Central Banking After the Crisis

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OUTLINE

- Science of Monetary Policy Before the Crisis
- Monetary Policy Strategy Before the Crisis
- How Has the Crisis Changed Our Thinking
- How Much of the Science of Monetary Policy Needs to Be Altered
- General Implications for Monetary Policy Strategy
- Forward guidance
- Concluding Remarks

Science of Monetary Policy Before the Crisis

NINE BASIC PRINCIPLES

Frederic S. Mishkin, "Will Monetary Policy Become More of a Science?" in Deutsche Bundesbank, ed., *Monetary Policy Over Fifty Years: Experiences and Lessons (Routledge: London 2009), pp. 81-107,* written before September 2007

Science of Monetary Policy Before the Crisis: Nine Principles

1. Inflation is always and everywhere a monetary phenomenon

2. Price stability has important benefits

3. There is no long-run tradeoff between unemployment and inflation

4. Expectations play a crucial role in the determination of inflation and in the transmission of monetary policy to the macroeconomy

Science of Monetary Policy Before the Crisis: Nine Principles

5. Real interest rates need to rise with higher inflation, i.e., the Taylor Principle

6. Monetary policy is subject to the time-inconsistency problem

7. Central bank independence helps improve the efficiency of monetary policy

8. Commitment to a strong nominal anchor is central to producing good monetary policy outcomes

9. Financial frictions play an important role in business cycles

Science of Monetary Policy Before the Crisis: Nine Principles

- Complete agreement on first 8 principles in central banks and academia

- Leads to consensus for "flexible inflation targeting"

- Ninth principle is well understood by many in central banks, but financial frictions are not explicitly part of models used for policy analysis and forecasting at central banks

- Objective Function

Minimize $L = \alpha(\pi - \pi^T)^2 + (1-\alpha)(Y - Y^P)^2$

- Constraints

DSGE MODEL

- Both Embody first 8 principles

Science of Monetary Policy Before the Crisis: Theory of Optimal Monetary Policy

- Two other key elements:
- Linear-quadratic (LQ) Framework
   No non-linearity
- Representative Agent Framework
   No financial frictions

Science of Monetary Policy Before the Crisis: Certainty Equivalence, Gradualism and Risk Management

- LQ implies certainty equivalence and gradualism

    Policy rates moved gradually in practice

- Central banks' discomfort with LQ and certainty equivalence led to informal discussion of "risk management"

    Some awareness that they had to worry about tail risk of very bad economic outcomes

Science of Monetary Policy Before the Crisis: Dichotomy Between Monetary Policy and Financial Stability Policy

- Central bankers were aware that financial disruptions could do serious harm to economy

  Reason for *Financial Stability Reports*

- But general equilibrium frameworks in use at central banks led to dichotomy between monetary policy and financial stability policy

  - M-policy focuses on stabilizing inflation and output

  - Prudential supervision stabilizes financial system

Science of Monetary Policy Before the Crisis: Monetary Policy and Asset Price Bubbles: "Lean" Versus "Clean" Debate

- Some economists (particularly at BIS) argued that monetary policy should "lean" against asset-price bubbles

- "Greenspan doctrine": monetary policy should not lean but should "clean" after the bubble bursts generally accepted

  1. Bubbles hard to detect
  2. Monetary policy may be ineffective in stopping bubbles
  3. Monetary policy is too blunt a tool
  4. Pricking a bubble may be too costly
  5. Cleaning up after bubble not too costly

How Has the Crisis Changed Our Thinking

1. *Developments in financial sector have a far greater impact on economic activity than we earlier realized.*

2. *The macro economy is highly nonlinear.*

3. *The zero lower bound is more problematic than we realized.*

4. *The cost of cleaning up after financial crises is very high.*

5. *Price and output stability does not ensure financial stability.*

How Much of the Science of Monetary Policy Needs to be Altered?

- *None of the lessons from the financial crisis in any way undermines or invalidates the nine basic principles of the science of monetary policy developed before the crisis.*

- On the other hand, the lessons from the crisis do undermine two key elements of the pre-crisis theory of optimal monetary policy: LQ and representative agent frameworks with no financial frictions

Monetary Policy Strategy Implications: Flexible Inflation Targeting

- Basic principles of flexible inflation targeting still hold up:

  There should be a strong credible commitment to stabilize inflation in the long run by having an explicit inflation objective, and there should be flexibility to pursue policies to stabilize output around its natural rate level in the short run.

- FIT is what Ben Bernanke and I have referred to as "constrained discretion" and is a form of target rule

- But details needs to be modified as discussed below

The Case for Constrained Discretion, Target Rules:
Why Policy Instrument Rules (e.g., Taylor Rule Policy) are Such a Bad Idea

1. Assumes have reliable model of economy
   - Counterexample: Mistakes in 1970s on NAIRU
2. Assumes economy doesn't undergo substantial changes
   - Counterexample: Failure of Swiss National Bank's money growth rule in 1988-90
3. Instrument rule too rigid because it cannot foresee every contingency
   - Example: Almost no one predicted that problem in one small part of financial system—subprime mortgages—would lead to worst meltdown since Great Depression
   - Required unprecedented Fed actions to prevent collapse
   - How do you write this into a rule ahead of time
   - E.g., Fed cut federal funds rate starting in September 2007, when inflation rising and output growth strong: Taylor rule would have produced opposite actions.
4. Instrument rule cannot incorporate judgement
   - Monetary policy is as much art as science
   - Need to look at wide range of information, some of which is not quantifiable: e.g., Greenspan the Maestro

