Financial Stability, Interest-Rate Smoothing and Equilibrium Determinacy

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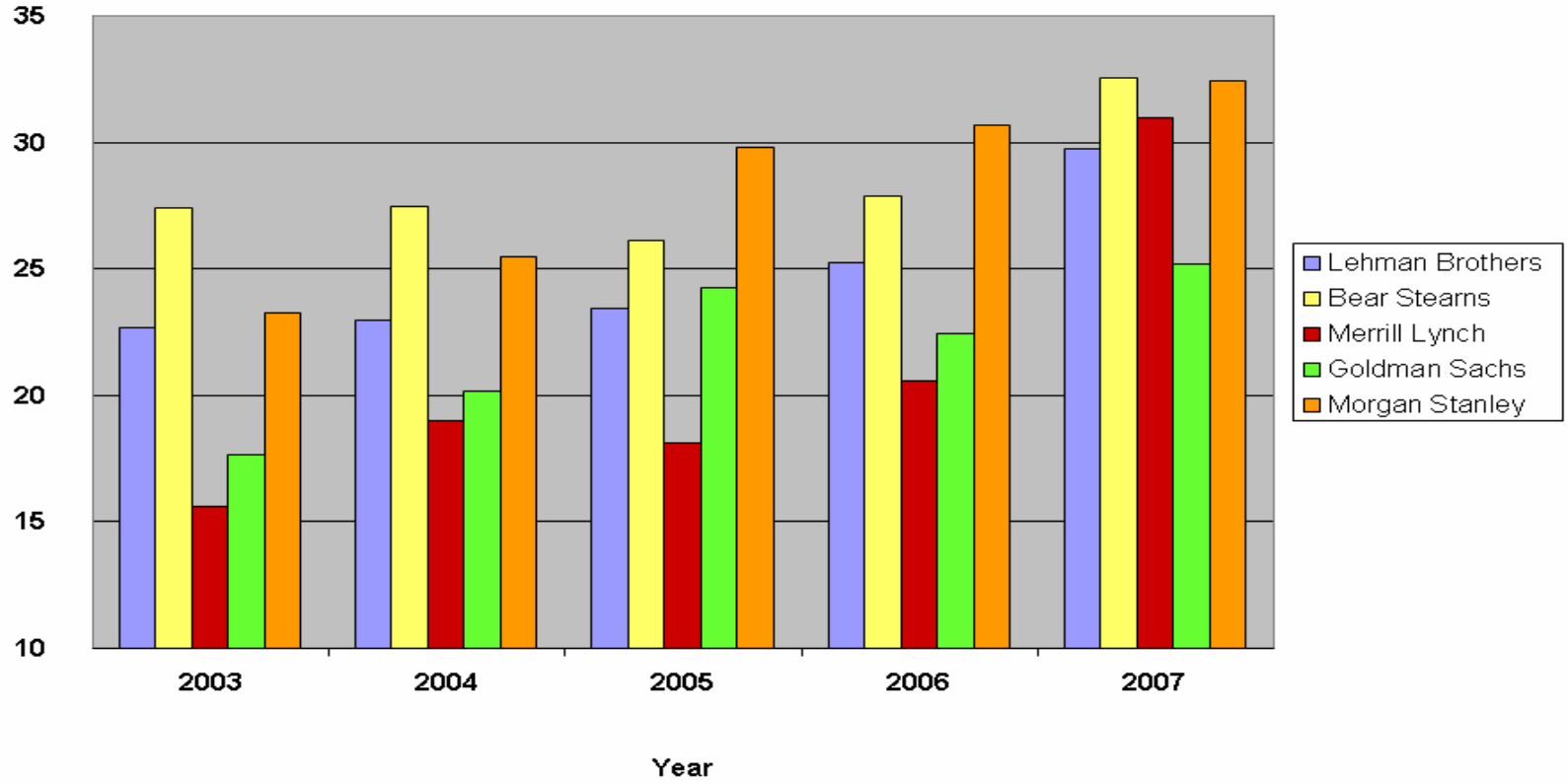
Unrealistic assumptions about mortgage-backed securities implied that risk was substantially underpriced: why did it happen?

Leverage Ratios For Major Investment Banks

The leverage ratio is a measure of the risk taken by a firm; a higher ratio indicates more risk.
It is calculated as total debt divided by stockholders equity. Each firm's ratio increased between 2003-2007.



Source Data: Company Annual Reports (SEC Form 10K)

Understanding the causes of the crisis

- roots of the crisis in the regulatory system: insufficient and ineffective regulation, lack of transparency in the securitization of subprime mortgages
- overreliance on standardized quantitative risk models: focus on variables easy to measure and hard to manipulate (e.g. leverage ratios)
- blaming the Fed's policy of prolonged low interest rates: it has been observed that the subprime crisis has its origin in Greenspan's policy of keeping persistently low short-term interest rates in response to the post-9/11 recession and the collapse of the new economy bubble.

Motivation of our paper

- in the literature on monetary policy, there exists a general view that central banks smooth interest rate changes to enhance the stability of financial markets.

- however, if the Fed were to limit changes in interest rates to protect banks' balance sheets, banks may feel they have some implicit insurance against their failure, and may feel able to operate on thinner margins and with riskier portfolios of assets and liabilities (moral hazard problems).

- this might induce financial institutions to maintain riskier portfolios and thereby inhibit active monetary policy.

Related issues that we examine

- how do financial stability considerations interact with the conduct of monetary policy?
- can a trade off between monetary and financial stability emerge and how to deal with it?
- what are the implications for interest rate smoothing when the central bank takes into account risk management practices by banks?

