

# Bank Lending Standards and the U.S. Economy

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## The importance of bank lending standards

Policymakers often rely on the **Senior Loan Officer Opinion Survey (SLOOS)** on Bank Lending Practices to assess, in a timely manner, lending conditions in the banking system

For example, on the July 26, 2023 Post-FOMC Press Conference:

Chair Powell: *"The SLOOS has been telling us for more than a year that banking conditions are tightening. That process is ongoing, and that will restrain economic growth."*

An empirical literature has developed to try to understand how changes in lending standards affect the macroeconomy [Lown and Morgan \(2006\)](#); [Bassett et al. \(2014\)](#); [Castro et al. \(2022\)](#); [Cavallo et al. \(2024\)](#)

The Fed has been conducting the SLOOS quarterly, for more than 30 years  
→ allows for a more comprehensive empirical investigation

- Challenge: lending standards are, to some extent, endogenous → hard to disentangle cause and effect

This work is part of a broader effort to determine the impact of credit supply shocks on macro outcomes (e.g., [Ajello, 2016](#); [Mumtaz et al., 2018](#); [Barnichon et al., 2022](#) and many more)

- some of the SLOOS literature interprets changes in lending standards as proxies for shocks to the supply of credit
- we take a more *agnostic view*: policymakers look at changes in lending standards: What should they expect about how the economy will respond to those changes?

## Dealing with endogeneity

Two approaches:

- Use a structural VAR approach to identify lending standard shocks and their effects on other macro variables; as in [Lown and Morgan \(2006\)](#)
- Use bank-level data to identify lending standards shocks and then use those in a VAR; as in [Bassett, et al. \(2014\)](#)

We pursue both approaches and compare

# Contribution and results

We make three **main contributions**:

- Disaggregating lending categories, into loans to households and to businesses
  - changes in business lending standards are the main drivers of the effect of standards on the economy; changes in household lending standards are less important
- Allowing for state-dependent responses and asymmetries
  - effect concentrated in periods when interest rates are away from effective lower bound and when output is below trend
  - tightening of standards has significant negative impact on GDP growth; easing of standards has insignificant effects
- We also assess the informational advantage of using bank-level data
  - adjusting for various bank characteristics seems to not matter much for the aggregated measures of exogenous changes in lending standards

# SLOOS overview

Sample period → 1996-2021

Participating banks in our sample:

- up to 80 domestic banks, each with \$2B+ in assets and geographically dispersed (we abstract from foreign banks)
- covering aprox. 70% of total domestic bank assets
- each bank reports changes to lending standards using the following general template:

*“Over the past three months, how have your bank’s credit standards for loans of type X changed?”*

where X is a category of loans: C&I, consumer, CRE, and RRE (and subcategories)

→ similar question for loan demand

## Constructing the diffusion index

We construct weighted diffusion indexes of changes in lending standards (and loan demand) for each of the major loan categories  $c$ , as in [Glancy, et al. \(2020\)](#)

$$\Delta S_{c,i,t} = \sum_k w_{c,i,t-1}[k] * I_{c,i,t}^S[k]$$

where

$w_{c,i,t-1}[k] \rightarrow$  fraction of bank  $i$  lending portfolio for subcategory  $k$  in loan category  $c$  at the beginning of period  $t$

and

$I_{c,i,t}^S[k] \rightarrow$  equals 1 if the bank tighten lending standards in subcategory  $k$  of loan category  $c$  at time  $t$  (and  $-1$  if it loosened standards, while zero represents no change)

## Adjusted lending standards

We construct adjusted lending standards using the approach in Bassett, et al. (2014)

$$\Delta S_{cit} = \beta_1 \Delta S_{ci,t-1} + \beta_2 \Delta D_{cit} + \lambda_1' E_{t-1} [\mathbf{m}_{t+4} - \mathbf{m}_t] + \lambda_2' \mathbf{f}_t + \theta' \mathbf{Z}_{ci,t-1} + \phi_i + \epsilon_{cit}$$

