

Deposit Supply and Bank Transparency

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Introduction

- **Question:** What is the impact of shocks to the supply of deposits on banks' voluntary information disclosure?
- **Motivation:** Transparency is important to the governance, efficiency, and stability of banks
 - Banks shape the growth and stability of firms, industries, and the aggregate economy
 - Bank opacity influences bank performance
 - Despite financial disclosure regulations, banks remain opaque
 - Despite research on the connections between disclosure and access to capital markets in nonfinancial firms (e.g., Diamond and Verrecchia, 1991; Lang and Lundholm, 2000; Healy and Palepu, 2001; Kothari 2001; Barth, Konchitchki, and Landsman 2013), we are unaware of previous studies of how dependence on external capital markets shape voluntary information disclosure by banks.
- **Contribution:** We believe that we are the first to identify the impact of shock to a bank's supply of deposit on its voluntary disclosure.

Theory

- The benefits and costs to bank managers from voluntarily disclosing information to the public
 - Benefits: Reducing informational asymmetries can ameliorate agency problems, improve the governance and performance of banks, and lower the costs of raising external funds (e.g., Jensen and Meckling 1976, and Myers and Majluf 1984)
 - Costs: Disclosure might...
 - release information that aids competitors (Verrecchia 1983, Darrough and Stoughton 1990)
 - make banks more vulnerable to depositor withdrawals (Diamond and Dybvig 1983, Morris and Shin 2002)
 - limit the ability of managers to extract private rents (Leuz and Wysocki 2016)

Thus,...

- Bank managers must weigh the benefits from voluntarily disclosing information—such as facilitating access to capital markets—against the potential costs — such as providing competitors with valuable information, increasing fragility, and making it more difficult for them to extract private rents
- In this study, we examine how shocks to the supply of bank deposits influence information disclosure.
 - We focus on bank deposits, which account for over 75% of U.S. commercial bank liabilities

Identification challenges

- Unobserved factors might simultaneously drive both a bank's deposit supply and its voluntary information disclosure.
- A bank's disclosure policies might shape deposit flows, and financing conditions by other creditors.

Ideally:

- Improve deposit supply of random, identical banks.
- Evaluate behavior.

Empirical strategy & data

How we evaluate the impact of shocks to banks' dependence on external finance on bank managers' voluntary information disclosure

Strategy

- **Bank-specific shocks:**
 - Identify deposit shocks to specific banks.
 - Assess impact on information disclosure by that bank.
 - Differentiate banks by competition, and pre-shock dependence on external finance.

Deposit Supply Shocks

(Gilje, Loutskina, & Strahan 2016)

1. Unexpected technological breakthroughs in “fracking” made shale gas production economically viable.
2. The energy industry began purchasing shale mineral leases in promising areas, i.e., in “shale counties.”
 - Times-Picayune (2008) reported that land with promising shale deposits could fetch from \$10,000 to \$30,000 an acre, so that a landowner who leased out 100 acres of promising land could immediately receive an upfront bonus of \$3 million.
3. The landowners deposited a portion of these mineral-lease payments in local banks.
4. Bank holding companies receiving these deposit shocks from their branches in shale counties -> voluntary disclosure.

