ONLINE APPENDIX FOR PERSISTENT EFFECTS OF THE PAYCHECK PROTECTION PROGRAM AND THE PPPLF ON SMALL BUSINESS LENDING

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Abstract. This online appendix for "Persistent Effects of the Paycheck Protection Program and the PPPLF on Small Business Lending" contains additional robustness checks and data information. See text for variable definitions and other details.

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Table OA.1. Summary Statistics for Conditioning Variables by Size

SAMPLE		N	Median	Mean	SD	Min	Max
FULL	$LIQUID$	3,760	0.067	0.088	0.070	0.013	0.324
	$COMMIT$	3,760	0.022	0.032	0.032	0.000	0.132
	$DEPOSITS$	3,760	0.849	0.837	0.055	0.646	0.909
	$TIER1CAP$	3,760	0.151	0.172	0.070	0.104	0.489
	$PROB$	3,760	0.012	0.017	0.016	0.000	0.071
SMALL	$LIQUID$	3,661	0.068	0.088	0.070	0.013	0.324
	$COMMIT$	3,661	0.022	0.030	0.030	0.000	0.132
	$DEPOSITS$	3,661	0.851	0.838	0.054	0.646	0.909
	$TIER1CAP$	3,661	0.153	0.173	0.070	0.104	0.489
	$PROB$	3,661	0.012	0.017	0.016	0.000	0.071
MID	$LIQUID$	76	0.033	0.043	0.032	0.013	0.169
	$COMMIT$	76	0.062	0.067	0.040	0.000	0.132
	$DEPOSITS$	76	0.786	0.787	0.058	0.646	0.905
	$TIER1CAP$	76	0.125	0.133	0.036	0.104	0.354
	$PROB$	76	0.008	0.013	0.015	0.001	0.071
LARGE	$LIQUID$	23	0.072	0.100	0.093	0.013	0.324
	$COMMIT$	23	0.132	0.111	0.037	0.000	0.132
	$DEPOSITS$	23	0.788	0.780	0.049	0.646	0.854
	$TIER1CAP$	23	0.123	0.126	0.021	0.104	0.185
	$PROB$	23	0.014	0.016	0.008	0.005	0.040

Note: Winsorized at 2.5%-97.5% levels. $LIQUID$ measures bank cash and security holdings as a share of total assets, as a measure of bank liquidity. $DEPOSITS$ measures core deposits relative to total assets to capture a bank's reliance on deposit funding. $TIER1CAP$ is a measure of tier one capital relative to total risk-weighted assets. $COMMIT$ is a measure of outstanding loan commitments. $PROB$ is an aggregate measure of past-due and non-accrual "problem" loans relative to total assets all at the bank level.

Table OA.2. Half-Yearly Univariate Results

	2018h1	2018h2	2019h1	2019h2	2020h1	2020h2	2021h1
PPP	1.143***	-0.233	0.0428	0.337**	15.09***	-0.987***	-0.492***
	(0.169)	(0.150)	(0.0330)	(0.159)	(0.882)	(0.0819)	(0.186)
CONSTANT	0.148***	0.161***	0.0708***	0.0653***	0.424***	0.0191***	0.0864***
	(0.00519)	(0.00438)	(0.000635)	(0.00631)	(0.0391)	(0.00388)	(0.00343)
N	3766	3779	3774	3794	3803	3805	3810

Note: IV univariate regression of average 6-month annualized SME lending growth ending on specified date on instrumented PPP variable for 2018h1-2021h1. See text for instruments included in first stage. Results reported in text Figure 2. Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	2021h2	2022h1	2022h2	2023h1	2024h1	2024h2	2025h1	2025h2
PPP	-3.600***	-2.168***	-4.487***	0.0812***	-0.961***	-0.167***	-0.0748**	-0.207
	(0.330)	(0.168)	(0.308)	(0.0228)	(0.0706)	(0.0205)	(0.0305)	(0.412)
CONSTANT	0.104***	0.169***	0.366***	0.0675***	0.156***	0.0447***	0.0469***	0.0574***
	(0.00848)	(0.00571)	(0.0108)	(0.00150)	(0.00161)	(0.00347)	(0.000429)	(0.00446)
N	3813	3821	3832	3827	3838	3846	3842	3846

