Good Buffer, Bad Buffer: Smoothing in banks' loan loss provisions and the response to credit supply shocks

Online Appendix: Endogeneity of smoothing via loan loss provisions and the Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending

The SEC's 1998 litigation of SunTrust Bank for apparently over-provisioning its reserves was a pivotal point in banks' financial reporting practices. The case sent a clear message regarding the SEC's preference for accounting transparency (i.e., less income smoothing) over bank stability (e.g., Balla and Rose, 2011). To address concerns that our results are confounded by the potential endogeneity of smoothing via loan loss provisions, we use this event as an instrument to extract measures of smoothing that are orthogonal to underlying bank characteristics.

Similar to Balla and Rose (2011), we expect publicly-listed banks that are under the SEC's jurisdiction to reduce smoothing in the post-litigation period more than privately-held banks.[1] In addition, we expect cross-sectional variation in public banks' response to the event based on the expected level of SEC enforcement. We predict that the reduction in smoothing via loan loss provisioning after the SunTrust litigation will be stronger for banks that are closer to an SEC office. This follows prior work on the resource-constrained SEC view (e.g., Kedia and Rajgopal, 2011) that finds that the SEC is more likely to investigate firms closer to its offices (see also Eisenbach et al., 2016 who document the role of resource constraints on bank supervision). While this design allows us to instrument smoothing with a counterpart that is untainted by unobserved bank characteristics, we cannot use this variable around the emerging market crisis as the litigation occurred subsequently. We therefore turn to an alternative setting.

We use changes in aggregate bank lending standards from the Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending to capture bank supply shocks. The purpose of the survey is to

[1] Beck and Narayanamoorthy (2013) examine changes in loan loss provisioning timeliness around this event, but restrict their focus to public banks.

provide qualitative and quantitative information on credit availability and demand, as well as on evolving developments and lending practices in U.S. loan markets. Since these surveys capture both supply and demand conditions, they are suitable for examining changes in bank lending due to supply versus demand factors (e.g., Lown and Morgan, 2002, 2006; Leary, 2009; Maddaloni and Peydró, 2011; Axelson et al., 2013; Bassett et al., 2014; Ciccarelli et al., 2015; Bergbrant et al., 2016). We provides details on survey administration and the questions underlying measures of lending standards and borrower demand in Appendix A.1 below.

Figure A.1 plots survey response data over the 1993 to 2014 period, where the solid line denotes lending standards (*Lending*) and the dashed line denotes borrower demand (*Demand*). Since bank lending standards are influenced not only by demand-side factors but also by macroeconomic uncertainty, we follow Bassett et al. (2014) and orthogonalize the lending standards measure with respect to borrower demand (from the survey), the S&P 500 implied volatility index (VIX), and the excess bond premium available from Gilchrist and Zakrajsek (2012).[2] This measure (labeled *Tighten*) is denoted by the dotted line.

Panel A of Table A.1 presents results of the regression of changes in bank lending on bank supply, borrower demand, and their respective interactions with smoothing via loan loss provisions. Following the monetary transmission literature (e.g., Bernanke and Blinder, 1992; Kashyap and Stein, 2000) we measure changes in bank lending over the subsequent four quarters. We compute smoothing via provisions (*SMOOTH*) based on a rolling-window of 12 prior quarters, and multiply the borrower demand values from the survey by -1 (and term it *WEAK*) so as to be

[2] Bassett et al. (2014) use a vector of forward- and backward-looking variables to extract a measure of bank supply. Since the forward-looking variables could be endogenous to bank lending, we exclude them. In addition, we retain VIX and the excess bond premium as some of the other controls could also capture supply effects (such as the Fed Funds rate as shown by Bernanke and Blinder, 1992; Kashyap and Stein, 2000). Since Gilchrist and Zakrajsek (2012) note that the excess bond premium could also capture supply, we verify that our results are robust to excluding it.

comparable with supply tightening.