- $\Delta D_{cit}$  is the diffusion index for changes in loan demand
- $\mathbf{m}_t$  is a vector of macroeconomic variables characterizing the economic outlook (e.g. expected change in unemployment)
- $\mathbf{f}_t$  controls for common factors affecting the current state of the macroeconomy (e.g. change in VIX)
- $\mathbf{Z}_{cit}$  is a vector of bank specific controls (e.g. change in NIMs)



## Aggregate time series

We aggregate across banks to produce time series of changes in aggregate lending standards

$$\Delta S_{ct} = \sum_i^{N_t} w_{ci,t-1} * \Delta S_{cit}$$

and our adjusted lending standards are

$$\Delta S_{ct}^a = \sum_i^{N_t} w_{ci,t-1} * \hat{\epsilon}_{cit}$$

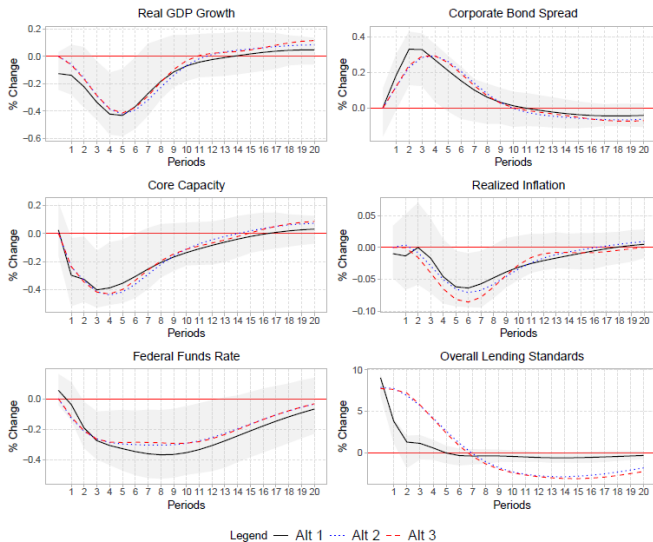
- $N_t \rightarrow$  number of respondent banks
- $w_{c,i,t-1} \rightarrow$  fraction of category- $c$  loans on SLOOS respondents' balance sheets that are held by bank  $i$  at the beginning of quarter  $t$

# Empirical approach

- ① We estimate a medium-scale VAR identified via timing assumption (standard Cholesky decomposition)
  - unadjusted standards ordered last → no contemporary impact on other macro variables
  - adjusted standards ordered first → since already purged
- ② Decompose the aggregate effect into effects from changes in business and household standard
  - VAR with aggregate changes in lending standards
  - VAR with changes in lending standards for loans to business and household, separately
- ③ Use a threshold VAR to evaluate state-contingent responses
  - above and below GDP growth trend
  - high and low interest rate
  - asymmetries: tightening vs. easing of adjusted lending standards

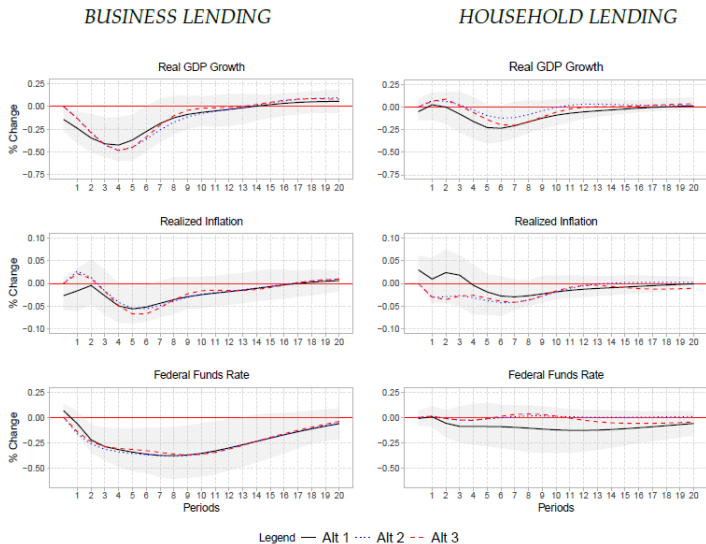
# Shock to overall lending standards

Figure 5: Orthogonal impulse response functions: Shock to overall lending standards



