FINM 35000: Topics in Economics

Week 4: Monetary Policy and Inflation

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Logistics

- Reminder about font colors in homework:
  - Each person chooses a color
  - Write your name and any responses that you type up in your chosen color
  - We made this policy to help you work together to prevent free-riding, but if you hate it let me know!
- Please do not use ChatGPT to write your homework answers!
- I've posted the final project instructions and an example, so start thinking about what you would like to work on
  - Proposal is due November 1
- Reminder: if you have a question that I don't know the answer to, feel free to send me an email to remind me to look into it!
- If there are specific econometrics topics you would like to learn about, email me

How to Read Regression Tables

Example from Last Week

Table 4: Carbon Prices, Permit Shortfall and Stock Returns

	(1) $RET_{i\tau}$	(2) $RET_{i\tau}$	(3) $RET_{i\tau}$
$SHORTFALL^{COVERAGE<50\%}_{it-1} \times \Delta EUA\%_{\tau}$	-0.0123**	-0.0123**	-0.0124**
	(0.0061)	(0.0061)	(0.0061)
$SHORTFALL^{COVERAGE<50\%}_{it-1}$	0.0006	0.0006	0.0030
	(0.0083)	(0.0083)	(0.0081)
$LOG(ASSETS_{it-1})$		-0.0235*	-0.0279**
		(0.0134)	(0.0134)
$TANGIBILITY_{it-1}$		0.0132	0.0119
		(0.0254)	(0.0233)
$LEVERAGE_{it-1}$		0.0190	0.0278
		(0.0897)	(0.0848)
$LOG(MV_{i\tau-1})$		0.0183	0.0196*
		(0.0118)	(0.0117)
$LOG(M/B_{i\tau-1})$		-0.0466***	-0.0495***
		(0.0094)	(0.0096)
$NET\ INCOME_{it-1}/EQUITY_{it-2}$		0.0145	0.0142
		(0.0294)	(0.0280)
$CASH_{it-1}/ASSETS_{it-1}$		0.0125	0.0021
		(0.0508)	(0.0511)
$LOG(TURNOVER_{it-1})$		0.0085	0.0088
		(0.0082)	(0.0080)
$\beta^{SMB}_{i\tau}$			-0.0119
			(0.0144)
$\beta^{HML}_{i\tau}$			-0.0079
			(0.0113)
$\beta^{RMW}_{i\tau}$			0.0168*
			(0.0091)
$\beta^{CMA}_{i\tau}$			0.0023
			(0.0081)
$\beta^{MKT}_{i\tau}$			-0.0154
			(0.0259)
$\beta^{WML}_{i\tau}$			0.0013
			(0.0135)
$VOLATILITY_{i\tau}$			1.0461
			(1.2613)
Constant	0.0296***	-0.2952***	-0.3015***
	(0.0020)	(0.0682)	(0.0844)
Observations	427,701	427,701	427,701
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Date FE	Yes	Yes	Yes
Cluster	Firm & Date	Firm & Date	Firm & Date
Firms	284	284	284
Adj. R-Sq.	0.251	0.251	0.251

NOTES: This table reports results from OLS panel regressions. The dependent variable is $RET_{i\tau}$, the return for firm i from day $\tau - 1$ to day τ. Variable definitions are provided in Table A1. Variables are winsorized at the 1% and 99% levels. The sample consists of listed firms in ETS-participating countries with a positive amount of ETS verified emissions in year $t - 1$. The sample period begins in 2013 and ends in 2020. Industry is defined by 2-digit NACE codes. Standard errors are two-way clustered at the firm and date level. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

High Level Overview

- What to pay attention to:
  1. What is the coefficient of interest?
  2. How does the specification change across the columns?
  3. How does the coefficient change across the specifications?
- Other notes:
  - *, ** and *** denote significance at the 10, 5, and 1% levels respectively
  - Unless stated otherwise in the caption, the numbers in parentheses are standard errors
    - Rule of thumb: if the coefficient divided by the standard error is larger than 2, the coefficient is significant
    - Sometimes authors put t-statistics or p-values in parentheses instead, but will note this in the caption

Back to Example

- Recall: Bolton, Lam and Muuls (2023) are interested in estimating the effect of carbon pricing on financial performance
- How do we read this table?
  1. What is the coefficient of interest?
     - *The coefficient on the interaction term in the first row*
  2. How does the specification change across the columns?
     - *Additional controls are added*
     - Note: Sometimes the regressors shown will be the same, but fixed effects will change
  3. How does the coefficient change across the specifications?
     - *It doesn't change meaningfully*

DiD and RDD

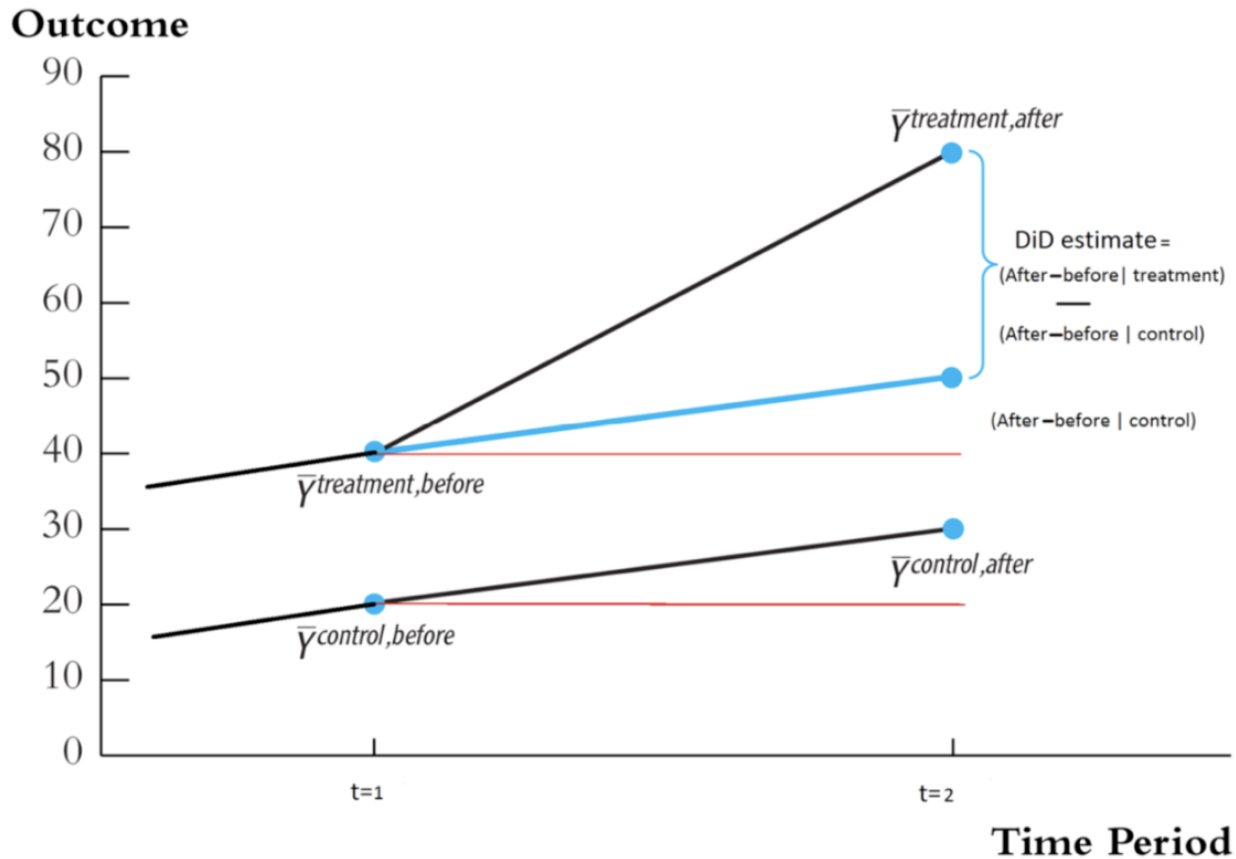
Overview of Difference-in-Difference

- Suppose we want to estimate the impact of a binary treatment D_i on an outcome Y_i
- Cannot estimate directly unless treatment is assigned randomly (or in other words if there are no unobservable differences between the treatment and control groups)
- DiD is a solution to this problem
  - Identifying assumption: absent treatment, the path of the outcomes would be the same for the treatment and control groups
- Empirical design:

$$Y_{it} = \alpha + \beta D_i + \gamma Post_t + \delta D_i \times Post_t + \varepsilon_{it}$$

  - Coefficient of interest is γ

Difference-in-Difference Illustration



Difference-in-Difference Example

From Card and Krueger (AER, 1994)

- Want to study the effect of minimum wage on employment
- Problem: minimum wage is not assigned randomly and areas with different minimum wages may differ in other ways
- Solution: focus on fast food restaurants in counties on the border between New Jersey and Pennsylvania
  - In 1992, minimum wage in New Jersey was increased from \$4.25 to \$5.05, but was unchanged in Pennsylvania
- Identifying assumption: absent the change in minimum wage, the path of employment would have been the same in the two states
  - Note: this does not say that employment itself has to be the same

Overview of Regression Discontinuity Design

- Suppose we are interested in the effect of X_i on Y_i and that X_i is exogenously determined by a **running variable**. Examples:
  1. X_i is being able to purchase alcohol, running variable is age
  2. X_i is being elected to a political position, running variable is vote share
  3. X_i is enrollment in a certain school, running variable is test score
- Key assumption: other than effecting X_i, there is no difference between individuals on either side of the discontinuity. In other words:
  1. 20.9 year olds and 21.1 year olds are do not differ except in that the 20.1 year olds can purchase alcohol
  2. Those receiving 50.1% vote share and those receiving 49.9% do not differ except that those with 50.1% gain power
  3. Imagine a school with a test score cutoff of 500. Students scoring 499 and those scoring 501 do not differ except that those scoring 501 attend the selective school.

