

## Small Business Lending during COVID-19: Appendix

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This appendix summarizes the methodology used in the estimation of results discussed in *FRBSF Economic Letter* 2020-35.

<https://www.frbsf.org/economic-research/publications/economic-letter/2020/november/small-business-lending-during-covid-19/>

Commercial banks in the United States are required to file quarterly Call Reports of their balance sheets and income statements. We use this bank-level data over the first half of 2020—from the end of the 2019:Q4 through 2020:Q2—to evaluate bank lending activity by banks of different sizes during the height of the pandemic lockdown procedures. We separate banks into three groups: small banks with total assets below \$10 billion, large banks with assets exceeding \$100 billion, and medium banks, ranging between the two. Our year-end 2019 sample includes 4,247 small banks, 641 medium-sized banks, and 138 large banks.

We use firm-level regression analysis to evaluate growth in bank lending over this period while also conditioning for differences in individual bank characteristics going into the crisis. Conditioning for disparities in bank characteristics is potentially important; for example, Cornett, et al. (2011) demonstrated that financial constraints during the Global Financial Crisis inhibited credit expansion by banks.

Our base specification at the bank level is

$$(1) \quad \dot{X}_t = \beta_1 \text{SMALL}_i + \beta_2 \text{MID}_i + \beta_3 \text{LARGE}_i + \gamma Z_i + \varepsilon_i$$

where  $\dot{X}_t$  represents growth of  $X$ ,  $(X - X_{t-1}) / X_{t-1}$ ;  $\text{SMALL}_i$  is an indicator variable that identifies the small banks in our sample;  $\text{MID}_i$  is an indicator variable that identifies the mid-sized banks;  $\text{LARGE}_i$  is an indicator variable that identifies the large banks;  $Z_i$  is a vector of conditioning variables at the bank level; and  $\varepsilon_i$  is a disturbance term. We estimate the regression with ordinary least squares and cluster the standard errors by size group.

We follow the literature, such as Rice and Rose (2016) and Li, Strahan, and Zhang (2020), in the determination of Call Report conditioning variables to include in our specification. We include:  $\text{LIQUIDASSETS} / \text{TA}_i$ , which measures bank cash and security holdings as a share of total assets, as a measure of bank liquidity,

$\text{COREDEPOSITS} / \text{TA}_i$  as a measure of a banks' reliance on deposit funding,

$\text{TIER1CAPITAL} / \text{TA}_i$  to capture bank capital positions, and

$\text{UNUSEDLENDINGCOMMITMENTS} / \text{TA}_i$  as a measure of their outstanding loan commitments.

We also add a fifth variable,  $\text{PPPRatio}_i$ , which is defined as the ratio of loans under the Paycheck Participation Program (PPP) to total small business and farm lending.

Results for this specification are shown in Table 1. Column 1 evaluates overall lending, while Columns 2 through 5 look at growth in specific lending categories. Columns 2 and 3 report results for small business and farm lending, with the latter including the fifth  $\text{PPPRatio}$  variable. Columns 4 and 5 break down small business and farm lending into its two components, small

business lending and small farm lending, which both also include the *PPPRatio* variable in addition to the four conditioning variables.

Our primary variables of interest are the indicator variables capturing the average influence of the bank groups, *SMALLBANK*, *MIDBANK*, and *LGBANK*, representing small, medium, and large bank averages respectively. We demean the remaining conditioning variables, so the coefficient on the indicators can be interpreted as the percentage growth in lending unexplained by the conditioning variables.

We estimate with ordinary least squares with standard errors clustered by bank size group.