Model (1) of Table A.1, Panel A presents results for supply tightening alone while model (2) also includes the demand weakening effect. Consistent with our earlier results, smoothing mitigates the contractionary effect of bank supply tightening on lending. In particular, the coefficient on *TIGHT* is negative and significant in both models, while that on *TIGHT*SMOOTH* is positive and significant. Further, while weakening demand also has a similar contractionary effect on bank lending (the coefficient on *WEAK* is negative and significant), smoothing is uncorrelated with this contraction – as seen by the insignificant coefficient on *WEAK*SMOOTH*. These results are robust to including bank and year-quarter fixed-effects in model (3) (that subsume the coefficients on *TIGHT* and *WEAK*) and also to alternative clustering of standard errors in model (4). Overall, we interpret these results as confirmatory evidence that smoothing via loan loss provisions mitigates bank lending contractions that arise due to adverse bank capital supply shocks. To ensure comparability with the capital crunch results, we split the sample into high and low capital (based on the median value of lagged capital), and estimate model (4) within each subset. Consistent with our earlier capital crunch results, the effect of smoothing in mitigating supply-based lending contractions comes through in the subset of poorly-capitalized banks in model (5) but not in well-capitalized ones in model (6).[3]

Panel B presents results of the diff-in-diff test of changes in smoothing around the SunTrust litigation. We set the *POST_ST* indicator to one for years after the SunTrust case (i.e., 1999 onwards) and to zero for the years before. We define another indicator, *SEC*, that takes one for banks registered with the SEC and zero for those that are not. This indicator captures not only publicly-listed banks but also private banks with public debt. *POST_ST*SEC* identifies the diff-

[3] In untabulated tests, we split poorly-capitalized banks into those with and without insider lending. Consistent with our prior results, we find that the beneficial effects of smoothing are concentrated in banks without insider lending.

in-diff effect of the litigation on financial reporting changes in banks that report to the SEC compared to those that do not. Consistent with our prediction (and evidence in Balla and Rose, 2011), the coefficient on this interaction term is negative and significant in all specifications indicating that publicly-listed banks engaged in less smoothing in the aftermath of the SunTrust litigation relative to private banks.[4] The latter in fact experienced no change in their reporting behavior (an insignificant coefficient on *POST_ST*). Model (2) presents the role of enforcement around the event – banks farther from the SEC (captured by *DIST*, the distance between the bank's headquarters and the closest SEC office) have a smaller decrease in smoothing after the litigation (*POST_ST*SEC*DIST* is positive and significant). Model (3) verifies that these inferences are robust to controlling for loan composition across banks (e.g., Ryan and Keeley, 2013).

Panel C presents similar tests to Panel A, but now using the instrumented *SMOOTH* measure based on model (3) of Panel B (which we label *SMOOTH_PRED*).[5] Consistent with prior inferences, the instrumented measure of smoothing mitigates the effect of supply tightening on bank lending (as seen by the negative and significant coefficient on *TIGHT*SMOOTH_PRED*) but is uncorrelated with lending contractions that accompany weakening of borrower demand (*WEAK*SMOOTH_PRED* is insignificant).[6] These inferences are robust to including year-quarter fixed effects in model (3) and alternative clustering of standard errors in model (4). Finally, we find that the effect of *SMOOTH* in mitigating lending contractions is concentrated in the sub-sample of banks with less capital (models [5] and [6]).[7] Overall, these results suggest that

[4] Since these specifications include bank fixed effects, they represent within-bank changes in smoothing after the event as compared to before.
[5] To ensure that our instrument is not confounded by bank characteristics, we define *SMOOTH_PRED* based on the coefficients on *POST_ST*, *SEC*, *DIST* and their interactions, but excluding the loan-composition variables.
[6] We do not perform the insider lending split since the instrumented measure is (by construction) orthogonal to agency-related motivations.
[7] We re-compute the instrumental variable (*SMOOTH_PRED*) by estimating the first-stage regression (model [3] of Table A.1, Panel B) separately for low capital and high capital banks.

inferences are robust to addressing the endogeneity of smoothing.

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Appendix A.1: Senior Loan Officer Opinion Survey (SLOOS)

The Federal Reserve circulates a survey typically four times a year to senior loan officers of up to 60 large domestically chartered commercial banks and up to 24 large U.S. branches and agencies of foreign banks (Federal Reserve Board, 2013). See https://www.federalreserve.gov/boarddocs/SnLoanSurvey/about.htm for additional details on the SLOO Survey.

Bank lending standards are measured based on the responses to the following question:

> "Over the past three months, how have your bank's credit standards for approving applications for C&I (commercial and industrial) loans or credit lines—other than those to be used to finance mergers and acquisitions—to large and middle-market firms changed?
> 1) Tightened considerably 2) tightened somewhat 3) remained basically unchanged 4) eased somewhat 5) eased considerably"

The lending standards measure is the aggregated *net* percent tightening, defined as 100 × [(# reporting tightening standards - # reporting easing)/total # reporting]. We orthogonalize bank lending supply with respect to borrower demand (below), the S&P 500 implied volatility index (VIX), and the excess bond premium measured by Gilchrist and Zakrajsek (2012) to arrive at our measure of supply tightening (*TIGHT*).