Main Results

1. we provide a theoretical framework for examining the role of monetary policy in the current crisis
2. when financial stability is a concern for central banks it may affect their setting of interest rates
3. we show that interest rate smoothing can emerge as a consequence of a concern for financial stability when central banks take into account risk management practices by banks
4. we argue that there exists a trade off between monetary and financial stability: the explicit targeting of financial stability interacts with that of macroeconomic stability and may result in equilibrium indeterminacy and instability

Outline of the paper (forthcom. Journal of Financial Stability)

- basic macroeconomic model
- risk management and central bank's concern for financial stability
  - novel element of the analysis: hedging strategies and "basis" risk
- monetary vs financial stability
- conclusions

Macroeconomic Model

- New Keynesian Phillips Curve:

$$\pi_t = ky_t + \beta E_t \pi_{t+1},$$

with $0<\beta<1$ and $k>0$;

- An IS curve: $y_t = E_t y_{t+1} - \sigma(r_t - r_t^n - E_t \pi_{t+1}),$
- with $\sigma>0$.
- An IS shock: $r_t^n = \omega r_{t-1}^n + \varepsilon_t,$
- where $0<\omega<1$ and ε is an *iid* disturbance with constant variance and zero mean.

Alternative monetary policy rules: Taylor-type rules

$$r_t = \phi_\pi \pi_t + \phi_y y_t$$

$$r_t = \phi_\pi \pi_t + \phi_y y_t + \rho r_{t-1}$$

$$r_t = \phi_\pi E_t \pi_{t+1} + \phi_y y_t$$

$$r_t = \phi_\pi E_t \pi_{t+1} + \phi_y y_t + \rho r_{t-1}$$

Risk management and basis risk

- we derive interest rate smoothing in equilibrium from a interest rate rule which incorporates a concern for stabilizing **basis risk** as a contribution to financial stability.
- this explicitly takes into account the fact that banks can hedge against interest rate risk. However, hedging strategies cannot eliminate some residual risk (i.e. basis risk).
- we focus on the basis risk that might arise in funds management by banks (in order to ensure adequate liquidity and effectively manage the spread between interest earned and interest paid).
- in particular, we consider hedging strategies based on futures contracts and focus on the bank's choice between lending to another bank for a one-period horizon by means of a Eurodollar deposit or rolling over overnight loans in the interbank market.

What kind of basis risk?

- **first type of basis risk**: when banks take a long position in the interbank market they might decide to hedge their investment. If we consider a hedge put in place at time t-1, the residual hedging risk is the uncertainty associated with the spread between the price of the underlying asset and the future price at time t.

- **second type of basis risk**: the second type of basis risk in a hedging situation is related to the differences that might arise between the Libor rate and the average overnight rate expected to prevail over one-period ahead.

The concern for basis risk

- Concern for basis risk as an important source of interest rate risk exposure for commercial banks
- Arguments for “basis risk” as something with which financial institutions “should be” concerned:
  - Principles for the Management of Interest Rate Risk, 1997, Basle;
  - Branch and Agency Examination Manual, 1997;
  - Wright and Houpt, 1996, Federal Reserve Bulletin
- Literature that discusses “basis risk” as something with which monetary authorities “should be” concerned is less easy to find:
  - speech by Alan Greenspan (2005): “Risk Transfer and Financial Stability”;
  - speech by Willliam Poole (2004): “Panel on Government Sponsored Enterprises”.
  - model by Driffill, Rotondi, Savona and Zazzara (Journal of Financial Stability, 2006)

Closing the model with monetary policy: the modified policy rule (with type 1 basis risk)

$$r_t = \frac{\phi_{BR}}{1+\phi_{BR}} r_{t-1} + \frac{\phi_{\pi}}{1+\phi_{BR}} \pi_t + \frac{\phi_y}{1+\phi_{BR}} y_t;$$

Notice that basis risk smoothing affects the response to inflation and output

Proposition 1 –*The introduction of monetary inertia, induced by a concern for stabilizing basis risk, does not alleviate problems of indeterminacy of rational expectations equilibrium with backward policy rules.*

Forward policy rules

Let's examine the case of future expected inflation as an argument of the policy rule:

$$r_t = \frac{\phi_{BR}}{1+\phi_{BR}} r_{t-1} + \frac{\phi_{\pi}}{1+\phi_{BR}} E\pi_{t+1} + \frac{\phi_y}{1+\phi_{BR}} y_t;$$

Proposition 2 –*The introduction of monetary inertia induced by a concern for stabilizing basis risk does not alleviate indeterminacy problems, but for the special case of an excessively aggressive response to inflation.*

Stabilizing a different defintion of basis risk (type 2)

We get a modified policy rule with forward smoothing:

$$r_t = \frac{\phi_{BR}}{1+\phi_{BR}} Er_{t+1} + \frac{\phi_{\pi}}{1+\phi_{BR}} \pi_t + \frac{\phi_y}{1+\phi_{BR}} y_t;$$

Proposition 3 –*The introduction of a large degree of basis risk smoothing leads to indeterminacy of rational expectations equilibrium.*

Conclusions

- interest-rate smoothing policies can emerge if the central bank also cares for basis risk stabilization
- indeterminacy of rational expectations equilibrium in general is not alleviated by interest-rate smoothing, forward smoothing can even yield additional indeterminacy issues
- excessive concern for financial stability (large degree of basis risk smoothing) may imply macroeconomic instability. Hence we require more tools for different targets (role of financial rules and supervision).
- empirical evidence: policy rules with backward and forward smoothing seem to fit well the data for US & UK (Di Giorgio and Rotondi, mimeo 2009)