

Lecture notes on risk management, public policy, and the financial system

Monetary policy after the global financial crisis

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The attempt at normalization of monetary policy after the crisis

The coronavirus crisis

The attempt at normalization of monetary policy after the crisis

- Exit strategy

- Behavior of money markets since the crisis

- Mechanics of exit

- Risks of exit

The coronavirus crisis

Exit from extraordinary accommodation

- Exit: remove accommodation and normalize rates
 - Raise target and short-term market rates away from zero
 - Reduce size of Fed balance sheet
- As recovery sets in, what is best *sequencing* of exit steps?
 - Back to open market operations? Requires vast reduction in reserves via bond sales to recreate reserve tightness
 - Would raise long-term rates and reverse salutary effects of LSAPs
- → Do it the hard way: *rates first, then balance sheet*
 - Initiate rate hikes while maintaining large balance sheet
 - Recalls dilemmas of late 2008, but in reverse: support asset markets while controlling volume of reserves
- Exit underway since 2014
 - Balance sheet: “tapering,” slowing of pace of purchases, from Jan. 2014
 - Fed funds target rate increases beginning Dec. 2015
 - Reduction of reinvestment of principal payments from Oct. 2017

Exit strategy: key challenges

- Money market conditions: awash in liquidity
 - Pre-crisis approach to overnight rate control not possible
- Communication challenges: gap between market, policymaker views
- Asymmetrical risks of error near zero bound
 - Lift-off too slow: subsequent tightening more aggressive (but Fed knows how to combat inflation)
 - Lift-off too fast: high cost to real economy, need to ease again, attendant political and communication nightmare
- Market volatility: potential decline in stock market, “risk-off”
- International impact of rising rates and strong USD
- Mark-to-market or realized losses on Fed balance sheet as rates rise
- Political challenges of raising IOER

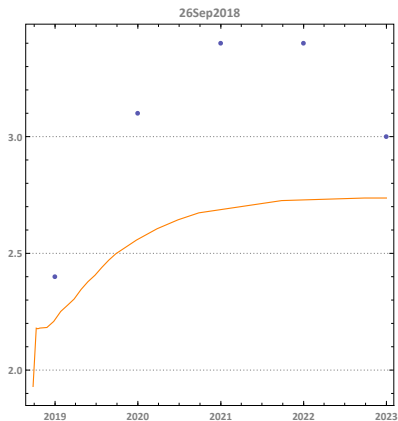
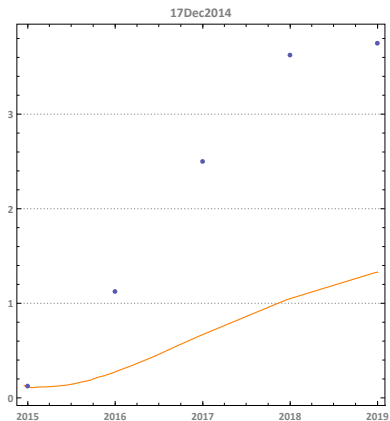
Central bank liabilities during exit

- Large volume of liabilities corresponding to asset purchases
 - Reduce volume via asset sales or run-off
 - Sterilize, i.e. exchange for non-monetary liabilities
 - Keep money multiplier low via IOR
- Banks have large amounts of excess reserves, corresponding to large Fed balance sheet
 - Banks have ample liquidity, no need to borrow in funds market
 - → Diminished activity in fed funds market
 - → Harder to control funds rate through normal operations
- Some central banks issue bonds, e.g. to offset foreign-exchange reserve accumulation
 - But not contemplated by Fed

Communication challenges: forward guidance and the “dots”