Regression Discontinuity Design Example

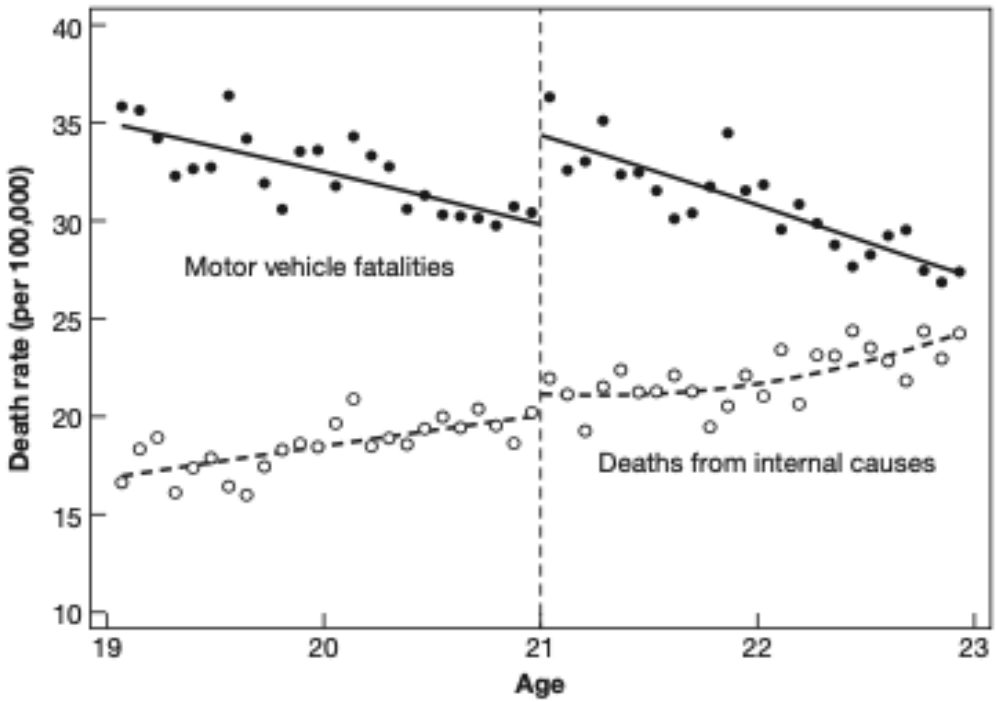
- Effect of turning 21 on car accident deaths:

$$M_a = \alpha + \rho D_a + \gamma a + \varepsilon_a,$$

  - M_a is deaths in a month
  - a is age
  - $D_a = 1$ when $a \geq 21$
- Coefficient of interest is ρ

Regression Discontinuity Design Illustration

FIGURE 4.5
RD estimates of MLDA effects on mortality by cause of death



Notes: This figure plots death rates from motor vehicle accidents and internal causes against age in months. Lines in the figure plot fitted values from regressions of mortality by cause on an over-21 dummy and a quadratic function of age in months, interacted with the dummy (the vertical dashed line indicates the minimum legal drinking age [MLDA] cutoff).

Monetary Policy

Structure and Goals of the Federal Reserve

- The Federal Reserve consists of the Board of Governors and 12 Federal Reserve District Banks
- The Federal Open Market Committee, which is the group that actually conducts policy, consists of the seven members of the Board of Governors, the President of the Federal Reserve Bank of New York and four of the other Reserve Bank Presidents, who serve in a rotation[1]
- U.S. monetary policy has two basic goals (called the "dual mandate"): to promote maximum sustainable output and employment and to promote stable prices

[1] The other Reserve Bank Presidents are considered non-voting members

The Fed's Dual Mandate Explained

- Price Stability
  - The FOMC has judged that inflation of 2% per year is consistent with its price stability mandate
  - "When households and businesses can reasonably expect inflation to remain low and stable, they are able to make sound decisions regarding saving, borrowing, and investment, which contributes to a well-functioning economy"[2]
- Maximum Sustainable Employment
  - Many non-monetary factors (e.g. business conditions, demographics, labor market regulations) affect the structure and dynamics of the labor market, and these may change over time, making it inappropriate to specify an explicit unemployment target

[2] https://www.federalreserve.gov/faqs/economy_14400.htm

Types of Monetary Policy Communication

- We will go into detail about why communication matters later in the lecture
- **Statements**: these are released immediately following FOMC meetings. These meetings are scheduled eight times per year. In addition, unscheduled meetings occur during crisis times. Example.
- **Minutes**: these are longer and more detailed documents that are released three weeks after scheduled meetings. Example.
- **Transcripts**: contain verbatim accounts of what was said at the meeting. Released with a five year lag. Example.
- **Other**: some meetings are also followed by a press conference, members of the FOMC give frequent speeches, the committee releases a lot of other documents about its assessment of current and future economic conditions (Beige Book, Teal Book, Summary of Economic Projections, etc.)

A Quick Primer on Terminology

- Two "directions" for monetary policy:
  1. Hawkish means that central bank is increasing rates. This is also referred to as tightening.
  2. Dovish means that the central bank is lowering rates. This is also referred to as easing or loosening.
- This will be important for your problem set because you will use the text of statements to measure the "hawkishness" of the FOMC at each meeting

Conventional Monetary Policy Tools: Overview

- The Fed's primary tool for influencing employment and inflation is a short-term interest rate called the "federal funds" rate
- Changes to this policy rate are announced at meetings of the FOMC (which are scheduled eight times per year, but also sometimes occur at unscheduled times during crisis periods)
- The actual raising and lowering of this rate is done through open market operations in the market for bank reserves, known as the federal funds market

Conventional Monetary Policy Tools: What are Reserves?

- Reserves are the funds that banks keep in order to cover unexpected outflows
  - Consider the simplification of a bank that has two purposes: take deposits and make loans
  - If the bank lends out all of their deposits, then if the depositors want to withdraw, the bank will not be able to meet its obligation
  - Reserves are the amount of cash that the bank keeps on hand in order to avoid this scenario
- Banks can hold reserves as cash or as deposits with the Fed
- The Fed requires banks to hold a certain amount of reserves (for example 10% of the value of the bank's deposits). This is called the "reserve requirement"

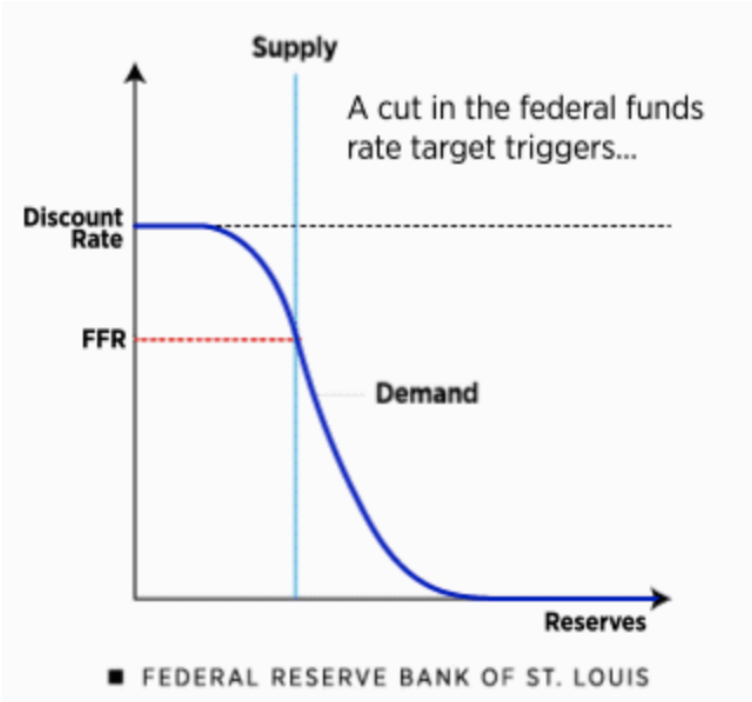
Conventional Monetary Policy: What is the Fed Funds Rate?

- Banks can borrow and lend reserves from each other on a short-term (overnight) basis
- The rate at which banks borrow and lend reserves is called the Fed Funds rate
- The Fed Funds rate adjusts to balance the supply and demand for reserves
- In particular, if a lot of banks would like to borrow reserves, then the Fed Funds rate would go up (because the Fed Funds rate is like the price that banks pay to borrow reserves)

Conventional Monetary Policy: What are Open Market Operations?