Borrower demand measures are similarly estimated based on the following question:

> "Apart from normal seasonal variation, how has demand for C&I loans changed over the past three months? (Please consider only funds actually disbursed as opposed to requests for new or increased lines of credit.)
> 1) Substantially stronger 2) Moderately stronger 3) About the same 4) Moderately weaker 5) Substantially weaker"

The demand measure is the aggregated *net* percent stronger demand, defined as 100 × [(# reporting stronger demand - # reporting weaker demand)/total # reporting]. We multiply the resulting borrower demand measure by negative one to result in a measure that increases as demand weakens (*WEAK*).

Figure A.1: Lending standards, capital supply and borrower demand

The horizontal axis denotes the sample period, while the vertical axis plots the value of lending standards (*Lending*), bank supply tightening (*Tighten*), and borrower demand (*Demand*) that correspond to each quarter. These data are obtained from the Senior Loan Officer Opinion Survey (SLOOS) on Bank Lending conducted by the Federal Reserve each quarter.

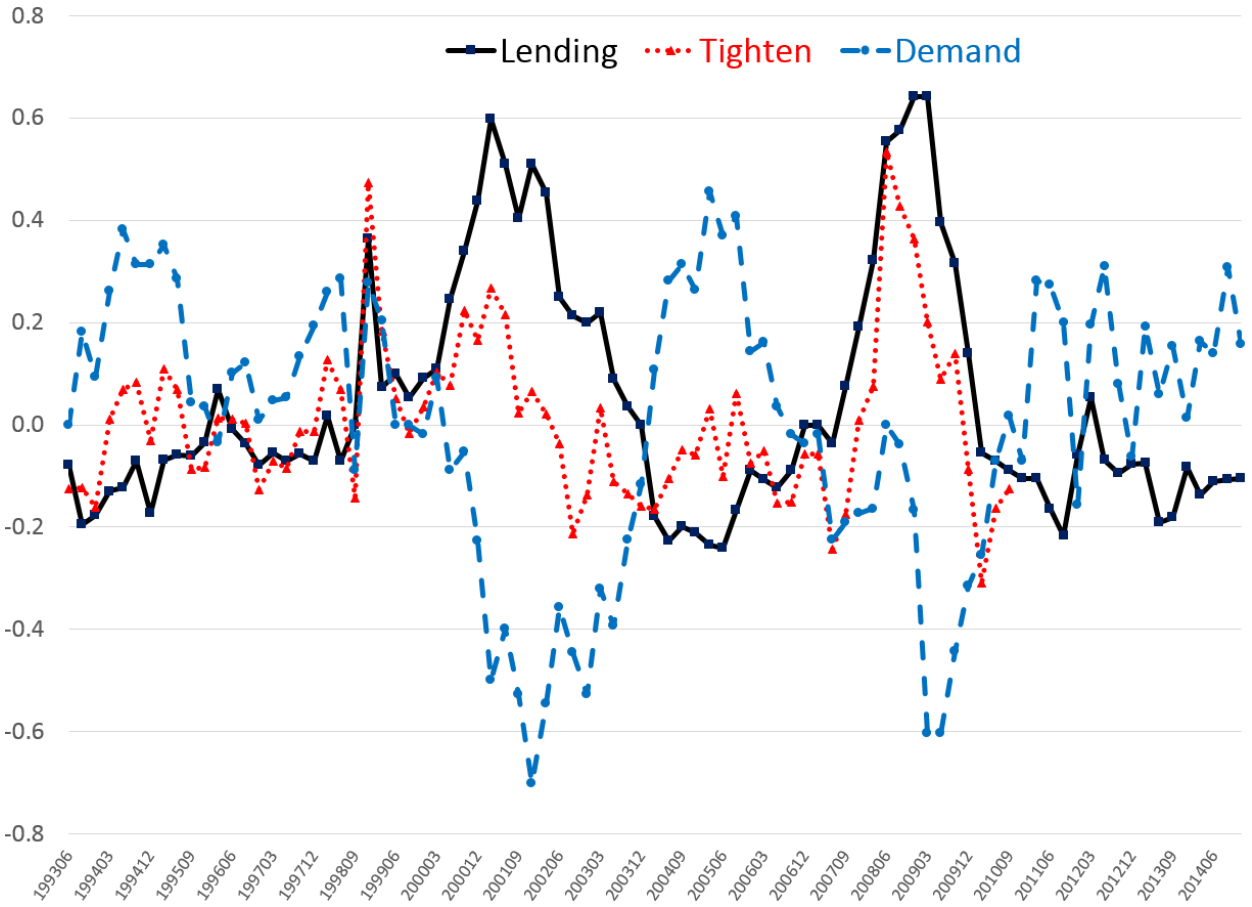

Table A.1: Disentangling supply and demand shocks using SLOO Survey data

Panel A: Preemptive loan loss provisioning and the supply of (demand for) bank lending

The dependent variable is loan growth over the next four quarters ($\Delta LOANS$). Preemptive provisioning (*SMOOTH*) is defined based on a rolling window of 12 prior quarters. *TIGHT* denotes bank supply tightening computed by orthogonalizing bank lending standards available from the Senior Loan Officer Opinion Survey (SLOOS) conducted by the Federal Reserve each quarter with respect to macroeconomic variables measuring borrower demand (from the SLOO survey), the S&P 500 implied volatility index (VIX), and the excess bond premium measured by Gilchrist and Zakrajsek (2012). *WEAK* denotes borrower demand weakening defined as the number of SLOO survey respondents reporting substantially weaker or moderately weaker demand for business loans minus those reporting substantially stronger or moderately stronger demand. Appendix B of our paper presents detailed variable definitions. Robust standard errors clustered by bank in models (1), (2) and (3) and by year-quarter in models (4), (5) and (6) are tabulated under the coefficients in parentheses. In addition, models (3) to (6) contains bank and year-quarter fixed effects. (***), (**), (*) denote statistical significance at the two-tailed 1%, 5% and 10% levels, respectively.