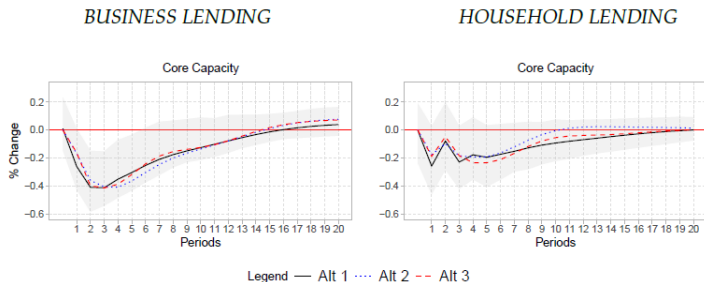
# Standards for businesses and for household

Figure 8: Orthogonal impulse response functions: Shock to business and household lending standards



# On the transmission channel

**Figure 9:** Impact on bank core lending capacity of a shock to business/household lending standards



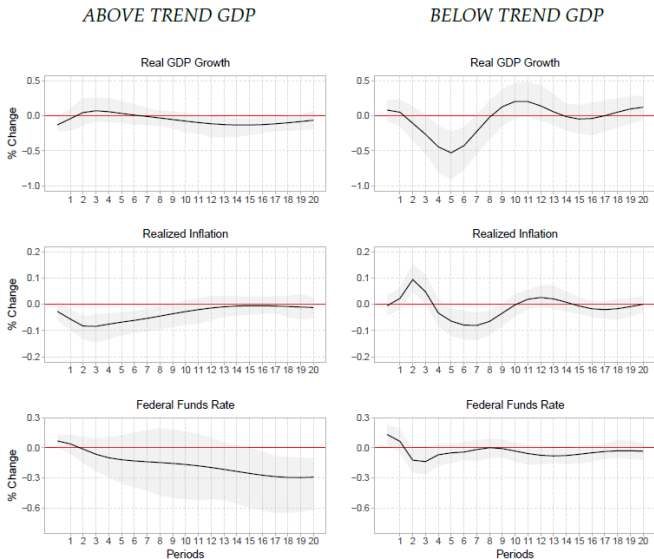
→ suggests that a tightening in lending standards to businesses reduces business lending by banks, which then impacts the macroeconomy

## Variance decomposition

Forecast error in	Forecast horizon	Percentage of variance, $h$ periods ahead, accounted for by innovations in						
	$h$	BUS	HOU	RGDP	CC	INF	CBS	FFR
RGDP	1	5.5	0.7	93.8	0.0	0.0	0.0	0.0
	5	23.5	1.5	37.4	3.8	26.3	7.4	0.2
	12	25.3	7.4	28.3	3.8	28.0	7.0	0.3
	20	25.0	7.4	27.7	3.7	28.0	6.8	1.3

# Threshold VAR: above and below trend GDP growth

Figure 11: Orthogonal impulse response functions: Shock to overall lending standards



# Threshold VAR: high and low interest rates

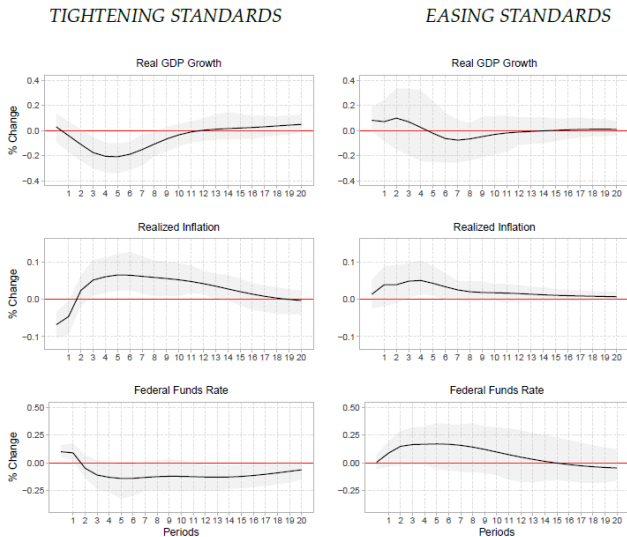
Figure 13: *Orthogonal impulse response functions: Shock to overall lending standards*