Monetary Policy Strategy Implications: Flexible Inflation Targeting

- Level of inflation target

    -Must be symmetric: i.e., not a ceiling

    Misses should as often be above as below

    - argument for it to be at higher end of ranges used by central banks

    - but not to be at 4% as IMF has suggested

Monetary Policy Strategy Implications: Flexible Inflation Targeting

- Price level targeting
    - Gets right expectations dynamics

Monetary Policy Strategy Implications: Flexible Inflation Targeting

- Price level targeting

  Negative AD shock, $Y \downarrow$, $\Pi \downarrow$, => $P < P^T$

  With price level target: $\Pi \uparrow$, r down $\downarrow$, $Y \uparrow$, $\Pi \uparrow$

  \- strong argument for Price Level Target

  \- but communication challenges are serious

- Nominal GDP targeting has even better expectations dynamics because it leads to expectations of even more expansionary policy when there is large output gap
  - Less simple than inflation targetRequires estimate of potential GDP growth
  - Need to carefully explain that commitment to long-run inflation target is still strong

Monetary Policy Strategy Implications: Risk Management and Gradualism

- Financial frictions and nonlinearities support risk management approach
  - timely (preemptive)
  - decisive
  - policy flexibility
- No gradualism when dealing with financial disruptions
- Needs flexible IT to anchor inflation expectations

Monetary Policy Strategy Implications: Lean Versus Clean Debate

- Two types of asset-price bubbles

    - irrational exuberance

    - credit-driven bubbles, which are the dangerous ones

- Suggests debate on lean versus clean has been miscast

- Strong arguments for leaning against credit bubbles (but not asset-price bubbles per se)

- Macroprudential regulation and supervision should be first line of defense

Monetary Policy Strategy Implications: Lean Versus Clean Debate

- There is case for monetary policy to lean against credit bubbles

- Easy monetary policy can promote excessive risk dubbed "risk-taking channel of monetary policy"

  - search for yield

  - valuation effects can cause leverage cycle

  - predictable policy lowers risk premiums

  - Greenspan put can create form of moral hazard

Monetary Policy Strategy Implications: Lean Versus Clean Debate

- Should monetary policy be used to lean?

- Objections:

    - Ones earlier

    - Violates Tinbergen principle that monetary policy should be used to stabilize economy while macroprudential polices should stabilize financial system

Monetary Policy Strategy Implications: Lean Versus Clean Debate

- But macroprudential policies may not be effective and so monetary policy may be needed
  - prudential policies more subject to political pressure than monetary policy because they affect bottom line of financial firms more directly
  - expectations of leaning against credit market bubbles will work to make this policy more effective.

Monetary Policy Strategy Implications: Lean Versus Clean Debate

- Low interest rates do not always imply excessive risk taking

- Need to monitor credit markets to assess if it is taking place:
  - credit spreads
  - credit growth
  - underwriting standards

- Research on what to monitor is starting: Should have high priority at central banks

Monetary Policy Strategy Implications: No Dichotomy Between Monetary and Financial Policy

- Monetary and financial policies are intrinsically linked

- Restrictive macroprudential policies require easier monetary policy and vice versa

- Need to coordinate monetary and financial policy provides another argument for central bank to be systemic supervisor and regulator

Fiscal Dominance and Monetary Policy

- Current fiscal crises in Europe and U.S. imply Fiscal Dominance more serious problem in advanced economies

- Central banks between rock and a hard place
  - If don't monetize debt, economy tanks
    Scenario already playing out in Europe with OMTs

- Even if Euro is saved, Europe faces "Argentina Problem"

- Bottom Line: No matter how strong commitment to price stability, fiscal dominance overrides it: unpleasant monetarist arithmetic

Nonconventional Monetary Policy

- Four types:

  - Liquidity Provision
  - Asset Purchases
  - Quantitative Easing
  - Management of Expectations:
    Forward Guidance

Forward Guidance

- Paper for U.S. Monetary Policy Forum, Feb. 26, 2016

  Michael Feroli, David Greenlaw, Peter Hooper, Frederic Mishkin and Amir Sufi,

  "Language After Liftoff: Fed Communication Away from the Zero Lower Bound"

Introduction

- Federal Reserve communication has come a long way

- Key communication issue now is forward guidance

- Paper examines Fed's communication strategy to see how well it has worked and how it can be improved, particularly after liftoff

Key Theme

- Two types of forward guidance
  - Time-based: specifies future policy path with calendar dates
  - Data-based: specifies how future policy path changes with different possible economic outcomes: i.e. provides information about reaction function
- We argue that Fed communication recently has relied too heavily on time-based forward guidance, even though it mentions conditionality

Setting the Stage

- Example: Yellen speech July 10, 2015
  - "Based on my outlook, I expect that it will be appropriate at some point later this year to take the first step to raise the federal funds rate and thus begin normalizing monetary policy. But I want to emphasize that the course of the economy and inflation remain highly uncertain, and unanticipated developments could delay or accelerate this first step."
  - Financial press (and many market participants) essentially ignored the conditionality

- Media interviews with Fed officials and market participants focus on calendar dates

Setting the Stage

"A couple of [meeting] participants questioned whether some financial market participants fully appreciated that monetary policy is data dependent, and a number of participants emphasized the importance of continuing to communicate this aspect of monetary policy."
Federal Open Market Committee Minutes, January 2016

Key Question

- Is it advisable for the Fed to provide such forward guidance when financial press and markets likely to ignore any data-dependency that comes with it?