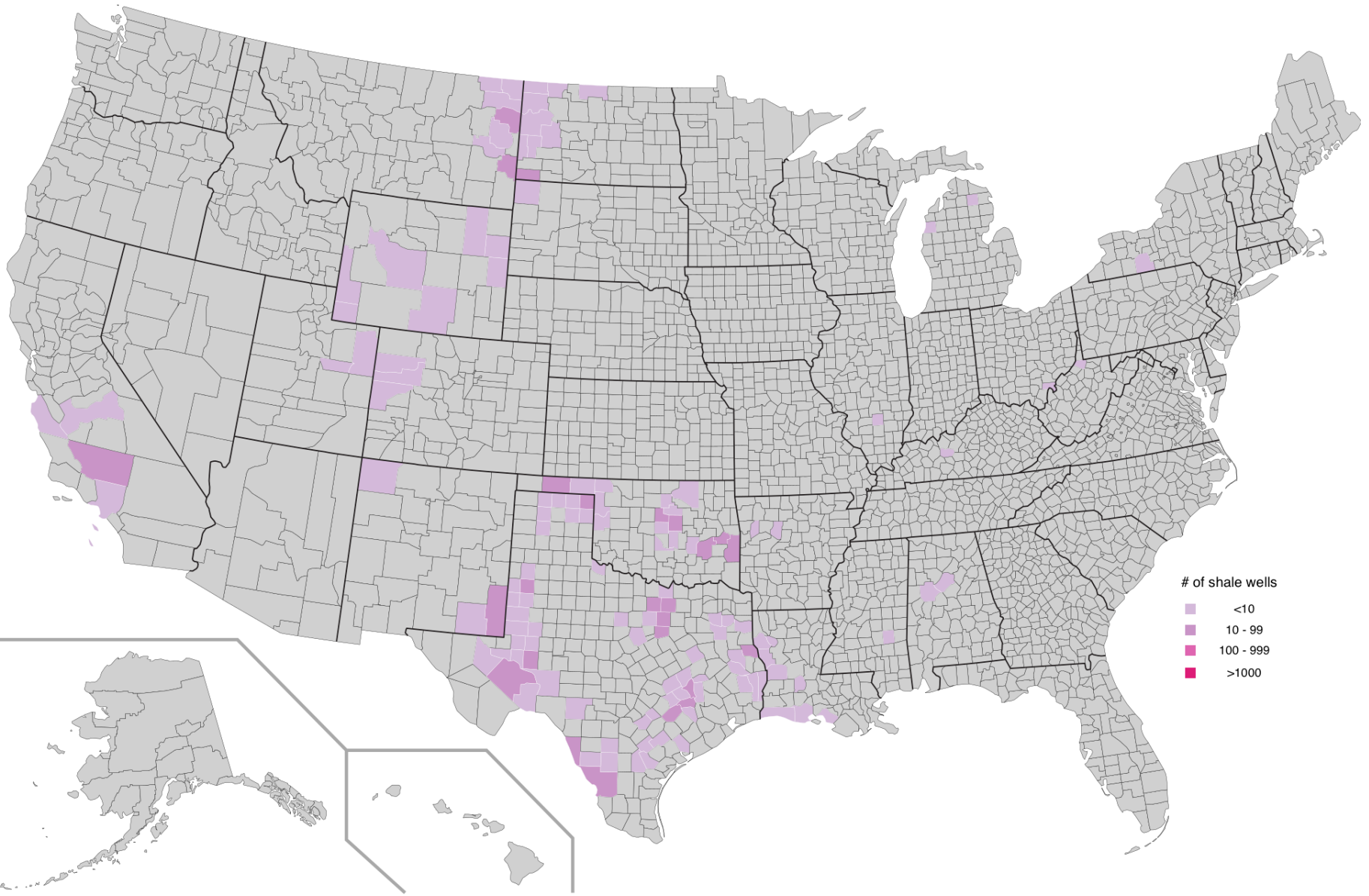
Data: 2000-2007

Bank Holding Company (BHC) sample

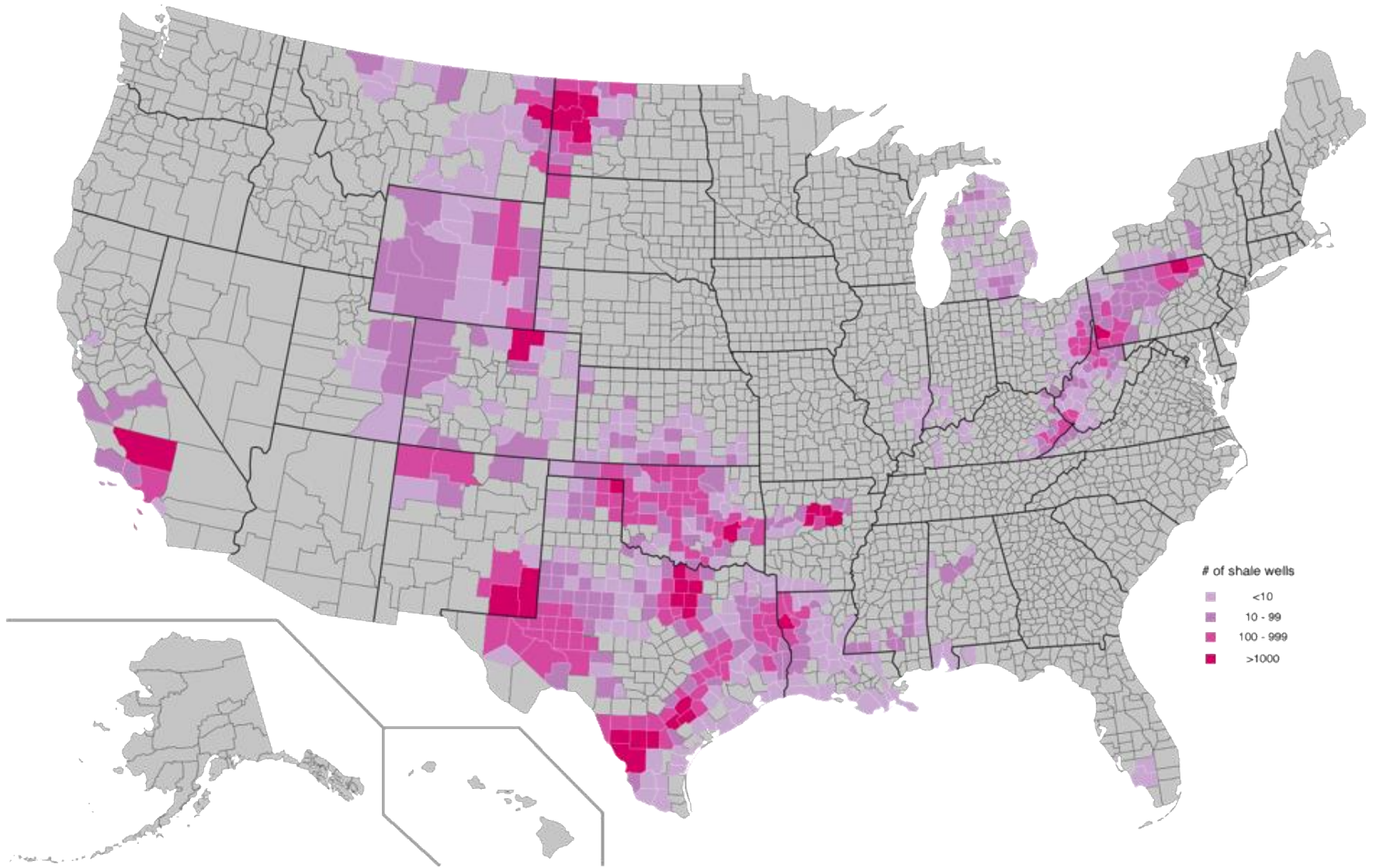
- Our primary sample contains 3,554 BHC-year observations involving 584 BHCs. Our “small” sample excludes the largest BHCs that together account for 80% of total banking assets, as measured in 2007. This reduces the number of BHCs by 12%.