- Prior to 2008, the Fed's primarily tool for moving interest rates was called "open market operations"
- In order to actually move interest rates, the Fed buys and sells government securities from banks in a process called open market operations
- To illustrate how this works, suppose the Fed wants to lower the Fed Funds rate: the Fed buys government securities from a bank, paying for them by increasing the bank's reserves. As a result, the bank has more reserves than it wants, so it lends them to other banks, which increases the supply of reserves in the interbank lending market, causing the Fed Funds rate to fall.
- The Fed conducts the opposite process (sells government securities to a bank) when it wants the Fed Funds rate to rise

Conventional Monetary Policy: Illustration of Open Market Operations



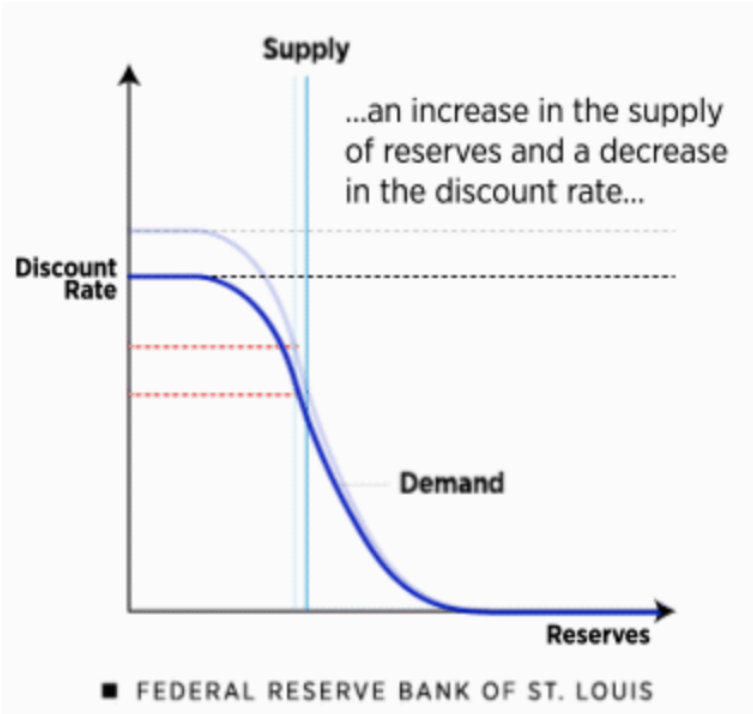


Figure: This only works if the supply of reserves is limited!

Conventional Monetary Policy: Administered Rates

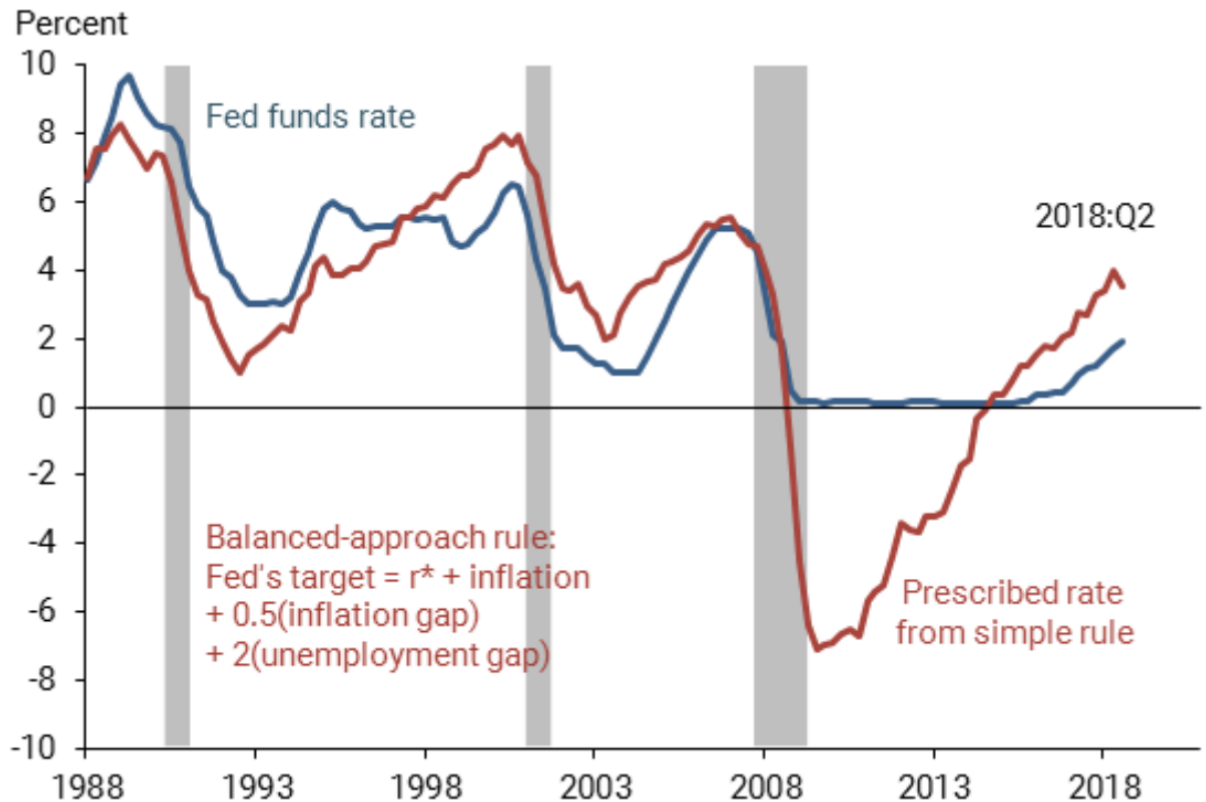
- Since the 2008 crisis, the Fed has kept an "ample" supply of reserves (the supply curve intersects with the flat part of the demand curve in the image above)
- The Fed sets a lower bound by "administering" two rates:
  1. Interest on reserves (IOR)
     - This is like the bank account in which banks can deposit money with the Fed
     - This is a riskless way for banks to store their cash, so the rate on this account serves as a lower bound for interest rates
     - Not every bank has a reserve account
  2. Overnight reverse repurchase agreement (ON RRP) rate
     - ON RRP facility is available to a broader set of financial institutions
     - Enables banks to deposit reserves at the Fed overnight, receiving a government security as collateral
     - Risk free, so also serves as a lower bound for rate that banks will lend

Conventional Monetary Policy: Setting a Ceiling

- IOR and ON RRP both set a lower bound for the Federal funds rate, but what stops the rate from going higher than the Fed wants?
- The discount rate is the interest rate charged by the Fed for loans it makes through the Fed's discount window
- Banks will not borrow at a higher rate than the rate at which they could borrow from the Fed, so this rate acts as an upper bound
- Open market operations are still needed to ensure that the level of reserves remains "ample"

Unconventional Monetary Policy Tools: Why Were They Needed?

- What happens when rates are already at zero, so conventional monetary policy is no longer feasible?

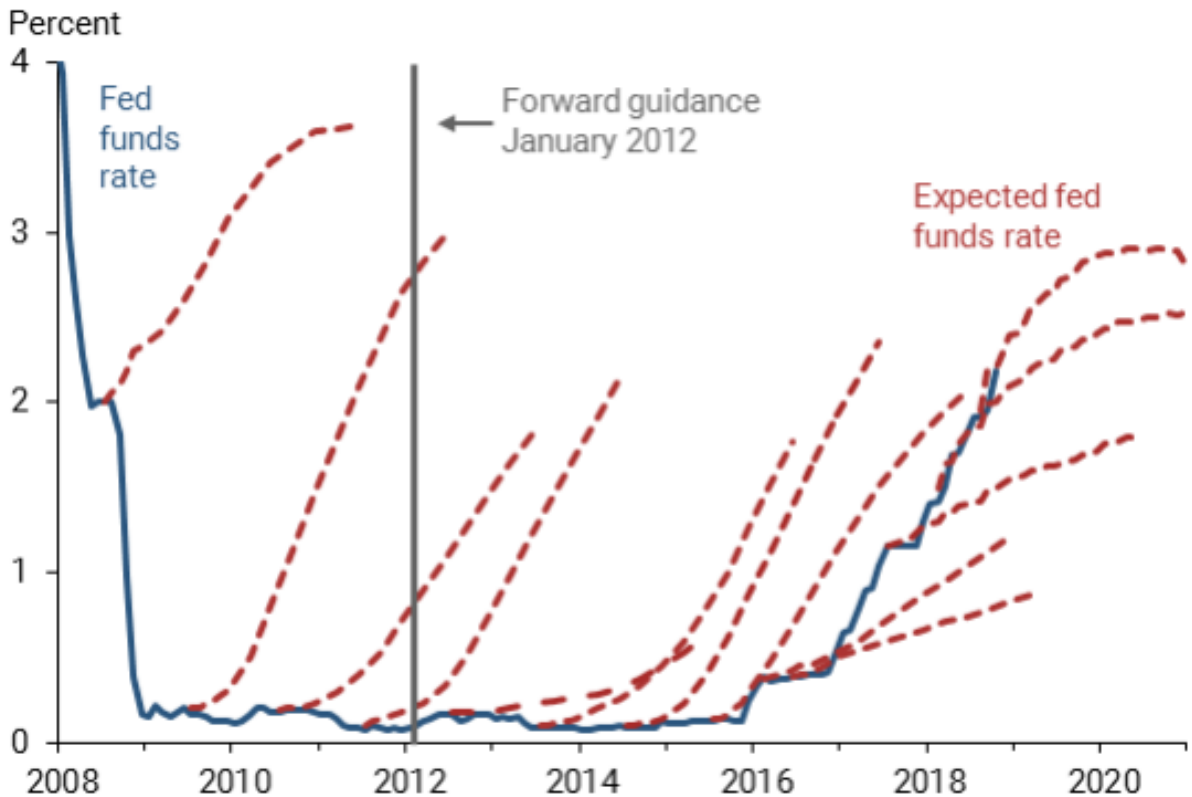


Source: https://www.frbsf.org/economic-research/publications/economic-letter/2018/december/review-of-unconventional-monetary-policy/

Unconventional Monetary Policy: Forward Guidance and the Importance of Communication

- Ben Bernanke: "I think monetary policy is 98% talk and 2% action, and communication is a big part."
- After reducing short-term rates to zero, the Fed sought to affect longer-term bond yields and other financial asset prices by providing forward guidance about future short-term interest rates
- Why would this work? Long-term yields have two components: (1) average of expected future short-term rates over the maturity of the longer bond and (2) the term premium (compensation for the risk of holding longer term bonds)
- Forward guidance changes the expectations component
- Monetary policy communication also plays a role in conveying information about how the Fed views the economy (Fed information channel). We will discuss this in detail when we discuss Bauer and Swanson (2021)

Unconventional Monetary Policy: Was Forward Guidance Effective at Shaping Expectations?