Outline

- What does science (theory) of monetary policy say about communication
- Describe how Fed communication has evolved over last 20 years
- Empirical evidence
- Lessons
- Recommendations

Science of Monetary Policy: Theory of Fed Communication

- Optimal monetary policy involves a commitment to a target criterion (flexible inflation targeting) which leads to a policy reaction function that is communicated to public: Woodford (2003)

- Communication is then data-based forward guidance

- Has desirable expectations dynamics:

    Negative shock leads to expectations that future policy path will be easier in future, so markets do heavy lifting by immediately lowering long-term rates, thereby stimulating the economy

Science of Monetary Policy: Theory of Fed Communication

- Data-based forward guidance should NOT be interpreted as a Taylor Instrument Rule (which has serious problems)
  - Policy reaction function changes over time, either as policymakers learn how economy works or when the structure of economy changes and allows judgement
  - However, because the policy reaction function changes over time and allows for judgement, it may be hard to credibly explain it with data-based forward guidance

Science of Monetary Policy: Theory of Fed Communication

- Example of how data-based forward guidance might have might worked at start of financial crisis:

- August-September 2007, economy growing rapidly and inflation rising
    - Would have explained that disruption in financial markets required a shift to much more expansionary reaction function and that judgements about financial disruption would affect future policy path
    - If understood and credible, long-term rates would fall more rapidly in response to news that the financial disruption was getting worse

- Time-based forward guidance has bad expectations dynamics
  - Because future policy path is fixed, negative shock does not lead to change in markets expectations of future policy, so no stimulatory effect from lowering of long rates
  - Even worse: negative shock likely to lower expected inflation, so real rate rises, which is in effect contractionary monetary policy that amplifies negative shock
  - Get same bad expectations dynamics as occurs with ZLB (Eggertson and Woodford, 2003)
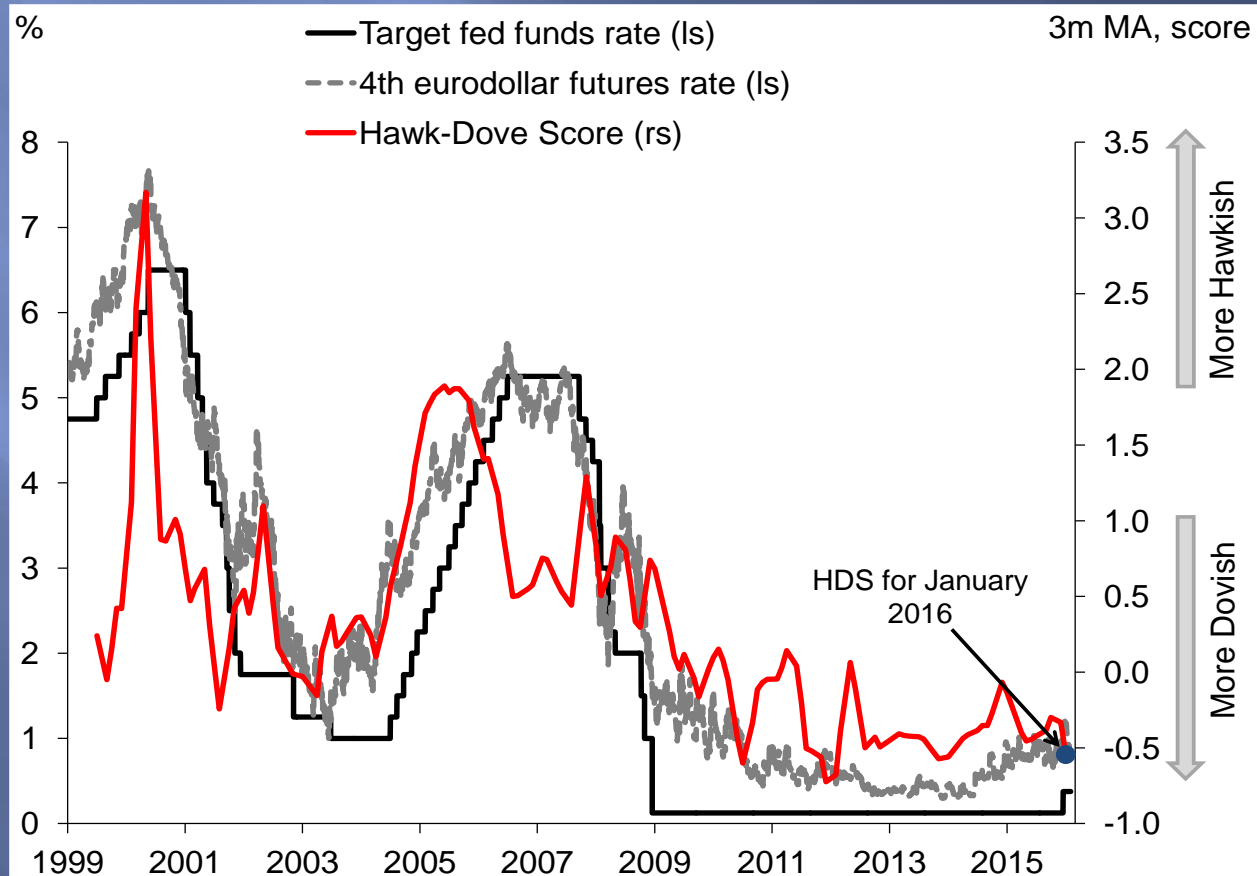
Fed Communication: Practice