Deposit supply shocks

- Shale wells drilled since 2003
 - “fracking invented”
 - date, location, orientation (horizontal)
 - (*IHS Markit Energy*) (over 15,265 wells)
- Bank branch location and deposit balances
 - (FDIC’s Summary of Deposits)



of Shale Wells Drilled over time since 2003



of Shale Wells Drilled over time since 2003

Bank exposure to shale-induced deposit shock measures

Bank Exposure $_{b,t} =$

$$\ln [1 + \sum_j (\Delta Wells_{j,t} * Mktshr_{b,j,t} * 1(Boom_{j,t})) / Branches_{b,t}],$$

- where subscripts b , j , and t denote bank, county, and year, respectively.
- $\Delta Wells_{j,t}$ equals the total number of shale wells drilled in county j in year t , so that it measures the intensity of shale development in the county during year t .
- $Mktshr_{b,j,t}$ equals the share of total deposits in county j in year t held by bank b , i.e., the market share of bank b in county j in year t .
- $1(Boom_{j,t})$ is an indicator variable that equals one if county j is categorized as a shale-boom county in year t , and zero otherwise. County j is treated as experiencing shale booms if the number of shale wells drilled in that county in year t is above the top quartile of the sample across all county-year observations.
- $Branches_{b,t}$ equals the total number of branches owned by BHC b in year t across all counties in the U.S.

Bank exposure to shale-induced deposit shock measures

- *Bank Exposure* ranges from 0 to 4.7, with a standard deviation of 0.12.
- Among banks exposed to shale development, *Bank Exposure* has a sample mean of 0.14, with a standard deviation of 0.54.
- For the smaller sample of BHCs that excludes the largest BHCs, the sample mean of *Bank Exposure* for exposed banks equals 0.23.

Validity Tests

- The degree of BHC exposure to shale development is positively associated with increases in deposits.

$$\text{Deposit Growth}_{b,t} = \beta \cdot \text{Bank Exposure}_{b,t} + \gamma' \cdot X_{b,t-1} + \theta_b + \theta_t + \varepsilon_{b,t},$$

- $\text{Deposit Growth}_{b,t}$ represents the annual growth rate of domestic deposits for BHC b in year t ,
- $\text{Bank Exposure}_{b,t}$ is the exposure of BHC b in year t to shale development.
- $X_{b,t-1}$: a vector of time-varying BHC traits, *Size*, *LLP*, *Loss*, and *Cap*.
- BHC and year fixed effects to account for time-invariant BHC characteristics and year-specific influences on deposit growth.

Table 2. Shale Exposure and Bank Deposit Gains

Dep Var	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
	Deposit Growth	Cost of Deposits	Deposit Growth	Cost of Deposits
Bank Exposure	5.6106** (2.1962)	-0.1495*** (0.0212)	4.6661*** (1.7099)	-0.1654*** (0.0155)

Economic magnitude

Consider the deposits of BHCs that are exposed to a one-standard-deviation of shale activities—*Bank exposure* = 0.54 (Average across those receiving non-zero shale activity.)

Estimates from column (1) indicate their deposits would grow 3 percentage points ($=0.54 \times 5.61$) faster than BHCs with zero exposure.

This is equivalent to about 26% of the sample mean deposit growth (11.7 percentage points).

BHC Disclosure Measures

- Based on the bank level measures, we then evaluate the impact on voluntary disclosure
- To measure the extent to which a BHC's management voluntarily discloses information to the public, we construct *three* categories of measures based on
 1. the Management Discussion and Analysis (MD&A) Section of annual reports (i.e., 10-K filings),
 2. the voluntary items in 8-K filings, and
 3. forward-looking earnings guidance provided by BHC managers.

Disclosure data

- The first category of BHC disclosure measures is based on data from the MD&A section of 10-K filings
- Since 1980, the Securities and Exchange Commission (SEC) requires public firms to augment GAAP mandated disclosure with unaudited, *narrative disclosures* in their annual reports.
- The SEC stipulates that MD&A disclosure should discuss and analyze the firm's operational performance, financial condition, and project trends, to improve the ability of investors to make informed predictions about the firm's prospects, and provide incremental information to other public financial statements (SEC 1980)

