Effects of Changing Monetary and Regulatory Policy on Money Markets

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The reasons of the paper

☐ **The reaction of the Fed to the recent financial crisis altered the MP implementation framework in the US:**

   i) FFR and other overnight rates at the ELB for several years;

   ii) UMPs (LSAP programme) $\rightarrow$ reserves in the banking system from \$10 billion in 2007 to \$2.5 trillion in 2016.

- The Fed started to pay interests on bank reserves (IOR) in October 2008 to achieve rate control (first lower bound of the MP corridor in the presence of superabundant reserves).

The reasons of the paper

☐ Nevertheless, Government-Sponsored Enterprises (GSE) do not earn the
IOR → incentives to lend at a rate below the IOR (market frictions limit
arbitrage).

- In order to put an effective (second) lower bound, the Fed
  (successfully) introduced the Overnight Reverse Repurchase
  (ON RRP) facility in September 2013.

- ON RRP are offered to a larger set of financial institutions
  (including those without access to IOR, like money funds).

The reasons of the paper

☐ **Changing regulatory environment created new incentives for participants:**

- change in the assessment base for the Federal Deposit Insurance Corporation (FDIC) deposit insurance;
- the Basel III leverage ratio requirement.

☐ The first one made wholesale funding more costly for U.S. charted banks relative to (that of U.S. branches and agencies of) foreign banks.

☐ The second one induced foreign banks to deleverage through money market activity (given regional differences).

Data and sample periods

☐ **Data set consists of four overnight money market interest rates:**

▶ EFFR,

▶ Eurodollar (EDR) rate (LIBOR for the pre-crisis period),

▶ volume-weighted average rate for Treasury GC Repos (RPR),

▶ overnight AA nonfinancial commercial paper rate (CPR).

☐ **The empirical analysis is run over two sample periods (daily observations):**

1st pre-crisis period : January 02, 2001 to July 31, 2007;

2nd ELB period : December 17, 2008 to August 28, 2015;

[the period from mid-2007 to late 2008 is excluded.]

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What the paper does and empirically finds

□ **The proposed paper shows that:**

   a) the FFR continued to provide an anchor for unsecured rates

   b) while its transmission to the repo market has been reduced
      after the crisis.

□ The newly introduced ON RRP facility led to stronger co-movement and
   lower volatility (clustering) of rates.

□ The new regulation affected market rates around financial reporting days
   because of increased balance sheet costs.

About Unit Root Tests

☐ **Using ADF and (ERS) Point Optimal tests, the authors find that:**

▶ interest rates have a <u>unit root in the pre-crisis period</u>,

▶ while they become <u>stationary during the ELB period</u>.

☐ Classical unit root tests (ADF and PP) have very low power against highly persistent but stationary alternatives.

• The so-called efficient unit root tests (like Point Optimal) perform better.

• Other efficient unit-root tests that might be considered are DF with GLS detrending (proposed by ERS(1996)), and Ng and Perron (2001).

▶ Same conclusion ?

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About Unit Root Tests

Pre-crisis period : rates between 1% and 6%.

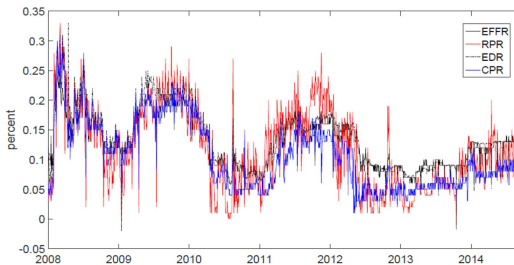Figure 4: Overnight Money Market Interest Rates: 2001-2007
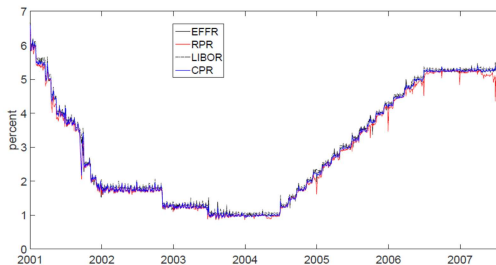
Note: Data are daily. EFFR and RPR are from FRBNY. Libor is from Bloomberg. CPR is from the commercial paper data release of the Federal Reserve Board.

About Unit Root Tests

ELB period : rates between 0% and 0.3%.

Figure 5: Overnight Money Market Interest Rates: 2008-2015

Note: Data are daily. EFFR and RPR are from FRBNY. EDR is from FRBNY after March 2010, and from Wrightson ICAP prior to this date. CPR is from the commercial paper data release of the Federal Reserve Board.