- More information provided to markets
- FOMC statements
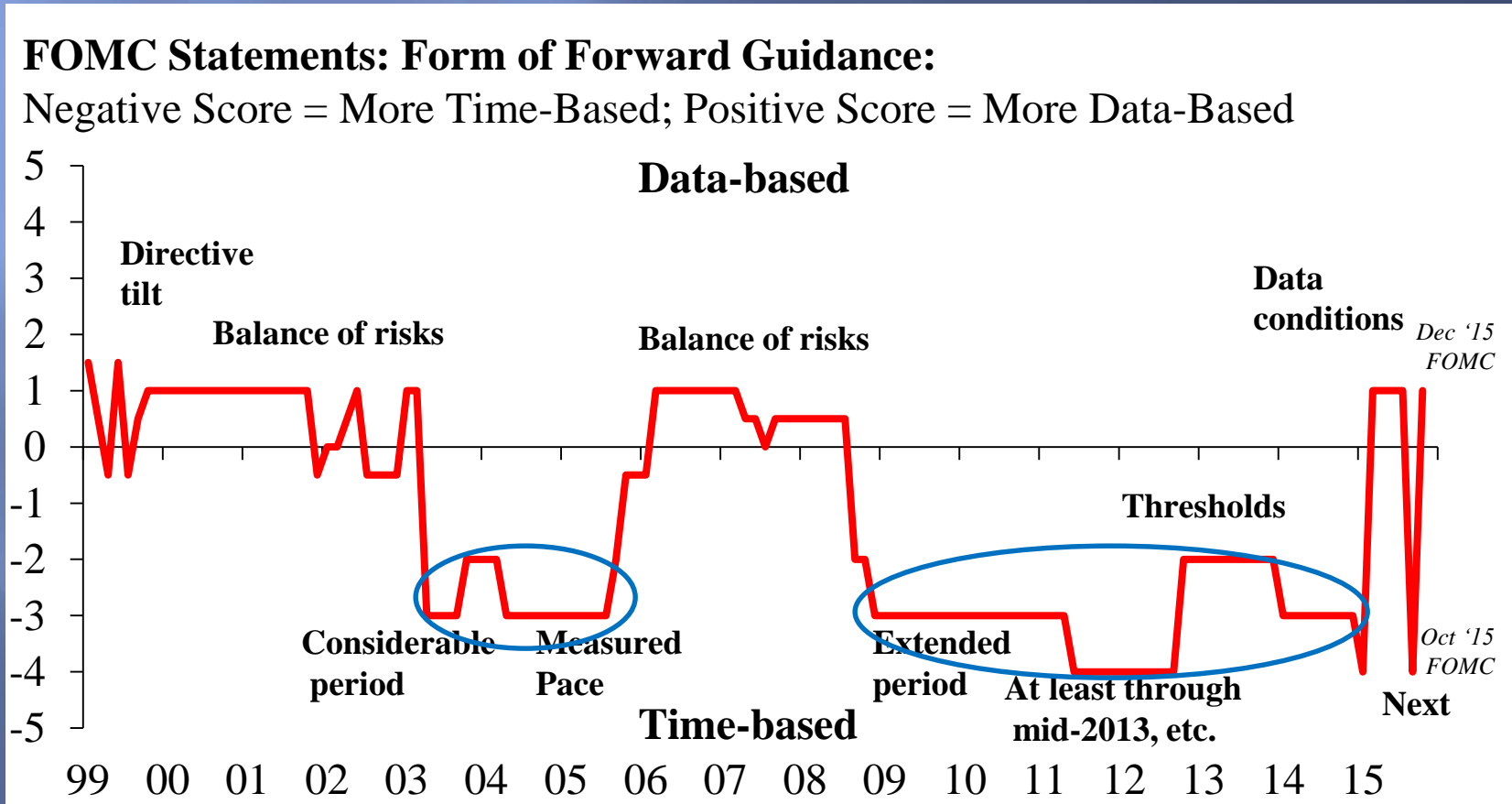

Word count of FOMC statements
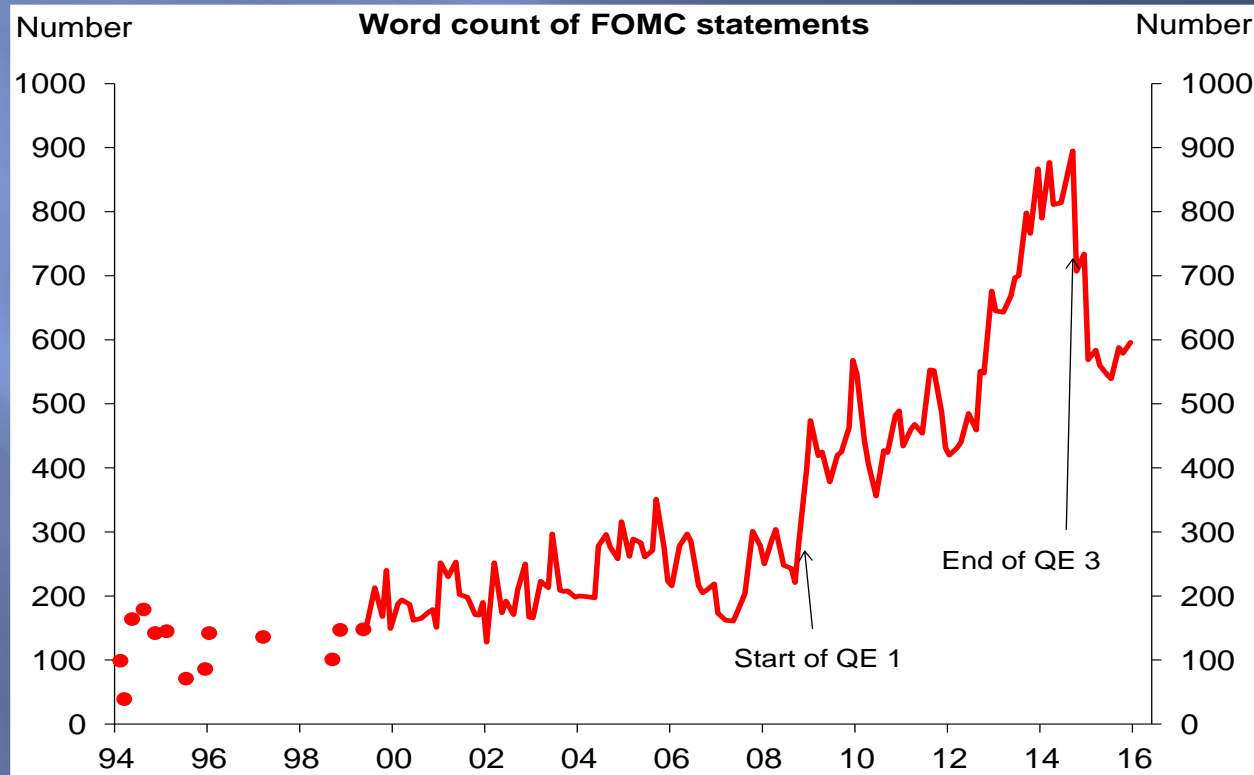
Fed Communication: Practice