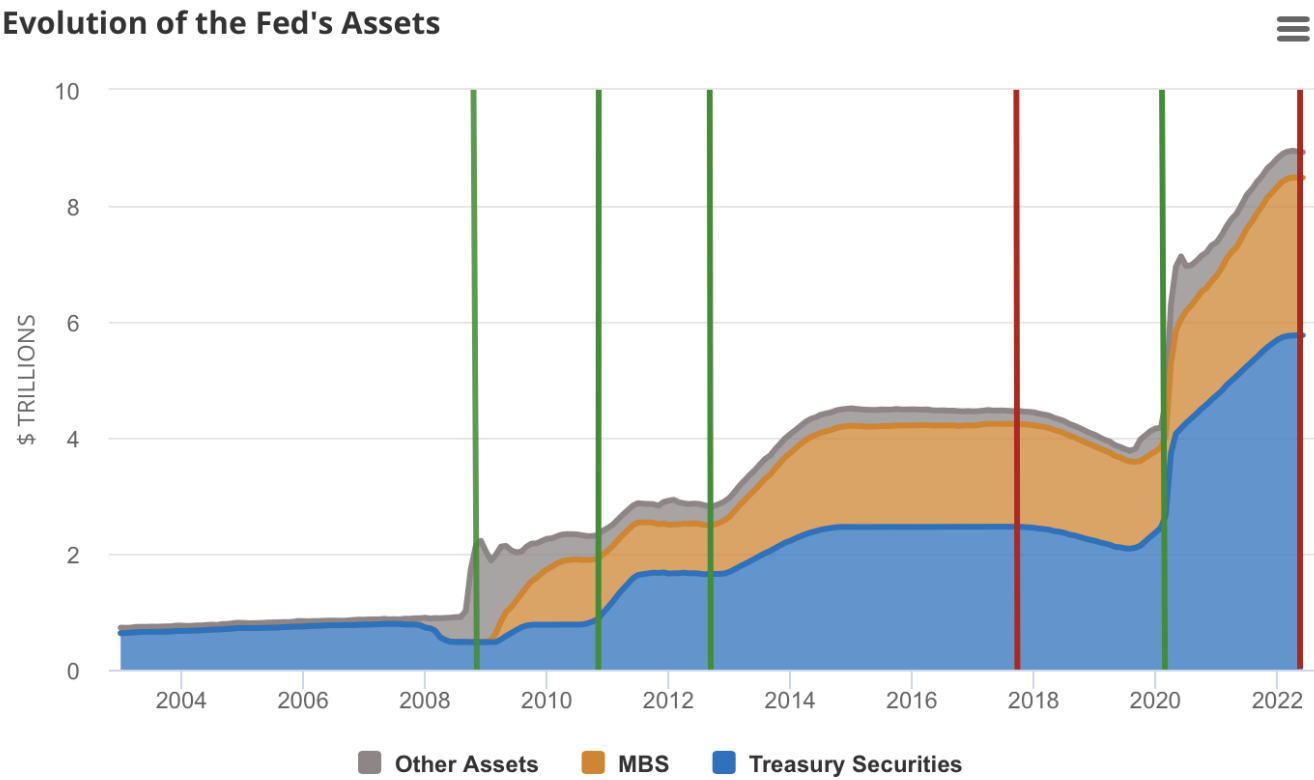


Source: https://www.frbsf.org/economic-research/publications/economic-letter/2018/december/review-of-unconventional-monetary-policy/

Unconventional Monetary Policy Tools: Quantitative Easing

- Quantitative easing refers to the Fed's (and other central banks') purchase of longer-term bonds
- Why would this help lower interest rates? Fed purchases $\Longrightarrow \uparrow$ demand $\Longrightarrow \uparrow$ prices $\Longrightarrow \downarrow$ yields
- During the financial crisis, QE happened in four rounds: QE1 (2008-2010), QE2 (2010-2011), Operation Twist (formally called the maturity extension program, 2011-2012), QE3 (2012-2014)
- The Fed began to normalize the balance sheet in 2017, but expanded it once again during COVID

Unconventional Monetary Policy: Effect of QE on the Fed's Balance Sheet



NOTE: Green lines denote the start of assetpurchases through quantitative easing (QE), red lines denote the start ofbalance sheet reduction through quantitative tightening (QT).
SOURCE: Board of Governors of the Federal Reserve System

Source: https://www.richmondfed.org/publications/research/econ_focus/2022/q3_federal_reserve

Unconventional Monetary Policy: Was QE Effective?

- Depends who you ask! Fabo et al. (2021) find that central bank papers (those written by authors who work at a central bank) find QE to be more effective than academic papers do, reporting larger effects of QE on output and inflation
- An overview of some of the evidence:
  - Balatti et al. (2016) suggest a positive response of equity prices to the quantitative easing. They find an insignificant impact on output and inflation. (Non-CB authors)
  - Weale and Wieladek (2016) find that an asset purchase announcement of 1% of GDP leads to a statistically significant rise of 0.58% (0.25%) and 0.62% (0.32%) rise in real GDP and CPI for the US (UK). (CB authors)

Unconventional Monetary Policy During COVID

- On March 3 and March 15, 2020, the Fed cut the Fed Funds rate back to zero, so it had to turn to unconventional policy tools
- Starting March 15 2020, the Fed resumed purchasing large amounts of debt securities, continuing to increase purchases until November 2021
- In addition to resuming QE (which involved purchasing treasuries, agency securities and mortgage backed securities), the Fed launched the Secondary Market Corporate Credit Facility, which allowed it to purchase investment grade corporate bonds and ETFs which hold those bonds
- The Fed also engaged in many programs in its capacity as "lender of last resort," including lending to large financial institutions, to municipal governments, to small and mid-sized businesses and to large employers
- See https://www.brookings.edu/research/fed-response-to-covid19/ for a full description of the Fed's response to COVID

Unconventional Monetary Policy: Attempts to Unwind QE (Quantitative Tightening)

- On May 22, 2013 Ben Bernanke said, "If we see continued improvement and we have confidence that that's going to be sustained then we could in the next few meetings ... take a step down in our pace of purchases" during an appearance before Congress. This startled financial markets (colloquially called the taper tantrum)
- On December 18, 2013, the Fed said it would reduce the pace of its asset purchases
- Balance sheet normalization began in October 2017
- The Fed did not sell assets to reduce the size of its balance sheet, but instead, let them mature and did not buy new assets to replace them (called balance sheet runoff)
- The amount of securities that were allowed to mature and not be replaced was capped by the FOMC
- QT was interrupted by COVID, only resuming in June 2022

Why Do Interest Rates Affect Output, Unemployment and Inflation?

- Note: what actually matters for demand is real interest rates (nominal interest rates minus the expected rate of inflation)
- Changes in real interest rates affect demand for goods and services by altering borrowing costs, the availability of bank loans, the wealth of households and foreign exchange rates
- Examples of how lower real rates stimulate economic activity?
  - Increase in business investment
  - Increase in durable goods purchases (such as cars and houses)
  - Increase banks' willingness to lend to businesses and households, which might increase spending
  - Stocks become more attractive relative to fixed income, which makes households that own stocks wealthier and potentially willing to spend more
  - Higher stock prices also make businesses more likely to invest (financing the investment by issuing stock)
  - Reduce the value of the dollar, making US-produced goods more attractive to foreign customers

Why is High Inflation a Problem?

- If prices are rising faster than wages, consumers are worse off (their purchasing power or real income falls)
- Inflation does not affect all goods equally (i.e. some goods have "sticky" prices), which means that the extent to which an individual's standard of living falls as a result of inflation is directly related to which goods they buy
  - A particular issue is that food prices tend to be more flexible and poor households spend a larger share of their budgets on food, meaning that inflation can exacerbate the effects of inequality
- Inflation creates uncertainty, which reduces investment

Why is Low Inflation or Deflation a Problem?