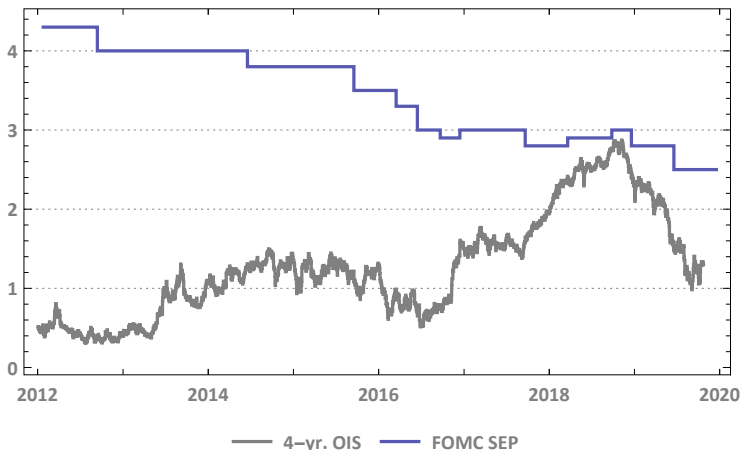
- Forward guidance a key tool in central bank accommodation since 2011
 - Pre-crisis approach to overnight rate control not possible
- Communication challenges: gap between market, policymaker views
 - Gap may represent greater pessimism in market than on FOMC
- SEP since 2012 includes projections of fed funds rate over next 4-5 years
- “Dots plot” shows gap between market and FOMC projections of funds rate at different horizons
- Gap has narrowed considerably: 4- and 5-year OIS swap rates now 2.7 percent, close to median longer-run funds rate projection

“Dots plot”



Purple markers: median of FOMC participants' projections of future Fed funds rate from 26Sep2018 Summary of Economic Projections (SEP). Medians computed by Bloomberg XLTP function, SEP data available at <http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm> Orange plot: forward overnight rates (OIS curves) on the date of the plot.

Convergence of market and FOMC expectations



Purple plot: median of FOMC participants' projections of longer run Fed funds rate from quarterly Summary of Economic Projections (SEP); *source*: FRED, series FEDTARMDLR. Gray plot: fixed rates on 4-year OIS swaps (4-year forward overnight rates); *source*: Bloomberg LP.

Evolution of exit strategy

- Initially set out in testimony Feb. 10, 2010, minutes June 2011 (“Exit Strategy Principles”)
 1. Reduce pace of asset purchases (tapering)
 2. “cease reinvesting some or all payments of principal”
 3. “modify...forward guidance...and...initiate temporary reserve-draining operations”
 4. Gradually sell MBS
- Runoff without MBS sales mooted: June 2013 press conference
- Asset purchases to end well before rate hikes Mar. 2014
- Formal announcement of revised approach to sequencing 16Sep2014 (“Policy Normalization Principles and Plans”)
 1. Tapering near done, so no discussion of pace of purchases
 2. Cease reinvestment at indeterminate future date, but no sales
 3. Desire to shift Fed assets to Treasuries as MBS pay down
 4. Funds rate remains intermediate target; range, not a point
 5. IOER as key tool to control funds rate, limited use of ON RRP
- Addendum of 13Jun2017: more detail on runoff plan
 - Gradual start, then acceleration up to certain caps

The shrunken money market

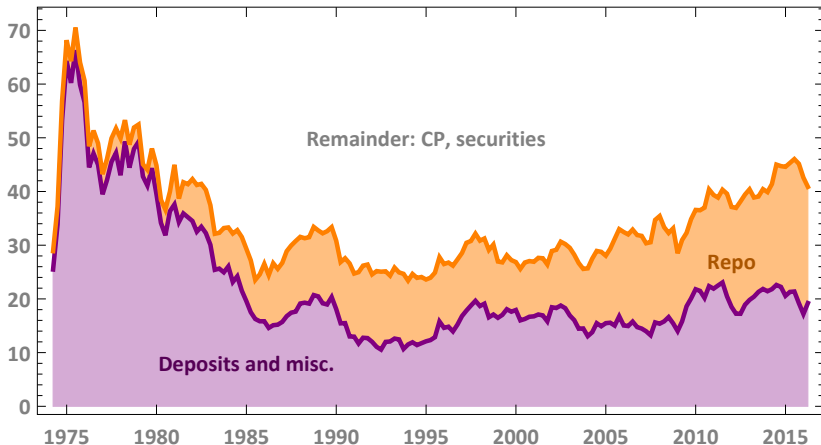
- Trading and issuance volumes much lower
- Rates in segments of money market track each other less closely, i.e. lower correlation of daily changes
- Shifts in participants
 - Greater MMMF role in short-term intermediation, e.g. eurodollars
- Short-term borrowing less attractive to banks