- Tone of statement anticipates movements in policy

Fed Communication: Practice

- Data-based versus time-based forward guidance

FOMC Statements: Form of Forward Guidance:
Negative Score = More Time-Based; Positive Score = More Data-Based

14

Fed Communication: Practice

- Time-based forward guidance can put the Fed in a box when new data suggests a need to revise the policy path

  - May be tendency to stick to previously announced path. For example, 17 consecutive 25 bps increase in fed funds rate target from 2003-2006 led to overly easy monetary policy and may have contributed to housing bubble

  - If instead there is a change from previously announced policy path, markets may take view that Fed has flip-flopped and broken its word which damages Fed credibility. This can be seen in bad communication scores in Primary Dealer Survey as seen in the case of Sept 2013 taper tantrum and Sept 2015 delay in liftoff.

Fed Communication: Practice

- **Time-based** forward guidance can be beneficial when ZLB is binding and more expansionary policy is needed
  - Other monetary policy tools may be ineffective or have problematic consequences
  - Data-based forward guidance may be hard to explain and not credible
  - Time-based forward guidance has advantage that it is easily understood and so may be more powerful than data-based forward guidance
  - Time-based forward guidance also can lower risk premiums to stimulate economy
  - Example when time-based forward guidance may have been justified: August 2011

Fed Communication: Practice

- Summary of Economic Projections (SEP) reveals information about policy reaction function

Regression (3): Unemployment Gap				
(R-R*) = C + B_UR*(U-U*) + B_Infl*(P-P*)				
Dependent Variable: R_MINUS_RSTAR				
Method: Least Squares				
Date: 02/02/16				
Sample: 1 35				
Included observations: 35				
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.13	0.20	-5.74	0.00
B_UR	-1.59	0.29	-5.47	0.00
B_Infl	3.16	0.43	7.40	0.00
R-squared	0.77	Mean dependent var		-2.10
Adjusted R-squared	0.75	S.D. dependent var		1.12
S.E. of regression	0.56	Akaike info criterion		1.74
Sum squared resid	9.86	Schwarz criterion		1.88
Log likelihood	-27.50	Hannan-Quinn criter.		1.79
F-statistic	52.79	Durbin-Watson stat		1.42
Prob(F-statistic)	0.00			

Fed Communication: Practice

- However, evidence from FRB Cleveland study based on data from the Survey of Professional Forecasters shows that using median forecasts to estimate policy reaction function provides little information about individuals reaction functions

Fed Communication: Practice

Figure 2. Regression Coefficients of Individual Forecasters
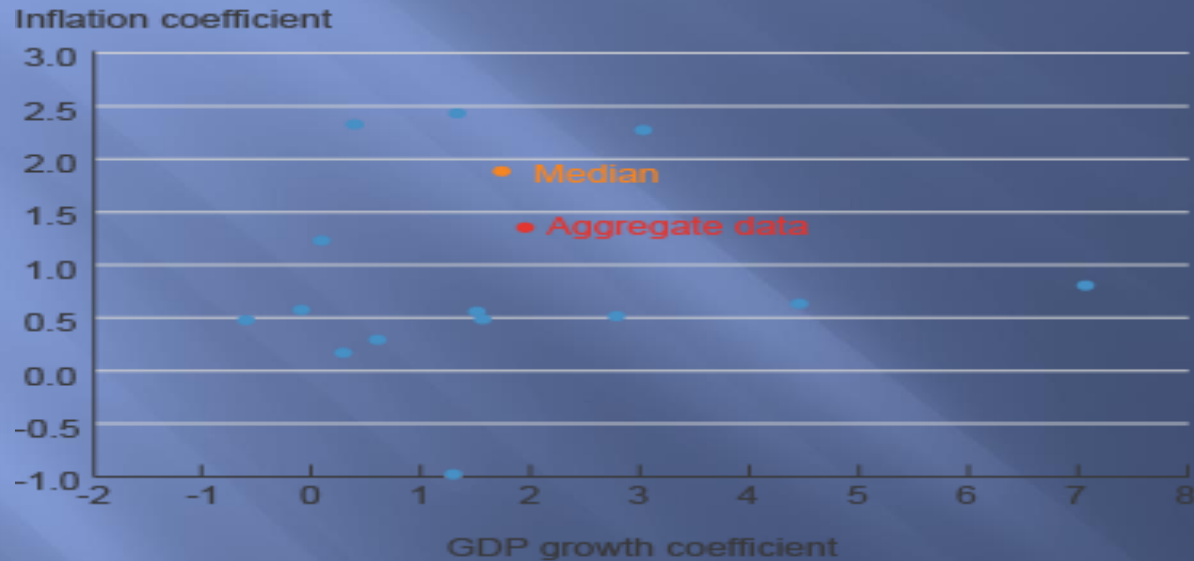
Source: Authors' calculations using Survey of Professional Forecasters data (Federal Reserve Bank of Philadelphia).