About Unit Root Tests

☐ The non-stationarity has disappeared in the ELB period.

• Is the time span too short for persistent processes like interest rates?

• Are we simply observing non-linear (persistent) stationary processes across different regimes/cycles ?

☐ For the same reason that you include the 2001 recession in the pre-crisis period, why not adding the mid-2007 to late 2008 sample to the ELB period?

• I would like also to suggest to add the last 2 years of rising interest rates.

• Do we find unit roots now?

About the adopted model in the pre-crisis period

☐ Denoting $y_t = (EFFR_t, RPR_t, LIBOR_t, CPR_t)'$, the adopted model during
the pre-crisis period is:

$$\Delta y_t = A\, d_t + \beta\, \Delta\, TFFR_t + \sum_{j=1}^{p-1} \Phi_j\, \Delta y_{t-j} + \Theta\, z_t + \varepsilon_t$$

- d_t = indicator variables for calendar effects,

- $TFFR_t$ = target FFR,

- z_t = cointegrating relationships,

- ε_t = conditionally heteroscedastic martingale difference sequence :
  multivariate-GARCH model.

About the adopted model in the pre-crisis period

☐ The authors <u>assume</u> that there are $r = 3$ cointegrating relationship among the $n = 4$ variables in the system:

• $z_{it} = y_{1t} - (c_i + \gamma_i \, y_{i+1,t})$, $i = 1, 2, 3$;

• Which are the estimated values of c_i and γ_i ?

• Do they are statistically significant ?

• Interpretation of the cointegrating relationships?

☐ Details about the estimation procedure would be useful (Appendix ?).

☐ How the model fit the data ? Is the model able to catch the spikes?

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About the adopted model in the pre-crisis period

☐ How to properly (statistically) justify the assumption of $r = 3$ cointegrating relationship ?

• The literature has recently provided several works trying to <u>detect</u> and <u>properly estimate</u> cointegrating relationships in the presence of heteroscedasticity.

◇ *Cavaliere, Rahbek and Taylor (2010, ET)*:

• they analyze the properties of the conventional Gaussian-based cointegrating rank tests of Johansen (1996) when y_t

• is driven by stationary conditionally heteroscedastic (but unconditionally homoscedastic martingale difference) innovations.

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About the adopted model in the pre-crisis period

◇ *Cavaliere, Rahbek and Taylor (2010, ET)* finds that :

  ▸ the standard tests (based on asymptotic critical values) are
    asymptotically valid $\rightarrow$ good news!

  ▸ even if the corresponding wild bootstrap tests can deliver
    considerable finite sample improvements.

☐ Suggestion : run the cointegrating rank tests of Johansen (1996).

• Do we find $r = 3$ cointegrating relationships?

About the adopted model in the pre-crisis period

◇ *Boswijk, Cavaliere, Rahbek and Taylor (2016, JoE)*:

- consider the problem of inference (estimation and hypothesis testing) on the coefficients of the co-integrating relations (β)

- and the adjustment coefficients (α) in vector autoregressions

- driven by conditional (and unconditional) heteroscedasticity.

☐ They find that:

- conventional results in Johansen (1996) for the MLEs and associated LR tests derived under homoskedasticity do not in general hold in the presence of heteroskedasticity.

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About Repo Rates

☐ The Repo Market is observed through a (volume-weighted) average rate for Treasury GC Repos (RPR).

• Your empirical analysis finds that the EFFR is not an important predictor of the RPR movements during ELB period.

• RPR volatility reduces after the ON RRP started (next slide).

☐ Which kind of conclusions do we reach is we consider a Special Collateral Repo Rate (possibly over different maturity buckets) ?

☐ What about the behavior of specialness (measure of scarcity) during/across relevant periods?

About Repo Rates

Figure 11: Repo Rate Volatility and ON RRP
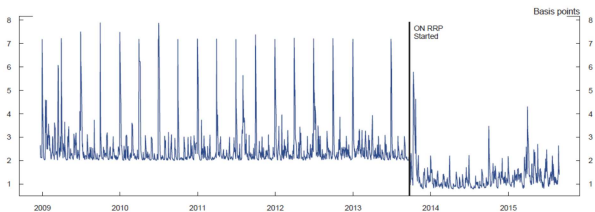
To conclude

- ☐ **Very interesting paper.**

- • Raising really relevant monetary/regulatory issues.

- • The analysis of money market in the new monetary and

  regulatory policy framework is extremely important (read it!).

- ☐ I suggest a more robust econometrics analysis.

- ☐ Further details about the Repo Market?

- ▶ **Thanks for your attention !**