Disclosure Measures

- Following prior research (e.g., Li, 2008; Brown and Tucker, 2011), we use textual analysis to construct two primary measures of information disclosure based on the MD&A section of 10-K filings.
 1. *MD&A Length*, which equals the natural logarithm of one plus the number of words in the MD&A section of the BHC's 10-K filings.
 2. *MD&A Modification* equals the log transformation of one minus the similarity score from comparing MD&A sections between year t and year $t-1$ for the same BHC.
 - The similarity score is calculated based on the Vector Space Model (VSM), an algorithm commonly used by Internet search engines to determine similarities between documents.
 3. Other measures: *MD&A Exhibits* and *MD&A Numbers*

Tests of Pre-trends

$$Y_{b,pre} = \lambda_1 \text{Bank Exposure}_b + \lambda_2 X_b + e_b,$$

	(1)	(2)	(3)	(4)
	All BHCs			
Dep Var	Deposit Growth, 2000-2002	#Branch Growth, 2000-2002	MD&A Length, 2000-2002	MD&A Modification, 2000-2002
Shale Exposure 2003-2007	-6.0398 (4.3482)	-4.5078 (6.2839)	1.2995 (1.0473)	-0.0434 (0.1753)
N	518	518	518	518
R-sq	0.0502	0.0721	0.1606	0.1106

- No “pre-trends” in bank deposits, bank branches, or information disclosure before shale discoveries.

Bank-level analyses

Bank Exposure and MD&A Disclosure

Bank Exposure and MD&A Disclosure

$$\text{Bank Disclosure}_{b,t} = \beta \cdot \text{Bank Exposure}_{b,t} + \gamma' \cdot X_{b,t-1} + \theta_b + \theta_t + \varepsilon_{b,t},$$

- *Bank Disclosure*_{*b,t*}: one of the measures on MD&A disclosure in 10-K filings (i.e., *MD&A Length*, or *MD&A Modification*) for BHC *b* in year *t*.
- *Bank Exposure*, the key explanatory variable, the BHC's exposure to shale development.
- $X_{b,t-1}$: a vector of time-varying BHC traits, *Size*, *LLP*, *Loss*, and *Cap*.
- θ_b and θ_t : BHC and year fixed effects.

Table 4. Bank Exposure and Disclosure via Management Discussion & Analysis

	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
Dep Var	MD&A Length	MD&A Modification	MD&A Length	MD&A Modification
Bank Exposure	-0.4416*** (0.0774)	-0.2272*** (0.0320)	-0.4932*** (0.0773)	-0.2312*** (0.0360)

Economic magnitude:

Consider two otherwise similar banks, except that one BHC is exposed to an average shale-induced deposit windfalls (*Bank exposure* = 0.14); the other does not.

The coefficient estimates from column 1 indicate that the length of a bank's text-based MD&A section would drop by about 6%.

Extension: Differentiate banks

- Conjecture: Voluntary disclosures could provide valuable information to competitors. Thus, BHCs facing more intense competitive pressures might be more concerned about the costs of providing information to competitors.
- Assume: The negative impact of a BHC's exposure to shale development on its disclosure decisions should be stronger among BHCs facing more intense competition.

Differentiate by Competition

- Are results especially strong among banks facing more intense competition?

$$\begin{aligned} \text{Bank Disclosure}_{b,t} = & \delta \cdot \text{Bank Exposure}_{b,t} \cdot \text{Competition}_{b,2003} \\ & + \beta \cdot \text{Bank Exposure}_{b,t} + \gamma' \cdot X_{b,t-1} + \theta_b + \theta_t + \varepsilon_{b,t} \end{aligned}$$

- *Competition*_{b,2003} : the number of occurrences of the following words in BHC *b*'s 10-K filing in 2003: “competition,” “competitor,” “competitive,” “compete,” “competing,” while removing any occurrences where “not,” “less,” “few,” or “limited” precedes the word by three or fewer words, and refer to this total as “competition words.”