From "Do Forecasters Agree on a Taylor Rule?" by Charles Carlstrom and Margaret Jacobson, Federal Reserve Bank of Cleveland *Economic Commentary*, September 2, 2015

Empirical Evidence: Time-Based Forward Guidance Reduces Sensitivity to Macro News

- Swanson-Williams (2014) regressions

$$\Delta y_t = \gamma^{\tau_i} + \delta^{\tau_i}\boldsymbol{\beta}\boldsymbol{X}_t + \varepsilon_t \qquad (1)$$

Yields estimate of $\widehat{\boldsymbol{\beta}}$ and $\hat{X}_t = \widehat{\boldsymbol{\beta}}\boldsymbol{X_t}$
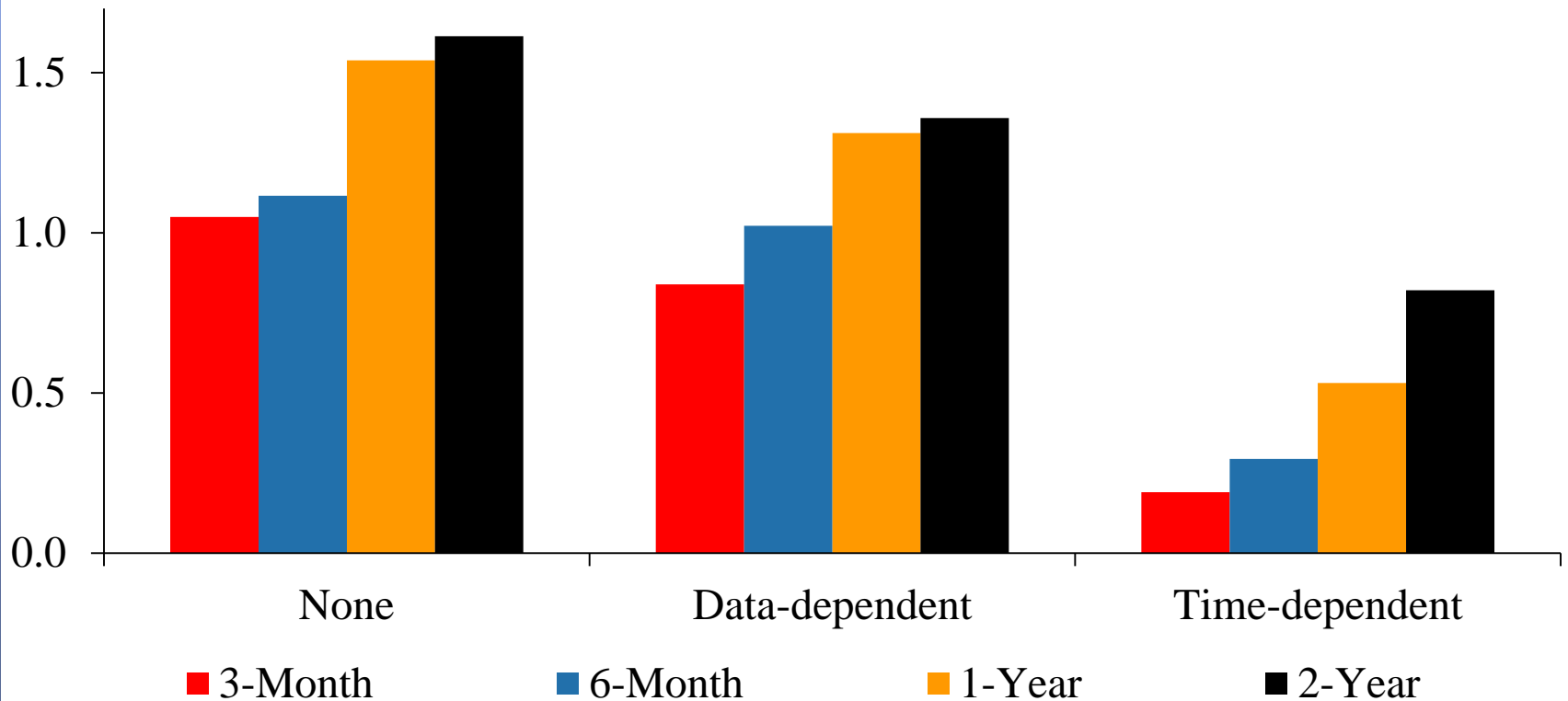
Then estimate:

$$\Delta y_t = \gamma^{\tau} + \delta^{\tau}\hat{X}_t + \varepsilon_t^{\tau} \qquad (2)$$

where $\widehat{\delta^{\tau}}$ describes sensitivity of interest rates to macro surprises

Empirical Evidence: Time-Based Forward Guidance Reduces Sensitivity to Macro News

Sensitivity Coefficient and Forward Guidance, 2001- 2015

Empirical Evidence: Time-Based Forward Guidance Reduces Volatility

|	Constant		Sensitivity Param.		CDX High Yield		Model
	Coef.	T-Stat	Coef.	T-Stat	Coef.	T-Stat	R^2
10Y Tails	2.478	9.261	0.700	6.138	0.006	19.426	0.524
5Y Tails	1.564	5.106	1.641	11.396	0.006	15.015	0.453
2Y Tails	0.234	0.905	2.634	19.518	0.005	13.569	0.587

