovner, Schoar (2011)). Similar in other countries.
 - ▶ Possibly credit risk revised up by participants. Black swan?

FIGURE: Bank Failures 1934-2009

Source: FDIC annual reports and statistics on banking. www.fdic.gov



EMPIRICAL CONTENT

- Credit terms tightened for large US banks during the financial crisis (e.g. Afonso, Kovner, Schoar (2011)). Similar in other markets.
 - ▶ Possibly credit risk revised up by participants
 - ▶ Precautionary liquidity hoarding (Acharya Skeie 2011)
- Credit risk and precautionary liquidity will be relevant precisely at times where conducting monetary policy becomes more challenging

EMPIRICAL CONTENT

- A bit more challenging to map distribution of intraday quantities (e.g. size of loans, number of counterparties) onto longer term performance measures
- Investors do not observe most of these variables, but the fed fund rate at daily frequencies
- Future research? Credit risk difficult to add, but liquidity hoarding may arise endogenously in anticipation of liquidity shocks
 - ▶ if shocks are not observed immediately by banks' trading desks, interesting dynamics can arise (Biais Weill 2011)

POLICY ANALYSIS

- \$1 trillion of excess reserves would call for massive open market operations to influence the fed fund rate \Rightarrow interest on reserves (“corridor” system)
 - ▶ Similar issue when reserves approach zero
 - ▶ Institutional features may prevent interest on reserves to act as a floor of the fed fund rate
- Good timing! This model provides a natural quantitative benchmark to evaluate the ability of interest on reserves (i^r or i^e) to manage the fed fund rate in such environment

POLICY ANALYSIS

- \$1 trillion of excess reserves would call for massive open market operations to influence the fed fund rate \Rightarrow interest on reserves (“corridor” system)
 - ▶ Similar issue when reserves approach zero
 - ▶ Institutional features may prevent interest on reserves to act as a floor of the fed fund rate
- Good timing! This model provides a natural quantitative benchmark to evaluate the ability of interest on reserves (i^r or i^e) to manage the fed fund rate in such environment
- The Fed does not change this rate daily (virtually unchanged since late 2008), thus its determination is more forward looking
- Daily open market operations during the day? Early lending decisions must account for policy risk (distribution shocks). How does the fixed point look like? implications for optimal implementation? Temporary vs permanent OMO?

- Are funds flowing to those banks which value them the most? Need a model for this...
- Recent financial crisis made clear that unhealthy banks can have serious real consequences
- Afonso Lagos provides the first rigorous efficiency analysis
 - ▶ As usual in search models, externalities often prevent from achieving the planner outcome
 - ▶ Depending on bargaining power, equilibrium payoffs may be too high or too low relative to their shadow price in the planning problem
 - ▶ When agents choose search intensities may induce too much effort or too little
- Are frictions important?

FIGURE: Welfare and contact rate in a DGP framework

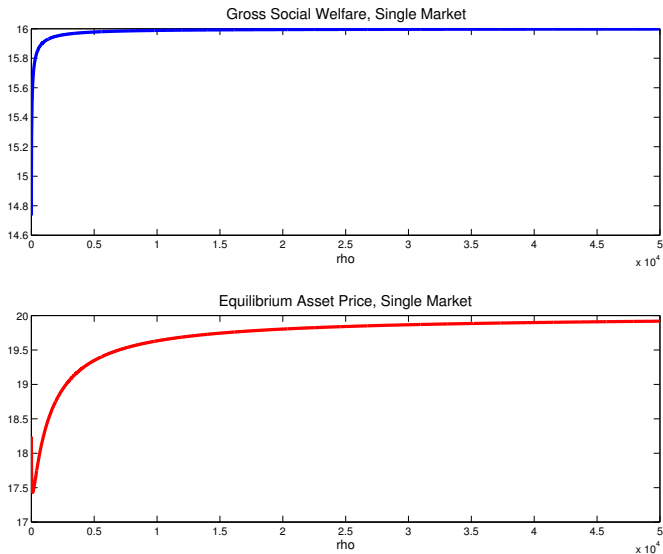
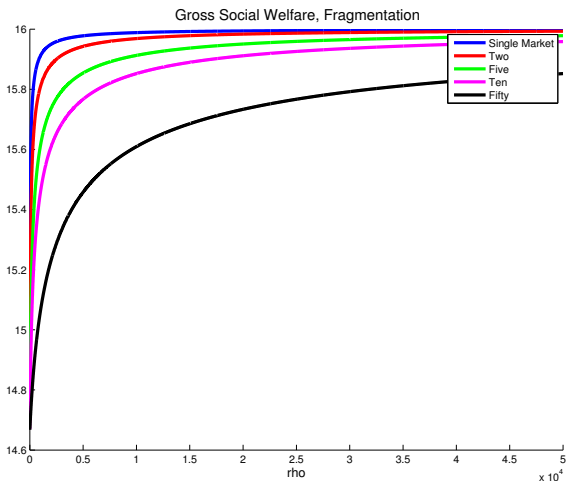


FIGURE: Welfare and frictions in fragmented environment



Source: Pagnotta and Philippon (2011)

- Banks liquidity management problem is complex (multiple markets, multiple instruments)
- Beyond the model: topology plays an important role in efficiency
- Gofman (2010) shows that bargaining frictions generate inefficient outcomes in incomplete OTC networks

CONCLUSIONS

- First real-time model of the individual interaction of financial institutions in the market for federal funds
- Very difficult problem. The reach of the theoretical contribution goes beyond the considered market
- Lots of food for thought for policy makers and monetary authorities!