Table 5. Bank Exposure, MD&A Disclosure and Market Competition

Dep Var	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
	MD&A Length	MD&A Modification	MD&A Length	MD&A Modification
Bank Exposure × Competition	-0.7344** (0.2915)	-0.1943* (0.0994)	-0.5981** (0.2489)	-0.1797* (0.1069)
Bank Exposure	-0.0285 (0.2061)	-0.1179* (0.0661)	-0.1550 (0.1888)	-0.1296* (0.0718)
BHC controls	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
N	3554	3554	3017	3017
R-sq	0.7571	0.5245	0.7440	0.5305

- As shown, the negative impact of bank exposure to shale development that increased the supply of deposits on MD&A disclosures is more pronounced among BHCs facing greater competition.
- Consistent with the notion that greater competition induces managers to withhold information disclosure due to the potential proprietary costs associated with transparency, thereby aggravating the negative impact of deposit windfalls on information disclosure

Differentiate by Access to Capital Markets

- Are results especially strong among banks that rely more heavily on capital markets prior to the shale shock?
- The main theoretical mechanisms suggest that the deposit shocks allow banks to substitute out of capital market financing into deposit financing.
- *Access to Capital Markets* _{$b,2003$} : the extent to which banks depend on capital market financing using the total number of equity and bond issuance of each BHC over the five-year window prior to the shale shock.

Table 6. Bank Exposure, MD&A Disclosure and Access to Capital Markets

Dep Var	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
	MD&A Length	MD&A Modification	MD&A Length	MD&A Modification
Bank Exposure × Access to Capital Markets	-0.4305** (0.2072)	-0.3426*** (0.1150)	-3.6865** (1.8116)	-2.2133*** (0.1959)
Bank Exposure	-0.4362*** (0.0745)	-0.2229*** (0.0330)	-0.4873*** (0.0741)	-0.2277*** (0.0374)
BHC controls	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
N	3554	3554	3017	3017
R-sq	0.7571	0.5250	0.7442	0.5318

- As shown, the negative impact of bank exposure to shale on MD&A disclosures is more pronounced among BHCs depending more on capital market financing.
- Consistent with the view that the shale shocks allow banks to substitute out of capital market financing and diminish the benefits of information disclosure to maintain access to capital markets

Disclosure via 8-K filings

8-K Disclosure Measures

We obtain the 8-K filings from the SEC's EDGAR database.

1. **Voluntary 8-K Frequency** equals the natural logarithm of one plus the total number of 8-K filings reported under items Reg FD and Others
 2. **Voluntary 8-K Length** equals the logarithm of one plus the average length (in characters) of these voluntary 8-K filings
 3. **Voluntary 8-K CAR(-n, +n)** measures the market reaction to the release of these voluntary 8-K filings, and equals the three- or seven-day absolute value of the cumulative abnormal return (CAR) around the announcement day, where $n = 1$ or 3 .
- SEC mandates that publicly listed companies disclose material corporate events in 8-K filings in a timely manner, so that investors obtain a continuous stream of relevant information on corporate performance
 - For example, the SEC requires that 8-K filings include information on acquisitions or dispositions of assets, entry into bankruptcy or receivership, changes in control of the registrant, changes in registrant's directors and officers, etc.
 - Other types of disclosures—voluntary disclosures—are left to the discretion of management. Following Boone and White (2015), we define “voluntary disclosures” as those 8-K filings under items “Regulation Fair Disclosure” and “Other Events” which managers choose to disclose to investors.
 - For example, these voluntary disclosures include updated risk factors associated with a company's business or capital structure, exposure to actual or threatened litigation, the launch of new products or entry into new markets, and other agreements or appointments.