Sample: January 2002 - November 2015

Empirical Evidence:
Time-Based Forward Guidance Reduces Volatility

- Danger that low volatility leads to increased leverage (Adrian and Shin)

Hedge fund leverage and implied volatility
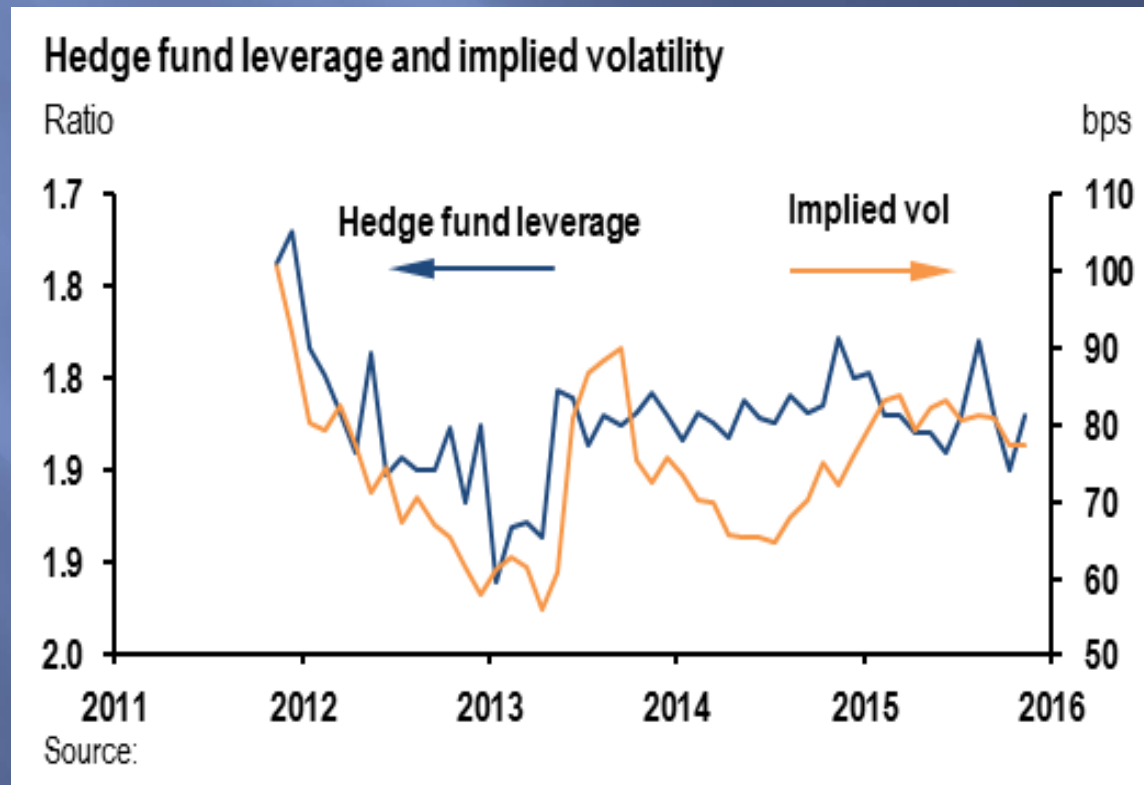
Empirical Evidence:
Time-Based Forward Guidance Weakens Fed Credibility

- Communication grades are lower in the post June-2013 period when Fed is moving toward normalization

PDS Average Score of Communications at FOMC Meeting
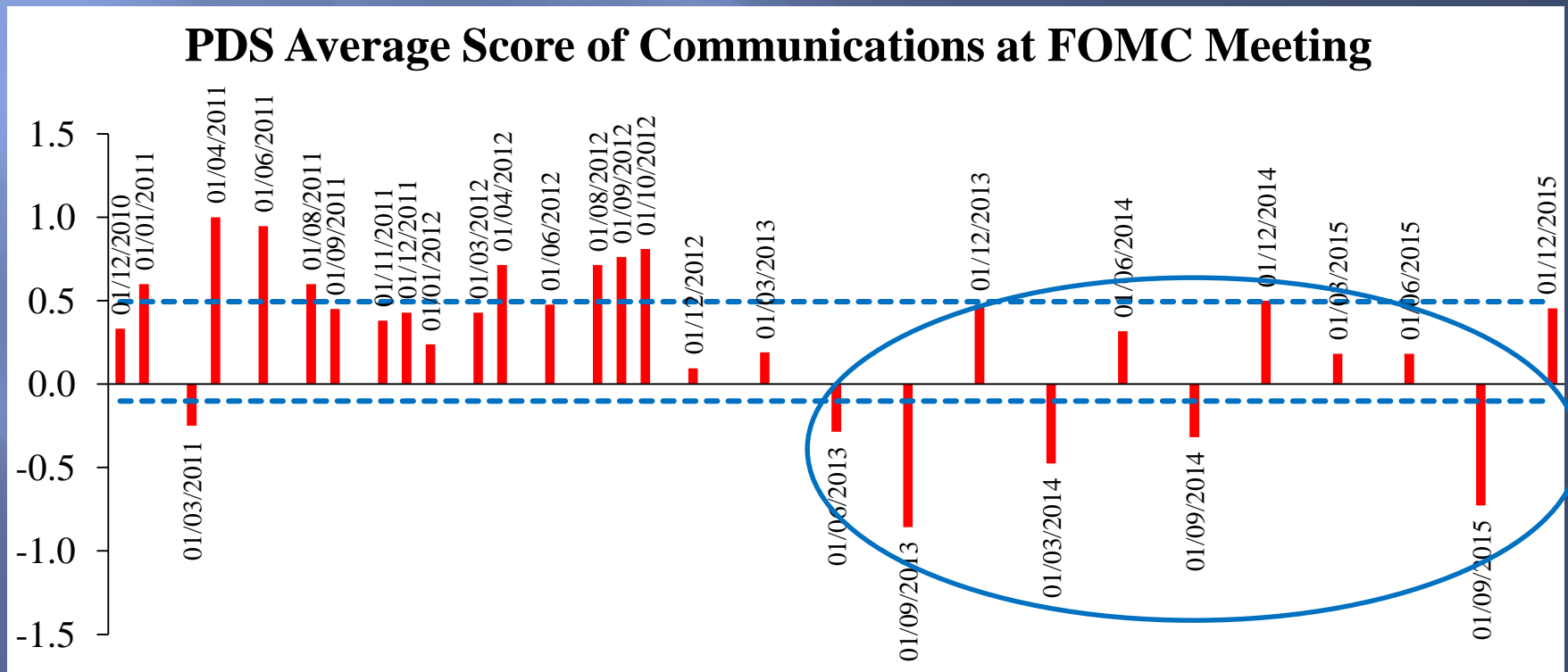
Lessons