Dep. variable	$\Delta LOANS$					
	All banks				**Low capital banks**	**High capital banks**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
SMOOTH	0.022	0.022	0.008	0.008	0.011	0.001
	[0.002]***	[0.002]***	[0.002]***	[0.001]***	[0.001]***	[0.002]
TIGHT	-0.115	-0.055				
	[0.004]***	[0.005]***				
*TIGHT*SMOOTH*	**0.024**	**0.028**	**0.019**	**0.019**	**0.026**	**0.011**
	[0.007]***	**[0.010]*****	**[0.008]****	**[0.006]*****	**[0.007]*****	**[0.007]**
WEAK		-0.065				
		[0.004]***				
*WEAK*SMOOTH*		**-0.001**	**0.002**	**0.002**	**-0.004**	**0.004**
		[0.009]	**[0.007]**	**[0.006]**	**[0.006]**	**[0.006]**
Clustering	Bank	Bank	Bank	Year-qtr	Year-qtr	Year-qtr
Fixed effects	None	None	Bank, year-qtr	Bank, year-qtr	Bank, year-qtr	Bank, year-qtr
Adj. R^2	0.05	0.05	0.32	0.32	0.39	0.32
Obs.	64,318	64,318	64,318	64,318	33,878	30,440

Table A.1, continued

Panel B: Using the Sun Trust case as an exogenous shock to preemptive provisioning

The dependent variable is preemptive loan loss provisioning (*SMOOTH*) defined based on a rolling window of 12 prior quarters. *POST_ST* is an indicator that takes 1 for the years after 1999 and 0 for the years before. *SEC* is an indicator that takes 1 for banks that report to the U.S. Securities and Exchange Commission and 0 for those that do not. This captures not only publicly-listed banks but also private banks with public debt. *DIST* captures the distance between the bank's headquarters and the closest SEC office. Remaining variables capture loan composition differences across banks, where *CI_LOANS*, *RE_LOANS*, *INDIV_LOANS* and *OTH_LOANS* represent the proportion of commercial and industrial loans, real estate loans, individual loans and all remaining loans, respectively, expressed as a proportion of total assets. Appendix B in our paper presents detailed variable definitions. All regressions contain bank fixed effects. Robust standard errors clustered by year-quarter are tabulated under the coefficients in parentheses. (***), (**), (*) denote statistical significance at the two-tailed 1%, 5% and 10% levels, respectively.