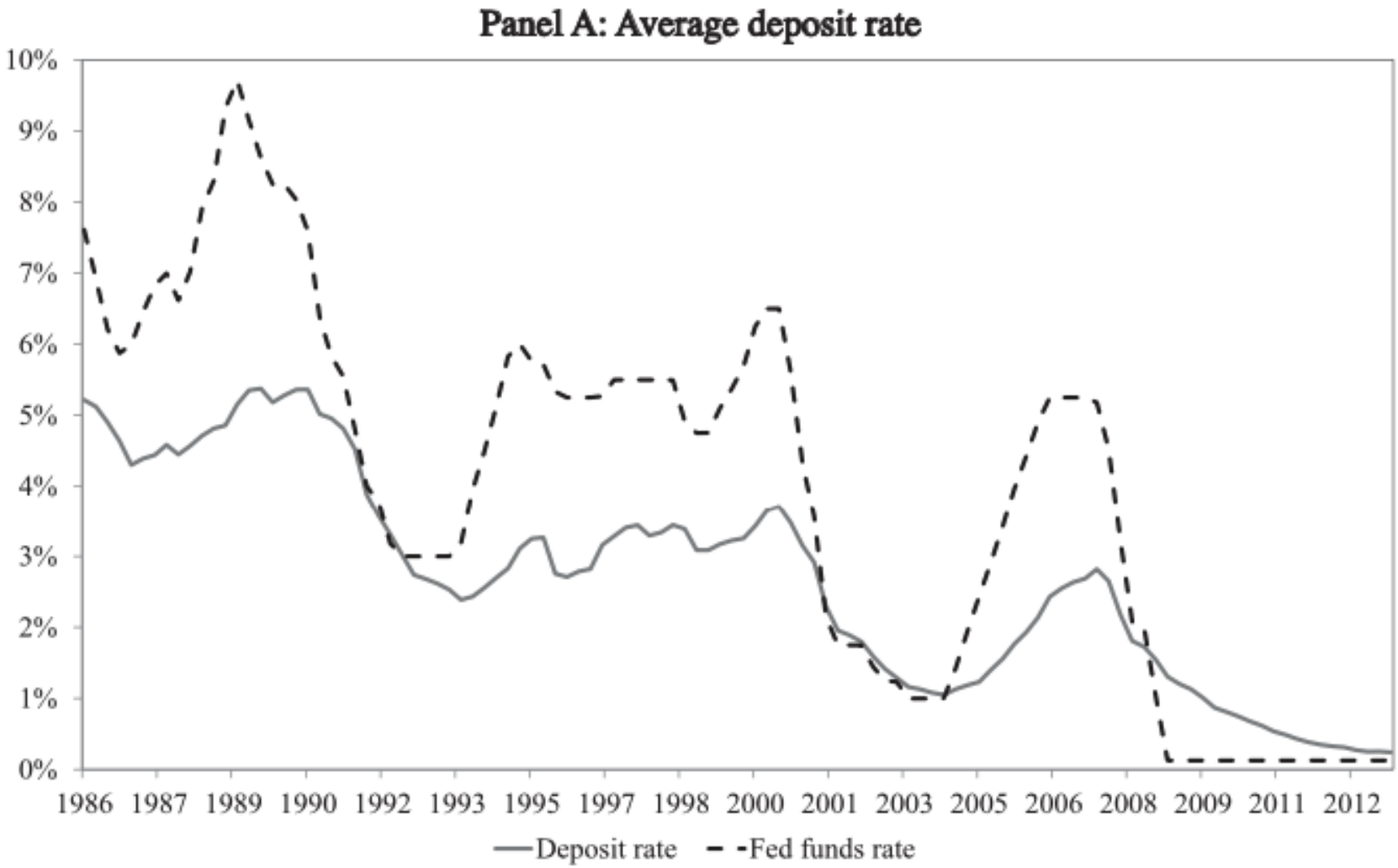
- Deflation redistributes wealth from borrowers to lenders (when debt is fixed rate)
- Deflation can make it more difficult to borrow because collateral value is falling
- Since it is difficult for employers to cut wages, they may lay off employees instead when faced with falling prices, causing a rise in unemployment
- Deflation reduces investment because why invest today if it will be cheaper tomorrow?

Some Empirical Papers Related to Monetary Policy

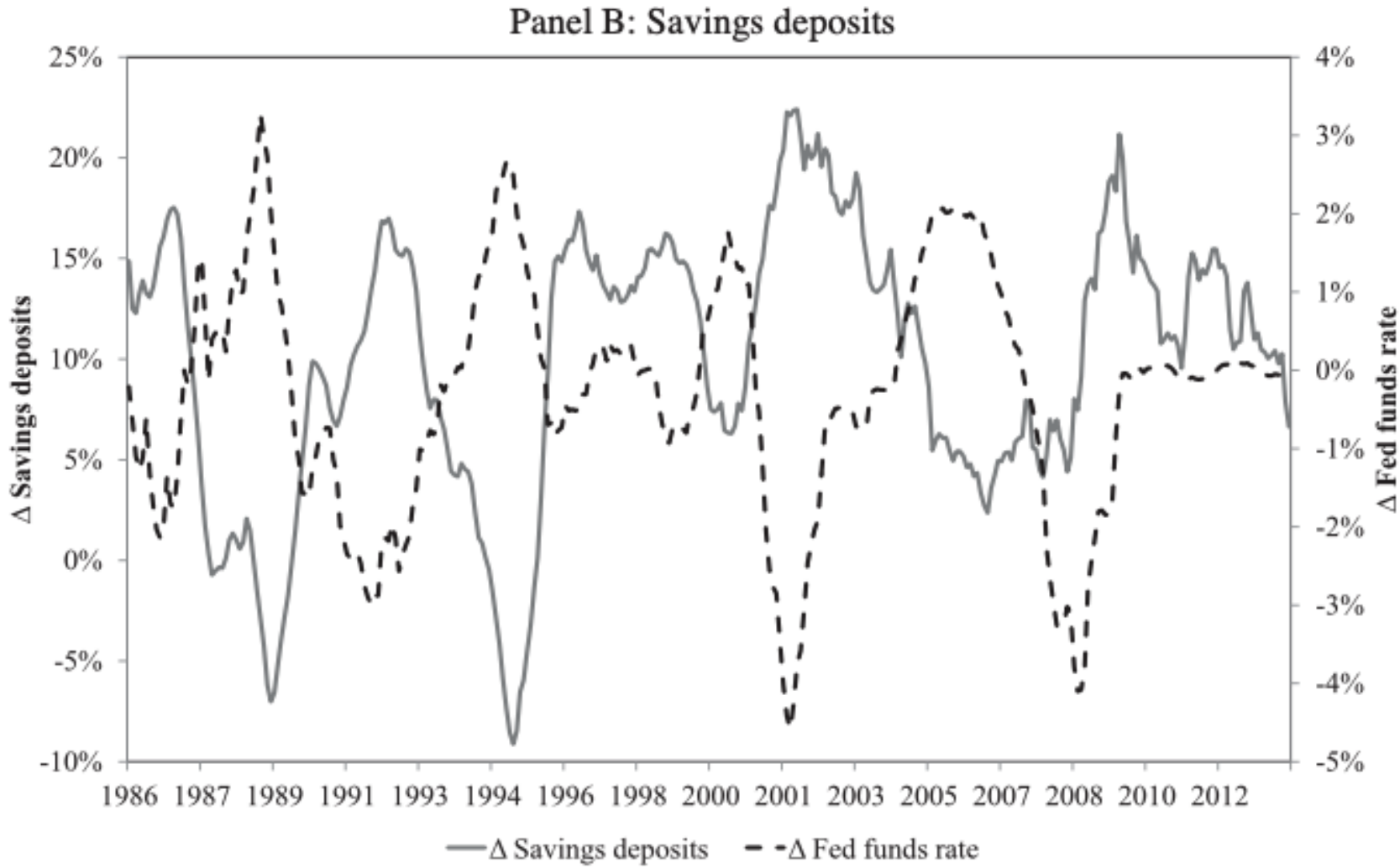
Drechsler et al. (2017): Overview

- A new channel of monetary policy transmission: Fed Funds rate increases $\underbrace{\Longrightarrow}_{①}$ banks widen spreads between the Fed Funds rate and the deposit rate $\underbrace{\Longrightarrow}_{②}$ deposits flow out of the banking system $\underbrace{\Longrightarrow}_{③}$ lending decreases
- $\underbrace{\Longrightarrow}_{①}$: the paper argues that this is possible because banks have market power in local deposit markets
- $\underbrace{\Longrightarrow}_{②}$: households can earn a higher yield by purchasing bonds
- $\underbrace{\Longrightarrow}_{③}$: with fewer deposits, banks have less capital with which to make loans

Drechsler et al. (2017): Illustration of $\underbrace{\Longrightarrow}_{\textcircled{1}}$



Drechsler et al. (2017): Illustration of $\underbrace{\Longrightarrow}_{②}$



Drechsler et al. (2017): Theory

- This is a high-level overview, see the paper for details
- Households value liquidity, which is provided by deposits or cash (liquidity can be considered a non-pecuniary benefit-recall our discussion in the ESG lecture)
- There is a third asset, which is more illiquid, whose rate of return (f) is influenced by the central bank (think of it as Treasuries)
- Banks earn a spread over f on their loans and set a spread for deposits
- Key result: when f is high, households start to move out of deposits. Instead of adjusting the deposit spread to retain their deposits, banks with market power act as monopolists, keeping the spread high and the quantity of deposits low