1. Data-based forward guidance has desirable expectations dynamics which allows markets to do heavy lifting for Fed

2. Time-based forward guidance has undesirable expectations dynamics which can amplify negative shocks

3. Empirical evidence supports weaker response to macro news when there is time-based forward guidance

Lessons

4. Empirical evidence finds that time-based forward guidance results in lower uncertainty. Although at times this can be desirable at ZLB, it can lead to higher leverage and financial instability in other periods

5. Summary of Economic Projections (SEP) provides information about Fed reaction function

6. Media and markets ignore conditionality of forward guidance

Lessons

7. Time-based forward guidance can put Fed in a box: either leading to inappropriate policy (2003-2006) or a view that Fed has flip flopped, weakening their credibility (September 2013 and September 2015)

8. Time-based forward guidance can lead to confusion and lower communication grades by the market

9. Time-based forward guidance does have a potential advantage in that it is more powerful because it is easily understood.

Recommendations

1. Time-based forward guidance should be used in only very unusual circumstances: (1) when the zero-lower-bound on monetary policy is binding and more expansionary monetary policy is required. And (2) when all other efforts to communicate the central bank's reaction function to markets have been unsuccessful. However, time-based forward guidance <u>should not</u> be used only because market forecasts of economic outcomes differ from the Fed's forecasts.

Recommendations

2. Data-based forward guidance in which there is a projected path of policy rates may be too hard to explain and make credible, so it might be better not to do this type of forward guidance at all and instead revert to weaker form of forward guidance

3. Make forward guidance more data-dependent by emphasizing the uncertainty around the policy path and how the path would change with economic outcomes.

Recommendations

4. The financial press and market participants should fixate less on dates, and more on the evolution of the Federal Reserve reaction function

5. The Summary of Economic Projections could be made more informative about FOMC participants' policy reaction functions by linking the dots to the economic forecasts of each (unnamed) participant.

Recommendations (#5 continued)

For example, SEP could include a forecast grid, such as that shown here, which is currently made public with a 5 year lag (note: of course, current version of this table, which is not public yet, would include a column showing fed funds rate forecasts).

Table 2: November 2010 Economic Projections (in percent)

Projection	Year	GDP	UR	PCE	Core PCE
1	2012	2.6	8.7	2	1.8
2	2012	3.6	8.4	1.2	1
3	2012	4.6	7.7	0.6	0.6
4	2012	4.2	8.2	1.4	1.2
5	2012	4.5	7.9	1	1
6	2012	3.2	8.1	1.5	1.5
7	2012	4	8	1.5	1.4
8	2012	4.7	7.9	1.1	1
9	2012	4.2	8.1	1.2	0.9
10	2012	4.1	8	1.5	1.5
11	2012	4.5	7	1.8	1.6
12	2012	3.2	7.2	2.2	2
13	2012	4.3	8.4	1.1	1
14	2012	4.4	8	1.5	1.5
15	2012	4	8	1.5	1.4
16	2012	4	8.2	2	2
17	2012	4.4	8	1.4	1.1
18	2012	4.7	7.1	1.2	1.2

Source: FOMC transcript material for the November 2010 meeting

Conclusion

- Basic paradigm of flexible inflation targeting needs to be modified
  - Monetary policy may need to lean against credit-driven bubbles and interacts with macroprudential policy
  - Nonlinear world requires risk management
  - Fiscal dominance is now a big problem
  - Nonconventional monetary policy of managing expectations is needed, but communicaton is challenging

Conclusion

- Although the Fed has made substantial progress in communication, it is now too focused on time-based forward guidance

- Recommend that time-based forward guidance only be used in extremely unusual circumstances, when: 1) the zero-lower bound on monetary policy is binding and more expansionary policy is needed, or 2) other efforts to communicate the central bank's reaction function to markets have failed. <u>Neither of these conditions holds currently</u>.

Conclusion

- Data-based forward guidance is hard to do well, although this is not entirely the fault of the Fed
  - One alternative: abandon forward guidance with interest rate projections
  - Another alternative: Take steps to improve data-based forward guidance to make it less likely to be misinterpreted as time-based.