Table 7. Bank Exposure and Voluntary 8-K Filings

Dep Var	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
	Voluntary 8K Frequency	Voluntary 8K Length	Voluntary 8K Frequency	Voluntary 8K Length
Bank Exposure	-0.2312** (0.1173)	-1.4499** (0.6548)	-0.2091* (0.1119)	-1.4053** (0.6392)
BHC controls	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
N	3554	3554	3017	3017
R-sq	0.6833	0.5084	0.6725	0.5040

Table 8. Bank Exposure and Market Reaction to Voluntary 8-K Filings

Dep Var	(1)	(2)	(3)	(4)
	All BHCs		Exclude Large BHCs	
	Voluntary 8K _CAR(-1,1)	Voluntary 8K _CAR(-3,3)	Voluntary 8K _CAR(-1,1)	Voluntary 8K _CAR(-3,3)
Bank Exposure	-0.0184*** (0.0022)	-0.0270*** (0.0016)	-0.0168*** (0.0032)	-0.0245*** (0.0027)
BHC controls	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
N	3554	3554	3017	3017
R-sq	0.5633	0.5929	0.5619	0.5982

Managerial earnings guidance

Corporate earnings guidance

We obtain data on corporate earnings guidance (i.e., the official earnings forecast provided by bank managers) from the Company Issued Guidance (CIG) database, which is contained in the First Call Historical Database.

1. ***Managerial Earnings Guidance Frequency*** equals the natural logarithm of one plus the total number of management earnings forecasts issued by the BHC in a given year
2. ***Managerial Earnings Guidance Precision*** gauges the precision of managerial earnings forecasts
3. ***Managerial Earnings Guidance_CAR(-n, n)*** equals the absolute value of CARs associated with managerial earnings forecasts n -day(s) around the announcement date, where $n = 1$ or 3 .

Table 9. Bank Exposure and Managerial Earnings Guidance

	(1)	(2)	(3)	(4)
	All BHCs			
	Managerial Earnings Guidance			
	Frequency	Precision	CAR(-1,1)	CAR(-3,3)
Bank Exposure	-0.0856*** (0.0207)	-0.1536*** (0.0196)	-0.0212*** (0.0016)	-0.0215*** (0.0020)
BHC controls	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
N	1107	1107	1107	1107
R-sq	0.4976	0.3600	0.4766	0.4659

Stock Market Liquidity

Bank Exposure and Stock Market Illiquidity

Stock market illiquidity measures: informational asymmetries (between insiders and outside investors) reduce the liquidity of a firm's securities

1. Bid-Ask Spread

2. Amihud Illiquidity

3. Proportion Zero-Return Days

- Findings: we confirm the paper's core findings with these stock market illiquidity measures of informational asymmetries: BHCs experiencing a shale boom shock experience a sharp increase in stock market illiquidity, which suggests an increase in informational asymmetries.

To further assess the economic impact of deposits on disclosure...

- Instrument bank deposits with bank exposure to shale development and estimate an instrumental variable (IV) model.
- Relevance of the instrument
- The second-stage results are consistent with the view that shocks to deposits materially affect information disclosure

Table 11. Deposit Growth and Bank Voluntary Disclosure – IV Tests

	(1)	(2)	(3)	(4)
	Management Discussion & Analysis		Voluntary 8K Filings	
Dep Var	MD&A Length	MD&A Modification	Frequency	Length
Deposit Growth	-0.0707*** (0.0259)	-0.0463* (0.0258)	-0.0589*** (0.0158)	-0.3149*** (0.1043)

The IV estimates suggest an economically large effect:

If bank deposits grow by 10 percentage points, (a) the length of MD&A text-based disclosures would drop by 0.7, equivalent to about 10% of the sample mean value of *MD&A Length*, (b) the frequency of voluntary 8-K filings would drop by about 50% of the mean value of *Voluntary 8-K Frequency*

Conclusions

- Q: What is the impact of positive shocks to deposit supply on banks' voluntary disclosure of information?
- A: Positive deposit supply shocks reduce voluntary disclosure
 - Deposit windfalls relax a bank's external funding constraints and lower the benefits to bank managers of voluntarily releasing information to facilitate fund raising

THANKS!