Drechsler et al. (2017): Empirical Specification I

- Question: what is the causal effect of monetary policy on deposit supply?
- Problem: if raising the Fed Funds rate causes lending opportunities to decline, then this could explain why deposits decrease (which is separate from the deposits channel of monetary policy put forth in this paper)
- Solution: bank-time fixed effects! Recall from last time that this means the effect is being estimated within a given bank-quarter (across branches)
- Identification assumption: banks can shift deposits across markets to meet differential loan demand

Drechsler et al. (2017): Empirical Specification II

$$\Delta y_{it} = \alpha_i + \zeta_{c(i)} + \lambda_{s(i)t} + \delta_{j(i)t} + \gamma \Delta FF_t \times \text{Branch-HHI}_i + \varepsilon_{it},$$

where:

- Δy_{it} is either the change in the deposit spread or in deposits of branch i from time t to time $t+1$
- ΔFF_t is the change in the Fed Funds rate from time t to time $t+1$
- Bank-HHI$_i$ is the concentration of the county where branch i is located
- $\delta_{j(i)t}$ are bank-time fixed effects (bank $j(i)$ owns branch i)
- α_i, $\zeta_{c(i)}$, $\lambda_{s(i)t}$ are branch, county and state-time fixed effects, respectively

Intuition: within a bank, following an increase in the Fed funds rate, do the bank's branches in more concentrated counties raise deposit spreads more and experience larger outflows relative to its branches in less concentrated counties

Drechsler et al. (2017): Results I

TABLE II

DEPOSIT SPREADS AND MONETARY POLICY

	ΔSpread					
	≥2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Savings deposits						
ΔFF × Branch-HHI	0.140***	0.101***	0.099**	0.199***	0.155***	0.159***
	(0.033)	(0.031)	(0.043)	(0.028)	(0.026)	(0.026)
Bank × quarter f.e.	Y	Y	N	N	N	N
State × quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	117,683	117,683	117,683	412,008	412,008	412,008
R^2	0.810	0.799	0.559	0.659	0.650	0.645
Panel B: Time deposits						
ΔT-bill × Branch-HHI	0.074***	0.073***	0.156***	0.156***	0.119***	0.119***
	(0.025)	(0.026)	(0.037)	(0.026)	(0.024)	(0.023)
Bank × quarter f.e.	Y	Y	N	N	N	N
State × quarter f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	121,990	121,990	121,990	430,050	430,050	430,050
R^2	0.808	0.796	0.442	0.513	0.492	0.488

Drechsler et al. (2017): Results I

TABLE III

DEPOSIT GROWTH AND MONETARY POLICY

	Δlog Deposits					
	≥2 Counties			All		
	(1)	(2)	(3)	(4)	(5)	(6)
ΔFF × Branch-HHI	−0.661***	−1.008***	−0.826***	−1.827***	−1.796***	−0.963***
	(0.254)	(0.331)	(0.246)	(0.198)	(0.242)	(0.212)
Bank × year f.e.	Y	Y	N	N	N	N
State × year f.e.	Y	N	N	Y	N	N
Branch f.e.	Y	Y	N	Y	Y	N
County f.e.	Y	Y	Y	Y	Y	Y
Quarter f.e.	Y	Y	Y	Y	Y	Y
Observations	1,150,049	1,150,049	1,150,049	1,310,111	1,310,111	1,310,111
R^2	0.344	0.336	0.025	0.230	0.221	0.025

Hansen et al. (2018): Overview

- Research question: how does transparency affect monetary policy makers' deliberations?
- Background: FOMC meetings have been recorded since the 1970s (to facilitate the preparation of minutes). Until 1993, committee members believed that the tapes were erased after the minutes were prepared. In 1993, it was revealed that the tapes were transcribed before being erased and the transcripts were released. Now, all transcripts are released with a five year lag.
- This paper exploits the fact that prior to 1993, FOMC committee members did not know that the remarks made during the meetings would ultimately be made public

Hansen et al. (2018): Methodology I

- Focus on two sections of the transcripts: FOMC1 and FOMC2
  - FOMC1 is an information-sharing exercise in which each member shares their reading of the current economic situation and its likely path
  - FOMC2 is a discussion of policy strategy
- Use a topic model, LDA (Latent Dirichlet Allocation) to summarize the content of the transcripts. ⏩ Topics
- Rank the topics based on how procyclical they are (higher rank means those that appear more frequently during expansions)
- How to decide which of the 40 topics matter? Use a multinomial logistic regression, using LASSO for shrinkage, with speakers' voiced disagreement as a dependent variable and speakers' distribution over topics as independent variables. They call the selected topics "policy topics" ⏩ List of Policy Topcis

Hansen et al. (2018): Methodology II

TABLE IV

SUMMARY OF COMMUNICATION MEASURES (MEETING-SECTION-SPEAKER LEVEL)

Count measures		Topic measures	
Name	Description	Name	Description
Words	The count of words spoken	Concentration	The Herfindahl index applied to distribution over policy topics
Statements	The count of statements made	Quant	Percentage of time on data topics
Questions	The count of questions asked	Avg Sim (X) $X \in \{B, D, KL\}$ B = Bhattacharyya D = dot product KL = Kullback − Leibler	The similarity between a speaker's distribution over policy topics and the FOMC average, computed using metric X
Numbers	The count of numbers spoken	Pr (no dissent)	The fitted value for no voiced dissent from the LASSO for policy topic selection (only FOMC2)

Hansen et al. (2018): Empirical Specification

- The difference specification:

$$y_{it} = \alpha_i + \gamma D(Trans)_t + \lambda X_t + \varepsilon_{it},$$

where y_{it} is any of the communication characteristics above, $D(Trans)_t$ is an indicator for being in the transparency regime (1 after 1993, 0 before) and X_t are macro controls

- The difference-in-differences specification:

$$y_{it} = \alpha_i + \delta_t + \eta FedExp_{it} + \varphi D(Trans)_t \times FedExp_{it} + \varepsilon_{it},$$

where α_i and δ_t are individual and time fixed effects, $FedExp_{it}$ is the number of years member i has spent working in the Fed system through meeting t

Hansen et al. (2018): Results I

TABLE VI

DIFFERENCE RESULTS FOR ECONOMIC SITUATION DISCUSSION (FOMC1): TOPIC MEASURES

Main regressors	Concentration (1)	Quant (2)	Avg Sim (B) (3)	Avg Sim (D) (4)	Avg Sim (KL) (5)
D(Trans)	0.0041	−0.00027	0.0082***	0.0012	0.032***
	[.205]	[.831]	[.001]	[.692]	[.000]
D(Recession)	0.0061**	−0.000056	0.0020	0.015***	−0.0017
	[.028]	[.968]	[.385]	[.000]	[.758]
EPU index	3.7e-06	−9.6e-06	0.000050*	0.000029	0.00015
	[.890]	[.541]	[.077]	[.300]	[.109]
D(2 day)	−0.0040*	0.0042**	0.00044	−0.0037***	0.00051
	[.093]	[.024]	[.802]	[.001]	[.914]
# of PhDs	0.0017	−0.00063	0.000097	0.00079	0.00018
	[.255]	[.292]	[.885]	[.671]	[.928]
# Stems	0.000075***	8.8e-06**	−3.5e-06	0.000030***	0.000049
	[.000]	[.049]	[.837]	[.001]	[.284]
Constant	0.13***	0.037***	0.89***	0.084***	0.62***
	[.000]	[.000]	[.000]	[.001]	[.000]
Unique members	19	19	19	19	19
Observation	903	903	903	903	903
Member FE	Yes	Yes	Yes	Yes	Yes
Time FE	No	No	No	No	No
Meeting section	FOMC1	FOMC1	FOMC1	FOMC1	FOMC1
Topics	P1	T4 & T23	P1	P1	P1
Similarity measure	—	—	Bhatta-charyya	Dot product	Kullback-Leibler
Transparency effect	2.5	−0.7	0.9***	1.1	4.9***

Hansen et al. (2018): Results II

TABLE X

DIFFERENCE-IN-DIFFERENCES RESULTS FOR ECONOMIC SITUATION DISCUSSION (FOMC1): TOPIC MEASURES

Main regressors	Concentration (1)	Quant (2)	Avg Sim (B) (3)	Avg Sim (D) (4)	Avg Sim (KL) (5)
D(Trans) ×	0.00039	−0.00038***	0.00064*	0.00038***	0.0019**
Fed experience	[.161]	[.005]	[.053]	[.005]	[.027]
Fed experience	0.10	−0.00042	0.075	0.079	0.24
	[.300]	[.984]	[.255]	[.126]	[.181]
# Stems	0.000068***	3.1e-06	1.7e-06	0.000033***	0.000059
	[.000]	[.557]	[.915]	[.000]	[.157]
Observations	920	920	920	920	920
Unique members	19	19	19	19	19
Member FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Meeting section	FOMC1	FOMC1	FOMC1	FOMC1	FOMC1
Topics	P1	T4 & T23	P1	P1	P1
Similarity measure	—	—	Bhatt-acharyya	Dot product	Kullback-Leibler
Rookie effect	−4.7	24.3***	−1.4*	−7.0***	−5.9**

Bauer and Swanson (2021): Overview

- Prior literature has identified a "Fed information effect" channel of monetary policy, whereby an FOMC tightening (easing) communicates that the economy is stronger (weaker) than the public had expected
- This paper shows that these empirical results are also consistent with a "Fed response to news" channel, in which incoming, publicly available economic news causes both the Fed to change monetary policy and the private sector to revise its forecasts