Dep. Variable	***SMOOTH***		
	(1)	**(2)**	**(3)**
POST_ST	0.005	0.010	0.012
	[0.005]	[0.007]	[0.007]
SEC	0.023	0.042	0.041
	[0.011]**	[0.014]***	[0.014]***
*POST_ST*SEC*	**-0.020**	**-0.042**	**-0.040**
	[0.009]**	**[0.014]*****	**[0.014]*****
DIST		0.014	-0.002
		[0.095]	[0.099]
*POST_ST*DIST*		-0.023	-0.019
		[0.033]	[0.035]
*SEC*DIST*		-0.093	-0.091
		[0.060]	[0.061]
*POST_ST*SEC*DIST*		**0.111**	**0.106**
		[0.049]**	**[0.051]****
CI_LOANS			-0.037
			[0.142]
RE_LOANS			0.025
			[0.132]
INDIV_LOANS			0.122
			[0.153]
OTH_LOANS			0.012
			[0.124]
Clustering	Year-qtr	Year-qtr	Year-qtr
Fixed effects	Bank	Bank	Bank
Adj. R^2	0.27	0.27	0.27
Obs.	51,931	51,931	51,931

Table A.1, continued

Panel C: Using instrumented *SMOOTH*

The dependent variable is loan growth over the next four quarters (Δ*LOANS*). *SMOOTH_PRED* denotes the instrumented measure of *SMOOTH* derived from model (3) of Panel B above. *TIGHT* denotes bank supply tightening computed by orthogonalizing bank lending standards with respect to macroeconomic variables such as changes in the VIX index and the excess bond premium. *WEAK* denotes borrower demand weakening defined as the number of respondents reporting substantially weaker or moderately weaker demand for business loans minus those reporting substantially stronger or moderately stronger demand. *CI_LOANS*, *RE_LOANS*, *INDIV_LOANS* and *OTH_LOANS* represent the proportion of commercial and industrial loans, real estate loans, individual loans and other loans, respectively, expressed as a proportion of total assets. Appendix B in our paper presents detailed variable definitions. All regressions contain bank fixed effects. In addition, models (3) to (6) include year-quarter fixed effects. Robust standard errors clustered by bank in models (1), (2) and (3) and by year-quarter in models (4), (5) and (6) are tabulated under the coefficients in parentheses. (***), (**), (*) denote statistical significance at the two-tailed 1%, 5% and 10% levels, respectively.

Dep. variable	**Δ*LOANS***					
	All banks				**Low capital banks**	**High capital banks**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
SMOOTH_PRED	0.300	0.321	0.202	0.202	-0.094	0.071
	[0.240]	[0.259]	[0.258]	[0.269]	[0.149]	[0.089]
TIGHT	-0.107	-0.056				
	[0.008]***	[0.009]***				
*TIGHT*SMOOTH_PRED*	**2.879**	**2.587**	**2.824**	**2.824**	**1.274**	**-0.307**
	[0.708]***	**[0.652]*****	**[0.664]*****	**[1.644]***	**[0.544]****	**[0.279]**
WEAK		-0.049				
		[0.007]***				
*WEAK*SMOOTH_PRED*		**0.399**	**0.114**	**0.114**	**-0.709**	**0.070**
		[0.503]	**[0.497]**	**[0.943]**	**[0.382]***	**[0.236]**
CI_LOANS	0.109	0.097	0.053	0.053	0.127	-0.040
	[0.113]	[0.113]	[0.111]	[0.087]	[0.089]	[0.154]
RE_LOANS	-0.056	-0.059	-0.044	-0.044	0.052	-0.132
	[0.120]	[0.120]	[0.117]	[0.081]	[0.081]	[0.154]
INDIV_LOANS	0.235	0.206	0.061	0.061	0.195	-0.089
	[0.128]*	[0.128]	[0.128]	[0.086]	[0.097]*	[0.153]
OTH_LOANS	0.162	0.150	0.058	0.058	0.156	-0.035
	[0.127]	[0.126]	[0.123]	[0.078]	[0.109]	[0.147]
Clustering	Bank	Bank	Bank	Year-qtr	Year-qtr	Year-qtr
Fixed effects	Bank	Bank	Bank, year-qtr	Bank, year-qtr	Bank, year-qtr	Bank, year-qtr
Adj. R^2	0.27	0.27	0.29	0.29	0.34	0.32
Obs.	51,931	51,931	51,931	51,931	27,192	24,739