The dormant fed funds market

- Trading volume much lower than pre-crisis
- Three sets of participants:
 - U.S. commercial banks
 - GSEs, esp. FHLBs: bulk of lending in shrunken funds market
 - U.S. offices and branches of foreign banks (FBOs) now nearly half the borrowing
- Dominated by FBOs borrowing from GSEs to earn IOER
- Market soggy, hence target rate expressed as 25 bps range
- Normal monetary operations ineffective, since based on structural deficiency of reserves

	Mean	Std. dev.
03Jan2000–10Aug2007	0.7	9.9
13Aug2007–18Mar2009	-11.7	28.0
19Mar2009–05Jan2016	-12.3	4.2

Holdings of money market mutual funds 1974–2016



Share of total by type of asset, percent, quarterly. *Source:* Federal Reserve Board, Financial Accounts of the United States (Z.1), Table L.121.

A new operating framework?

- No reference in exit strategy to permanent changes in framework
- Apart from laconic references to
 - Holding “ primarily Treasury securities, thereby minimizing the effect...on the allocation of credit.”
 - “[R]educing...reserve balances...to a level appreciably below that seen in recent years but larger than before the financial crisis.”
- But indications in Federal Reserve public statements that some elements of “exit strategy” may be part of new framework
 - E.g. ON RRP, IOR
- Discussion of potential alternatives to fed funds effective rate as target
 - But likely with attention paid to a broader set of money market rates than pre-crisis
- No decision as yet regarding future size of balance sheet
 - Possible return to LSAPs if ZIRP required in future

Alternative target rates

Overnight bank funding rate (OBFR): similar to effective fed funds rate

- Index of unsecured rates
- Includes fed funds transactions
- But also interbank overnight borrowing in Eurodollar market

Treasury repo reference rate: esp. (→) **Secured Overnight Financing Rate (SOFR)** index of overnight repo rates

Administered rate: e.g. ON RRP, IOR

Normalization: new tools to control target rate

Reverse repos (ON RRP): test exercises since Sep. 2013

- Offered to wide audience, including MMMFs, GSEs
- Constitutes borrowing from public, thus provision of an asset
- Put high-quality collateral into market → firming of repo market
- Fixed amount or full allotment at fixed award rate (5–10bps)

Term Deposit Facility (TDF), 7 or 28 days

- Banks only
- Can be used to satisfy regulatory liquidity requirements
- Cannot be used for clearing

IEOR introduced in 2008, plays different role during exit

- Can be paid only to banks, not GSEs
- Then: keep rates in 1–25 bps range, rather than dropping to zero
- Now: keep rates from falling below funds rate as target is lifted

Floor system for funds rate during exit

- IOER *floor*, ON RRP “sub-floor” on effective fed funds rate
 - Technically still a corridor system, as discount rate still set, though barely used
 - IOER as primary tool to set rates near target
 - Wide ON RRP-IOER spread → active funds trading
- Fed funds rate remains target, supported by system of administered rates until normalization
- Keep effective funds rate close to 25 bps upper limit of target range
- Actual fed funds rate should get closer to IOER as reserves drained
 - Draining can however be temporary e.g. ON RRP, TDF
 - Switch liabilities, reducing reserves, but not balance sheet size