Bauer and Swanson (2021): Simple Framework

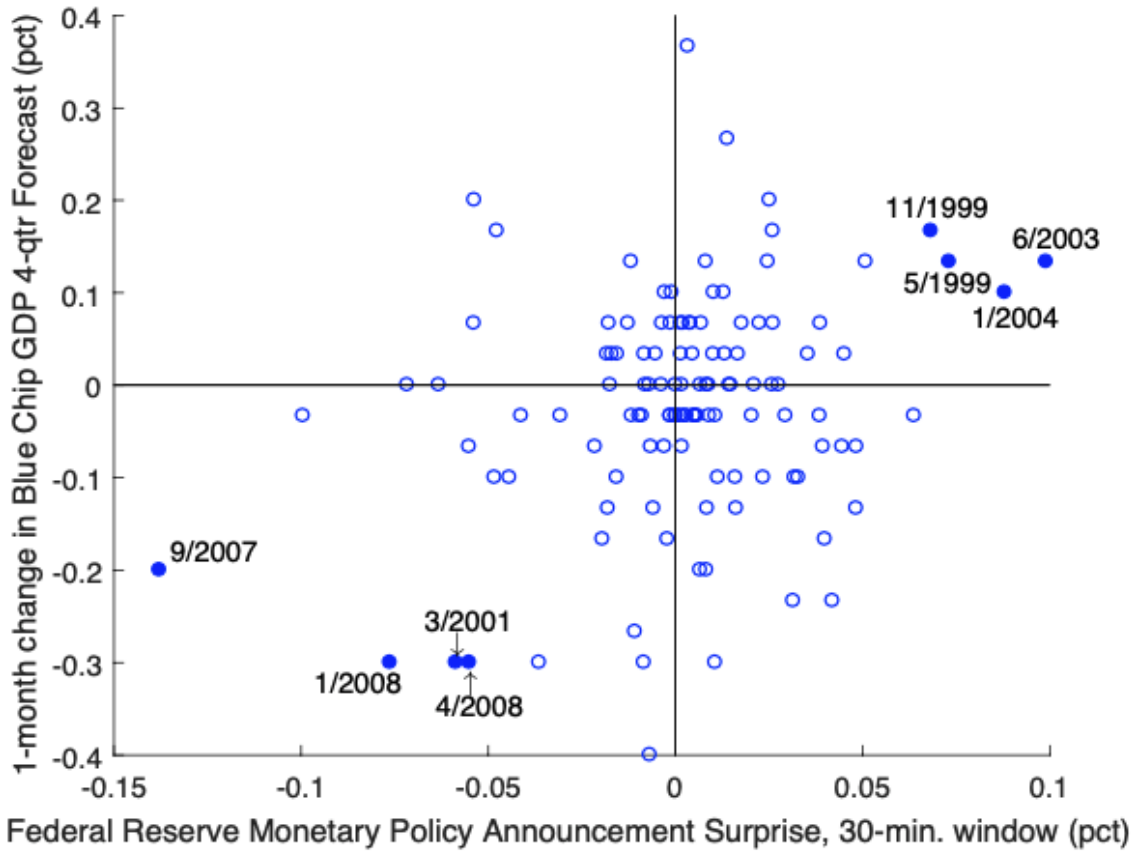
- Monetary policy reaction function:

$$i_t = f(X_t) + \varepsilon_t,$$

  where i_t is the policy rate, X_t is a vector describing the state of the economy and ε_t is a monetary policy shock
- When i_t differs from the private sectors ex-ante expectation, $\mathbb{E}_{t-\delta}[i_t]$, there are three possible reasons:
  1. Exogenous monetary policy shock, ε_t
  2. Fed information effect, in which the Fed's observation of X_t differs from the private sector's ex-ante estimate, $\hat{X}_{t|t-\delta}$
  3. A difference between the Fed's actual policy response function f and the private sector's ex-ante estimate of that function, $\hat{f}_{t-\delta}$
- Prior literature has focused on distinguishing between (1) and (2), but this paper shows that empirical evidence is also consistent with (3)

Bauer and Swanson (2021): Motivation I

Figure 1: Blue Chip GDP Forecast Revisions and FOMC Monetary Policy Surprises



Nakamura and Steinsson (2018) take this relationship to be evidence of the information effect (channel 2 above). This paper argues that it is also consistent with channel 3.

Bauer and Swanson (2021): Motivation II

Table 1: Fed Information Effect Replication and Sample Extension

Blue Chip forecast revision:	Unemployment rate		Real GDP growth		CPI inflation	
	(1)	(2)	(3)	(4)	(5)	(6)
(A) Campbell et al. replication sample: 1/1990–6/2007 ($N=129$)						
target	−0.114		0.097		0.146	
	(0.102)		(0.187)		(0.115)	
path	−0.226		0.273		0.102	
	(0.139)		(0.264)		(0.154)	
R^2	0.04		0.02		0.02	
(B) Nakamura-Steinsson replication sample: 1/1995–3/2014, excluding unscheduled FOMC announcements and 7/2008–6/2009 ($N=120$)						
NS surprise		−0.165		0.920		0.062
		(0.294)		(0.373)		(0.249)
R^2		0.00		0.06		0.00
(C) Full sample: 1/1990–6/2019 ($N=217$)						
target	−0.161		0.162		0.163	
	(0.112)		(0.171)		(0.096)	
path	−0.237		0.139		0.084	
	(0.146)		(0.229)		(0.123)	
NS surprise		−0.391		0.325		0.288
		(0.194)		(0.298)		(0.167)
R^2	0.03	0.02	0.01	0.01	0.02	0.02
(D) Full sample: 1/1990–6/2019, excluding unscheduled FOMC announcements ($N=206$)						
target	0.070		0.126		0.123	
	(0.182)		(0.242)		(0.151)	
path	−0.315		0.369		0.133	
	(0.153)		(0.202)		(0.125)	
NS surprise		−0.298		0.543		0.267
		(0.247)		(0.331)		(0.203)
R^2	0.02	0.01	0.02	0.02	0.01	0.01

Bauer and Swanson (2021): Empirical Specification

Two specifications:

$$BCrev_t = \alpha + \beta target_t + \gamma path_t + \delta' news_t + \varepsilon_t$$

and

$$BCrev_t = \phi + \theta mps_t + \psi' news_t + \eta_t,$$

where $BCrev_t$ is the revision in Blue Chip forecasts for unemployment, GDP and inflation, $target_t$ and $path_t$ are from Gürkaynak et al. (2004), mps_t is the monetary policy surprise and $news_t$ is a vector containing macroeconomic and financial news. The terms in purple are the contribution of this paper relative to Nakamura and Steinsson (2018).

Bauer and Swanson (2021): Results

Table 4: Economic News Drives Out the Fed Information Effect

Blue Chip forecast revision:	Unemployment rate		Real GDP growth		CPI inflation	
	(1)	(2)	(3)	(4)	(5)	(6)
Macroeconomic news						
unemployment surprise	0.314	0.313	−0.022	−0.020	0.024	0.027
	(0.037)	(0.037)	(0.073)	(0.073)	(0.044)	(0.045)
payrolls surprise	−0.139	−0.140	−0.070	−0.065	−0.132	−0.125
	(0.057)	(0.057)	(0.111)	(0.111)	(0.068)	(0.069)
GDP surprise	−0.023	−0.023	0.070	0.069	0.013	0.011
	(0.008)	(0.008)	(0.016)	(0.016)	(0.010)	(0.010)
BBK index	−0.047	−0.047	0.031	0.031	0.008	0.008
	(0.014)	(0.013)	(0.027)	(0.027)	(0.016)	(0.016)
change in core CPI inflation from 6 mos. previous	−0.028	−0.027	−0.010	−0.011	0.034	0.033
	(0.010)	(0.010)	(0.019)	(0.019)	(0.012)	(0.012)
expectation of core CPI release	0.138	0.142	−0.316	−0.334	0.230	0.202
	(0.104)	(0.104)	(0.203)	(0.202)	(0.123)	(0.124)
core CPI surprise	0.069	0.071	−0.131	−0.139	0.224	0.211
	(0.070)	(0.070)	(0.139)	(0.138)	(0.085)	(0.086)
Financial news						
Δ log S&P500	−0.255	−0.252	0.701	0.692	0.027	0.013
	(0.088)	(0.088)	(0.170)	(0.170)	(0.105)	(0.106)
Δ yield curve slope	−0.018	−0.018	−0.021	−0.021	0.012	0.012
	(0.011)	(0.012)	(0.023)	(0.023)	(0.014)	(0.014)
Δ log pcommodity	−0.171	−0.166	0.267	0.245	0.468	0.435
	(0.110)	(0.110)	(0.211)	(0.210)	(0.132)	(0.133)
Monetary policy surprise						
target	0.152		−0.241		0.067	
	(0.073)		(0.144)		(0.088)	
path	0.167		−0.373		−0.212	
	(0.096)		(0.192)		(0.114)	
NS surprise		0.328		−0.588		−0.035
		(0.135)		(0.258)		(0.160)
R^2	0.65	0.65	0.42	0.42	0.32	0.31

Next Week

- What determines inflation other than monetary policy?
- How does monetary policy affect asset prices?