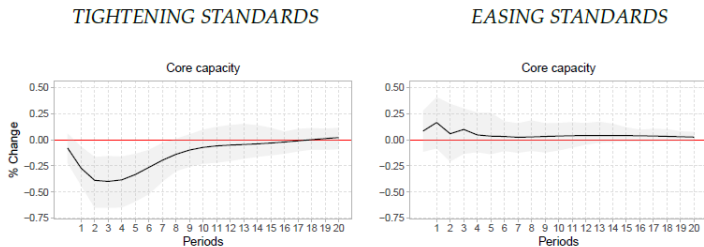
# Tightening vs. easing lending standards

Figure 14: Orthogonal impulse response functions: Shock to overall lending standards

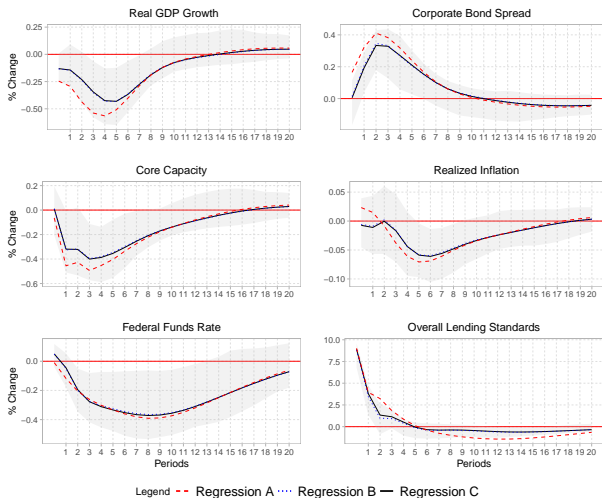


# More on the transmission channel

Figure 15: *Impact on bank core lending capacity of a shock to lending standards*



# The impact of bank-level controls



**Regression A** controls for bank level loan demand and past bank level standards;  
**Regression B** adds macro controls; **Regression C** adds bank-level controls

# Conclusion

- We find significant effects of changes in lending standards on bank lending and GDP growth
  - these effects come mainly from:
    - tightening of lending standards when
    - output growth is below trend and
    - interest rates are away from the effective lower bound
- Large banks (the top 15) account for much of the effects
- Bank-level controls do not produce first-order adjustments on the estimated effects

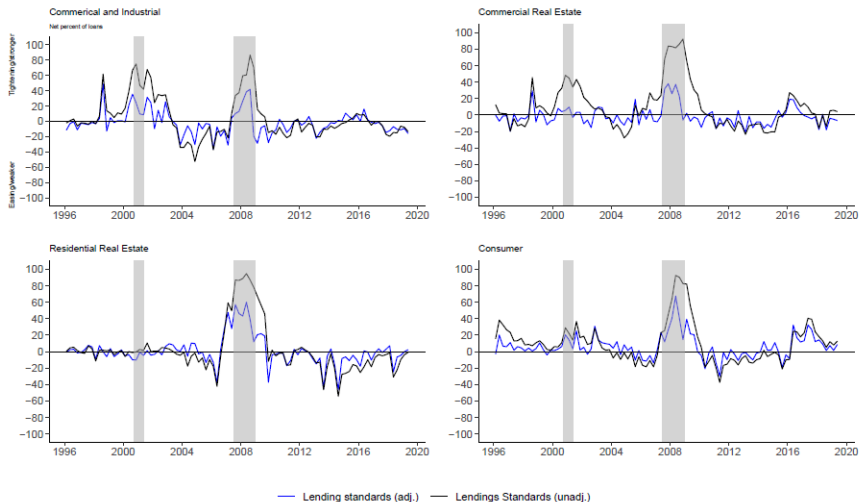
# Factors Affecting Changes in Banks' Lending Standards