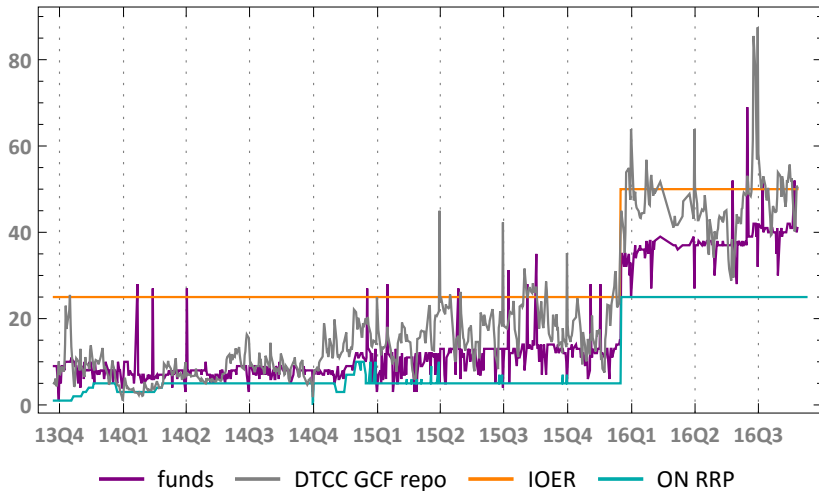
Why so hard to raise rates?

- IOER a leaky floor due to *incomplete arbitrage in money markets*
 - But note it is to be a ceiling and a magnet during normalization
- GSEs cannot receive IOR from Fed
 - But as government entities, eligible to hold deposits at Fed
 - FHLBs receive large and lumpy interest payments from mortgage borrowers
 - →Willing suppliers of o/n funds below IOR rate
- →Arbitrage opportunity for commercial banks
 - Banks could borrow from GSEs, lend to Fed until funds rate=IOER
- But: DIs face regulatory costs
 - Liquidity regulation, e.g. **Liquidity Coverage Ratio** (LCR)
 - U.S. capital charges, e.g. **Supplementary Leverage Ratio** (SLR), **GSIB Surcharge**
 - FDIC deposit insurance assessment base: assets minus capital rather than deposits
- FBOs not subject to SLR, FDIC assessment
 - →disproportionately large borrowers of Fed balances, carry out much of existing IOER arbitrage

Potential for “accidents” during exit

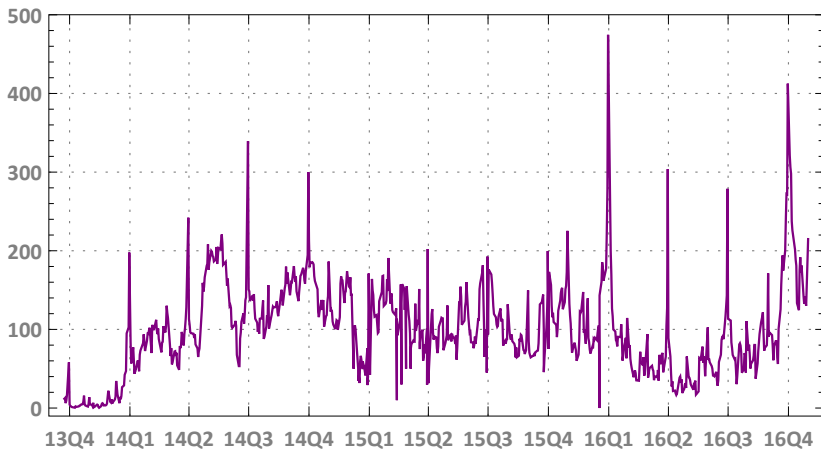
- How tightly can Fed control rates during exit?
 - Money market rates consistently below IOER, IOER doesn't act as floor
- Availability of ON RRP may make system more run-prone
 - ON RRP as safe-haven asset
- Market volatility (e.g., taper tantrums) may help or hinder exit
 - Volatility aids exit by tightening financial conditions
 - Low volatility may ordain more aggressive tightening (“Yellen collar,” risk-on increases likelihood of further tightening)

U.S. money market rates 2013–16



All rates in basis points, daily. *Sources:* Bloomberg LP, Federal Reserve Bank of New York.