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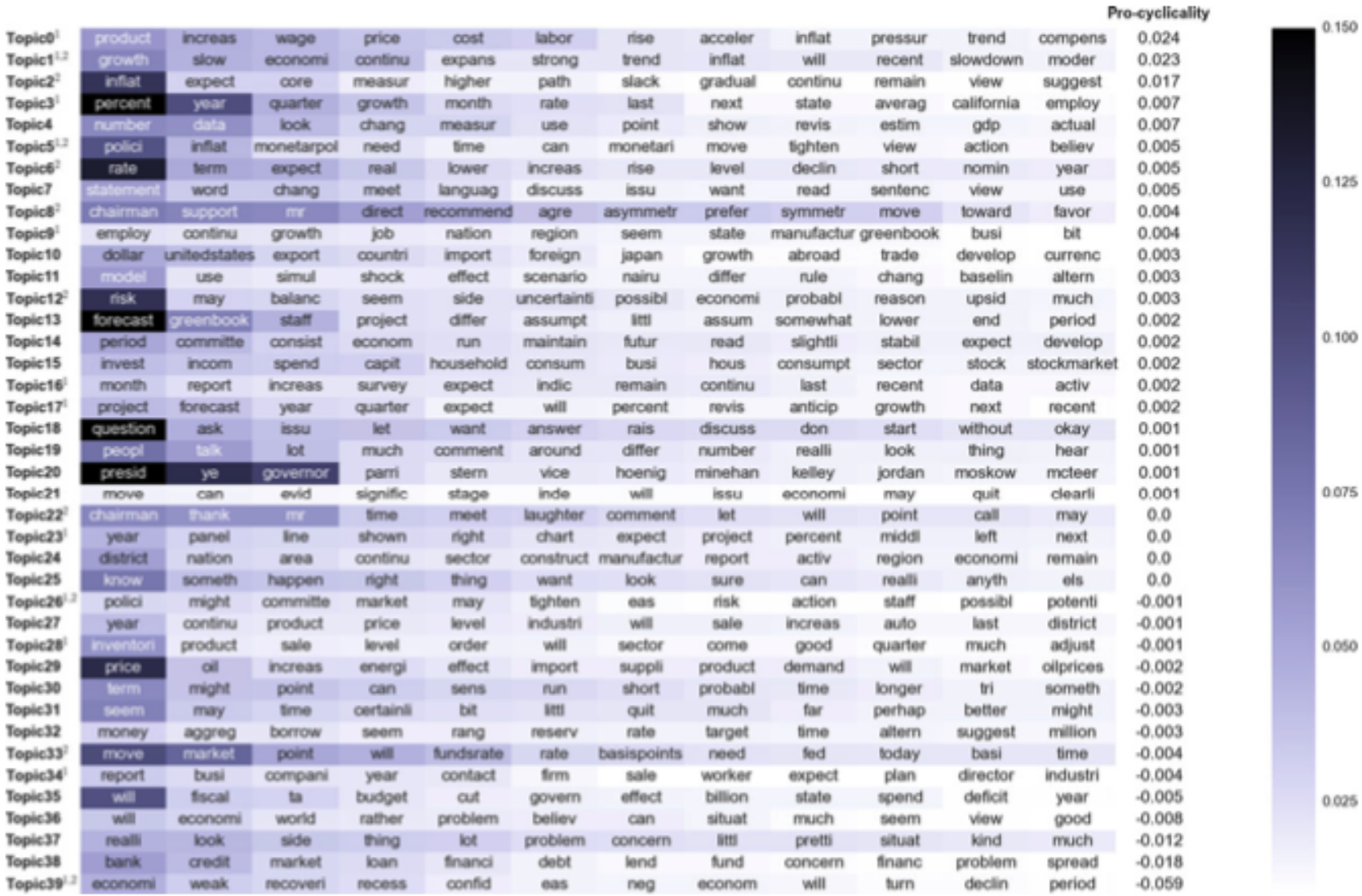
Topics in FOMC Transcripts



													Pro-cyclicality
Topic0[1]	product	increas	wage	price	cost	labor	rise	acceler	inflat	pressur	trend	compens	0.024
Topic1[1,2]	growth	slow	economi	continu	expans	strong	trend	inflat	will	recent	slowdown	moder	0.023
Topic2[2]	inflat	expect	core	measur	higher	path	slack	gradual	continu	remain	view	suggest	0.017
Topic3[1]	percent	year	quarter	growth	month	rate	last	next	state	averag	california	employ	0.007
Topic4	number	data	look	chang	measur	use	point	show	revis	estim	gdp	actual	0.007
Topic5[1,2]	polici	inflat	monetarpol	need	time	can	monetari	move	tighten	view	action	believ	0.005
Topic6[2]	rate	term	expect	real	lower	increas	rise	level	declin	short	nomin	year	0.005
Topic7	statement	word	chang	meet	languag	discuss	issu	want	read	sentenc	view	use	0.005
Topic8[2]	chairman	support	mr	direct	recommend	agre	asymmetr	prefer	symmetr	move	toward	favor	0.004
Topic9[1]	employ	continu	growth	job	nation	region	seem	state	manufactur	greenbook	busi	bit	0.004
Topic10	dollar	unitedstates	export	countri	import	foreign	japan	growth	abroad	trade	develop	currenc	0.003
Topic11	model	use	simul	shock	effect	scenario	nairu	differ	rule	chang	baselin	altern	0.003
Topic12[2]	risk	may	balanc	seem	side	uncertainti	possibl	economi	probabl	reason	upsid	much	0.003
Topic13	forecast	greenbook	staff	project	differ	assumpt	littl	assum	somewhat	lower	end	period	0.002
Topic14	period	committe	consist	econom	run	maintain	futur	read	slightli	stabil	expect	develop	0.002
Topic15	invest	incom	spend	capit	household	consum	busi	hous	consumpt	sector	stock	stockmarket	0.002
Topic16[1]	month	report	increas	survey	expect	indic	remain	continu	last	recent	data	activ	0.002
Topic17[1]	project	forecast	year	quarter	expect	will	percent	revis	anticip	growth	next	recent	0.002
Topic18	question	ask	issu	let	want	answer	rais	discuss	don	start	without	okay	0.001
Topic19	peopl	talk	lot	much	comment	around	differ	number	realli	look	thing	hear	0.001
Topic20	presid	ye	governor	parri	stern	vice	hoenig	minehan	kelley	jordan	moskow	mcteer	0.001
Topic21	move	can	evid	signific	stage	inde	will	issu	economi	may	quit	clearli	0.001
Topic22[2]	chairman	thank	mr	time	meet	laughter	comment	let	will	point	call	may	0.0
Topic23[1]	year	panel	line	shown	right	chart	expect	project	percent	middl	left	next	0.0
Topic24	district	nation	area	continu	sector	construct	manufactur	report	activ	region	economi	remain	0.0
Topic25	know	someth	happen	right	thing	want	look	sure	can	realli	anyth	els	0.0
Topic26[1,2]	polici	might	committe	market	may	tighten	eas	risk	action	staff	possibl	potenti	-0.001
Topic27	year	continu	product	price	level	industri	will	sale	increas	auto	last	district	-0.001
Topic28[1]	inventori	product	sale	level	order	will	sector	come	good	quarter	much	adjust	-0.001
Topic29	price	oil	increas	energi	effect	import	suppli	product	demand	will	market	oilprices	-0.002
Topic30	term	might	point	can	sens	run	short	probabl	time	longer	tri	someth	-0.002
Topic31	seem	may	time	certainli	bit	littl	quit	much	far	perhap	better	might	-0.003
Topic32	money	aggreg	borrow	seem	rang	reserv	rate	target	time	altern	suggest	million	-0.003
Topic33[1]	move	market	point	will	fundsrate	rate	basispoints	need	fed	today	basi	time	-0.004
Topic34[1]	report	busi	compani	year	contact	firm	sale	worker	expect	plan	director	industri	-0.004
Topic35	will	fiscal	ta	budget	cut	govern	effect	billion	state	spend	deficit	year	-0.005
Topic36	will	economi	world	rather	problem	believ	can	situat	much	seem	view	good	-0.008
Topic37	realli	look	side	thing	lot	problem	concern	littl	pretti	situat	kind	much	-0.012
Topic38	bank	credit	market	loan	financi	debt	lend	fund	concern	financ	problem	spread	-0.018
Topic39[1,2]	economi	weak	recoveri	recess	confid	eas	neg	econom	will	turn	declin	period	-0.059

⏩ Back

List of Policy Topics

TABLE III

POLICY TOPICS

FOMC1 policy topics (P1)	0	1		3	5			9			16	17			23		26	28		34	39
FOMC2 policy topics (P2)		1	2		5	6	8		12				22			26			33		39

Notes. To select policy topics, we use a penalized multinomial regression with the voiced dissent measure of Meade (2005) as a dependent variable. The independent variables are the distributions over topics for each speaker, as well as real-time contemporaneous CPI and unemployment. We penalize the coefficients on the topic shares with the ℓ_1 norm but not those on CPI nor unemployment. We optimize the resulting LASSO using the glmnet package in R (Friedman, Hastie, and Tibshirani 2010), and select the weight on the penalty using ten-fold cross-validation. Since these folds are generated randomly for each function call, we perform 100 calls and keep as policy topics those selected in at least 50.

Back