Dependent variable: quarterly bank-level overall lending standards,  $\Delta S_{it}$

	A		B		C	
	Est.	(S.E.)	Est.	(S.E.)	Est.	(S.E.)
Lagged Qtly. Change in Standards	0.528***	(0.016)	0.402***	(0.017)	0.361***	(0.018)
Qtly. Change in Loan Demand	-0.099***	(0.010)	-0.070***	(0.010)	-0.071***	(0.011)
Economic outlook: Real GDP			1.560*	(0.851)	1.857*	(0.949)
Economic Outlook: Unemployment			22.262***	(1.755)	23.721***	(2.081)
Economic Outlook: 3-Month Treasury			-2.148*	(1.097)	-1.864*	(1.089)
Economic Outlook: 10-Year Treasury			1.224	(1.640)	0.411	(2.151)
Yearly Change in Real GDP			-2.157***	(0.374)	-2.197***	(0.407)
Yearly Change in Unemployment			1.487**	(0.647)	1.570**	(0.745)
Qtly. Change in EBP			9.065***	(1.140)	9.363***	(1.158)
Qtly. Change in Real FF Rate			-3.644***	(0.467)	-3.711***	(0.475)
Qtly. Change in VIX			-0.218**	(0.101)	-0.236**	(0.102)
Qtly. Change in NIMs					-0.979	(0.727)
Qtly. Change in LLPs					1.339	(1.065)
Bank Size					-0.118	(0.831)
ROA					2.945*	(1.596)
Share of Core Loans					0.148*	(0.082)
Share of Core Deposits					0.102	(0.111)

# Adjusted Lending Standards

Figure 3: Adjusted and Unadjusted Lending Standards by Group of Categories



# VAR Specifications

$$\mathbf{Y}_t^1 = \begin{bmatrix} \Delta S_t^a \\ \Delta GDP_t \\ \Delta CoreCapacity_t \\ \pi_t \\ GZSpread_t \\ RealFedFunds_t \end{bmatrix}$$

Alternative 1

$$\mathbf{Y}_t^2 = \begin{bmatrix} \Delta GDP_t \\ \Delta CoreCapacity_t \\ \pi_t \\ GZSpread_t \\ RealFedFunds_t \\ \Delta S_t \end{bmatrix}$$

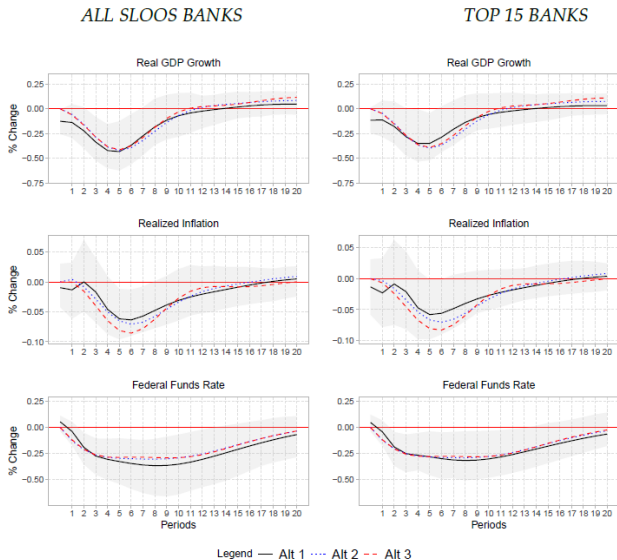
Alternative 2

$$\mathbf{Y}_t^3 = \begin{bmatrix} \Delta GDP_t \\ Unemp_t \\ \Delta D_t \\ \Delta CoreCapacity_t \\ \pi_t \\ GZSpread_t \\ RealFedFunds_t \\ \Delta S_t \end{bmatrix}$$

Alternative 3

# The Role of Large Banks

Figure 16: Orthogonal impulse response functions: Sub-sample of large banks





## Threshold VARs

We study the state-dependent impact of credit supply shocks according to the model:

$$Y_t = \Theta_s(t-1)Y_{t-1} + \Sigma_s(t-1)u_t, \quad u_t \sim N(0, I)$$