**Table 1: Overall and small business and farm lending growth**

	(1)	(2)	(3)	(4)	(5)
	Total loans and leases	Small business and farm lending	Small business and farm lending	Small business lending	Small farm lending
SMALLBANK	0.116*** (0.001)	0.232*** (0.002)	0.260*** (0.000)	0.318*** (0.000)	-0.010*** (0.001)
MIDBANK	0.092*** (0.003)	0.377*** (0.005)	0.277*** (0.003)	0.311*** (0.003)	-0.011** (0.001)
LGBANK	0.009 (0.004)	0.349*** (0.010)	0.254*** (0.004)	0.268*** (0.004)	-0.004 (0.003)
Liquid Assets / TA	0.082* (0.027)	0.033 (0.077)	0.065 (0.030)	-0.101** (0.013)	-0.001 (0.025)
Core Deposits / TA	-1.425*** (0.119)	-0.879** (0.113)	-0.338** (0.056)	-0.319** (0.074)	0.032* (0.008)
Total Capital / TA	-1.982*** (0.114)	-1.898*** (0.051)	-0.434*** (0.010)	-0.479*** (0.029)	-0.108 (0.107)
Unused Lending Commitments / TA	0.934*** (0.029)	1.821** (0.283)	-0.743* (0.232)	-0.773* (0.181)	0.018 (0.033)
PPP Ratio			0.994*** (0.030)	0.982*** (0.027)	-0.002 (0.013)
Observations	4,968	4,795	4,781	4,625	3,900
R-squared	0.334	0.512	0.694	0.713	0.005

OLS with standard errors in parentheses clustered by bank size group.

\*\*\* p<0.01; \*\* p<0.05; \* p<0.1

We also examine determinants of participation in the PPP, including the impact of the Federal Reserve PPP Lending Facility (PPPLF). Our specification nests equation (1):

$$(2) \quad \dot{X}_i = SMALL_i + MID_i + LARGE_i + Z_i + PPPLF_i + PPLF \times SMALL_i + \varepsilon_i$$

where  $\dot{X}_i$ , the three size indicators, and the four conditioning variables in  $Z_i$  are as defined above, but without *PPPRatio* as a right-hand side variable and with the addition of

$PPPLF_i$  to capture the share of PPP loans that were under the PPPLF program, and

$PPLF \times SMALL_i$ , which interacts our small bank indicator variable on PPPLF participation.

We suspect that the PPPLF was particularly important for small banks, as high participation in the PPP program could quickly erode small bank lending capacity due to their smaller balance sheets. We again estimate the regression with ordinary least squares and cluster the standard errors by size group. We also demean the four conditioning variables, so the coefficient on the indicators can be interpreted as the percentage growth in lending unexplained by the conditioning variables.

Results for equation (2) are reported in Table 2. Column 1 reports the effect of our size indicators and four conditioning variables on banks' PPP ratio. Column 2 adds the PPPLF ratio and column 3 adds the interaction term between the PPPLF ratio and our small bank indicator.

**Table 2: Determinants of PPP Participation**

	(1)	(2)	(3)
	PPP ratio (level)	PPP ratio (level)	PPP ratio (level)
SMALLBANK	0.232*** (0.001)	0.267*** (0.001)	0.265*** (0.000)
MIDBANK	0.361*** (0.002)	0.392*** (0.004)	0.403*** (0.004)
LGBANK	0.362*** (0.005)	0.432*** (0.007)	0.442*** (0.008)
Liquid Assets / TA	-0.029 (0.044)	0.128* (0.041)	0.132* (0.036)
Core Deposits / TA	-0.541** (0.074)	-0.447*** (0.024)	-0.429*** (0.035)
Total Capital / TA	-1.462*** (0.081)	-1.281*** (0.046)	-1.246*** (0.071)
Unused Lending Commitments / TA	2.539*** (0.109)	2.124*** (0.178)	2.111*** (0.190)
PPPLF Ratio		0.099* (0.028)	0.020** (0.003)
PPPLF Ratio × SMBANK			0.105*** (0.003)
Observations	4,802	4,102	4,102
R-squared	0.735	0.807	0.808

OLS with standard errors in parentheses clustered by bank size group.

\*\*\* p<0.01; \*\* p<0.05; \* p<0.1

## References

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