

Do Central Bank Liquidity Operations Affect Interbank Lending Rates?

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Spring 2009

1 Motivation

Background

- During summer 2007 Market experienced significant disruption:
 - ▶ Subprime meltdown in mid June (Bear Stearns hedge fund defaults)
 - ▶ Credit meltdown in July 16-30
 - ▶ Quant credit crunch August 3-10 (25 std deviation event!)
 - ▶ BNP suspends redemption in some of its funds on Aug 9
 - ▶ Interbank and ABCP markets shows signs of tremendous stress
 - ▶ ECB and Fed inject 150bln euros and 24 bln dollars on Aug 9-10
- Events continued to deteriorate in the Fall (Northern Rock)
- The FED cut rates several times
- On December 12, the FED launched the Term Auction Facility (TAF) to "Allow the efficient dissemination of liquidity by allowing the FED to inject term funds thorough a broader range of counterparties and against a broader range of collateral"
- The issue is to evaluate the effectiveness of the TAF at improving lending conditions in interbank markets.
- Specifically, it would be useful to sort out effects of liquidity risk versus credit risk. (TAF is expected to mainly affect liquidity risk and

Existing papers

- Two earlier papers use event-study methodology (compare level of changes of LIBOR around TAF announcement/operation days controlling for credit risk as measured by bank CDS) to investigate impact of TAF on LIBOR rates and find conflicting results.
 - ▶ Taylor and Williams (TAF has no effect)
 - ▶ Andrews, Sarkar and Wang (TAF increases liquidity/reduces LIBOR rates)
- This paper revisits the question using different methodology:
 - ▶ estimates a 6-factor non-linear affine arbitrage-free asset pricing model.
 - ▶ Allows for regime-shift pre and post TAF.
 - ▶ Looks at a 'counterfactual' path of LIBOR rates.

⇒ Finds substantial impact of TAF in decreasing LIBOR rates.

Methodology

- Data on 16 time series from January 1995 to July 25, 2008:
 - ▶ 8 Treasury bond zero-coupon yields from 3mths to 10 year maturity
 - ▶ 3, 6, and 12 mths LIBOR rates
 - ▶ BBB, A, AA rated US bank and A and AA financial corporation zero-coupon yield
- 6-factor Gaussian affine model of three term structures:
 - ▶ 3-factor term structure model for Treasury curve with parameter restrictions on risk-neutral dynamics to generate Nelson-Siegel yield curve shapes.
 - ▶ 5-factor Gaussian model for the credit risk yield curves (3 treasury + 2 independent credit spread factors).
 - ▶ LIBOR rates are equal to the short end of the AA-curve + 1 independent factor capturing *LIBOR liquidity*
- Very general *essentially affine* risk-premium structure (time-varying).
- Estimation using the Kalman Filter, allowing for regime change in parameters of the LIBOR liquidity factor after Dec 14 2007
- Plot Counterfactual path of LIBOR Rates by comparing the estimated one to one obtained fixing the LIBOR factor at its long-run mean.

Results

- Significantly different path of LIBOR after TAF

Is an affine framework the right setup?

- needs lots of data before and after. could be lots of other reasons we pick up a regime shift.
- Causality: TAF was introduced for a reason. That could be the regime shift.
- Difficulty in running a counterfactual: Lucas Critique. Is the affine model a structural model?

Deeper issues

- What was the TAF set out to achieve:
 - ▶ Lower LIBOR rates (this study) or(and?)
 - ▶ Increase lending
 - ▶ Reduce Treasury specialness
 - ▶ Prevent Money-market collapse,
 - ▶ Prevent major bankruptcies
 - ▶ Solve the Quantitative hedge fund managers?
- My guess is all of the above. So measuring LIBOR is not sufficient.
- Also, if very successful at increasing lending than reduction in LIBOR would be mitigated.
- Need to look at other things (amount of lending, repo-specialness, . . .).

The ASFN

- Structural model needed to answer the Lucas critique.

- Should estimate the regime switching time.
- It might have been anticipated.
- Given much data before time, little after, and lots happening after, my guess is put regime switch anywhere before the summer 2007 and it will be statistically significant. So difficult to identify the break with this approach. Yet, identifying the break point seems important to be able to say something about causality.
- To do counterfactuals want to avoid Lucas critique. Need structural model: separate deep parameters that do not change from those that do. Affine TS model are not structural models. Even the state variables have no economic meaning. Their definition will change before an after the break, when do new estimation. Hard to understand the exercise.
- Don't understand the magnitudes of the LIBOR factor (difference between AA and LIBOR) 5.5%??!!!
- Should allow regime switching also in Treasuries (they also obviously jumped on August 9).
- Issue of liquidity versus Credit. Difficult to sort out with this model