Overnight reverse repo facility use 2013–16



Accepted bids, \$bill., daily. *Source:* Federal Reserve Bank of New York.

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Prelude: repo market turmoil

Federal Reserve policy measures

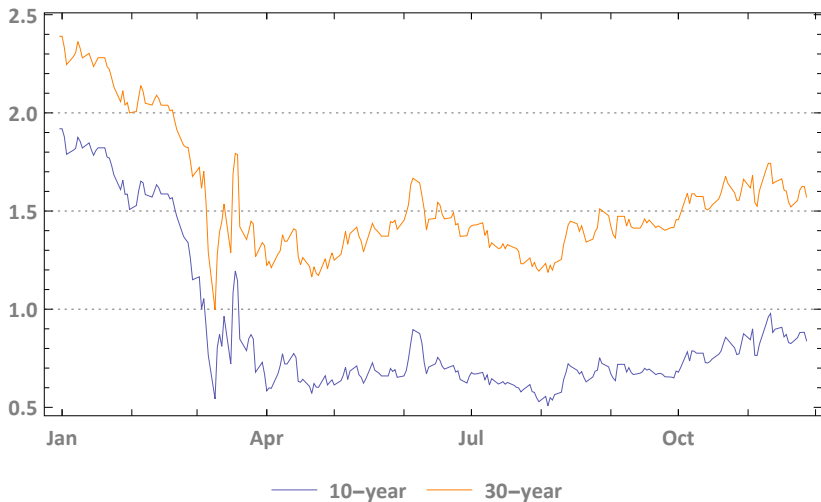
Market response to the crisis

The new monetary policy framework

Federal Reserve emergency measures

- Monetary ease
 - Fed funds target rate reductions from 1.5-1.75 to 0-0.25 percent
 - Increase in volume of Treasury and MBS purchases
- Stabilization of government-backed U.S. bond markets: illiquidity and increased credit risk
 - Increase in volume of Treasury and MBS purchases
 - Foreign and international monetary authorities (FIMA) Repo Facility
- Stabilization of credit markets: illiquidity, evaporation of economic activity, increased credit risk
- Stabilization of money markets: impaired funding liquidity

Treasury yields 2020



Source: Bloomberg Financial LP.

Stabilization of money markets

- U.S. money markets: revival of MMLF, CPFF, PDCF
- Increased foreign demand for U.S. dollars: foreign banks' dollar funding liquidity
 - Expansion of dollar liquidity swap lines with other central banks
 - Foreign and international monetary authorities (FIMA) Repo Facility: temporarily permits participating central banks to borrow U.S. dollars from Fed

Stabilization of credit markets

- Support of corporate bond markets
 - Corporate bond purchases: Primary Market (PMCCF) and Secondary Market Corporate Credit Facility (SMCCF)
 - Revival of TALF
- Support of bank lending
 - Paycheck Protection Program Liquidity Facility (PPPLF)
 - Postponement of regulatory changes, e.g. introduction of CECL

The new monetary policy framework

- Augments (or supplants?) “shadow” Taylor-rule/reaction function
- Background:
 - Policy at effective lower bound (ELB)
 - In context of failure to meet 2 percent long-term inflation goal since GFC
- At ELB: price-level targeting, “make-up” strategy
 - Do *not* taper or raise rates in response to employment, near potential output
- Above ELB: inflation targeting
- Inflation goal 2 percent, not zero to avoid ELB
- Policy operates via inflation expectations

Introduction of a standing repo facility

- Address increased demand for reserves
- Together with ON RRP facility, establishes a full-fledged corridor system