Note: Note: IV univariate regression of average 6-month annualized SME lending growth ending on that date on our instrumented PPP variable. Results correspond to coefficient estimates in Figure 2. Shows 2018H1 through 2025H2. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table OA.3. DFAST Banks in Sample

Ally Financial Inc.	Category IV
American Express Company	Category IV
Bank of America Corporation	Category I
The Bank of New York Mellon Corporation	Category I
BMO Financial Corp.	Category IV
Capital One Financial Corporation	Category III
The Charles Schwab Corporation	Category III
Citigroup Inc.	Category I
Citizens Financial Group, Inc.	Category IV
Discover Financial Services	Category IV
Fifth Third Bancorp	Category IV
The Goldman Sachs Group, Inc.	Category I
HSBC North America Holdings Inc.	Category IV
Huntington Bancshares Incorporated	Category IV
JPMorgan Chase & Co.	Category I
KeyCorp	Category IV
M&T Bank Corporation	Category IV
Morgan Stanley	Category I
Northern Trust Corporation	Category II
The PNC Financial Services Group, Inc.	Category III
Regions Financial Corporation	Category IV
TD Group US Holdings LLC	Category III
Truist Financial Corporation	Category III
U.S. Bancorp	Category III
Wells Fargo & Company	Category I

Note: List of 34 DFAST banks required to participate in the 2022 Federal Reserve Stress Test. Sample reflects 25 observations due to missing values. Column 2 differentiates banks by category as defined by the Federal Reserve: Category I banks are U.S. global systemically important banks. Category II banks are banks that do not meet the criteria for Category I with at least $700 billion in total assets or at least $75 billion in cross-jurisdictional activity. Category III banks are banks that do not meet the criteria for Category I or II with at least $250 billion in total assets or at least $75 billion in nonbank assets. Category IV banks are banks that do not meet the criteria for Category I, II, or III with at least $100 billion in total assets.

Table OA.4. OLS Estimation

	Small	Medium	Large	Small	Medium	Large
PPP	0.690***	1.623**	6.712**			
	(0.0585)	(0.703)	(2.959)			
LIQUID	0.0630*	-0.0259	1.237*	0.0979***	-0.205	0.616
	(0.0327)	(0.434)	(0.665)	(0.0331)	(0.482)	(0.762)
COMMIT	-0.371***	-1.597***	-1.687	-0.0209	-1.397***	-2.717
	(0.0698)	(0.454)	(1.565)	(0.0609)	(0.453)	(1.752)
DEPOSITS	0.00492	-0.246	-1.409	0.0429	-0.263	-0.858
	(0.0393)	(0.350)	(1.044)	(0.0400)	(0.351)	(0.860)
TIER1CAP	0.174***	-0.868**	1.122	0.148***	-0.929**	-1.454
	(0.0399)	(0.424)	(2.422)	(0.0411)	(0.380)	(1.920)
SME18H2	-0.204***	-1.209***	-1.052	-0.185***	-0.586	-1.949
	(0.0191)	(0.439)	(1.186)	(0.0194)	(0.392)	(1.343)
PROB	0.223**	-1.838	6.709	0.0505	-2.215*	2.717
	(0.114)	(1.167)	(4.870)	(0.114)	(1.127)	(5.038)
TRADEABLE	-0.0382**	0.224	0.740	-0.0401**	0.274	0.164
	(0.0164)	(0.217)	(0.596)	(0.0167)	(0.203)	(0.549)
PPPLF				0.283***	0.162	-0.520
				(0.0360)	(0.225)	(0.323)
CONSTANT	0.0400	0.473	0.772	0.0263	0.522*	1.171
	(0.0347)	(0.297)	(0.633)	(0.0355)	(0.285)	(0.777)
N	3864	76	23	3864	76	23

Note: OLS estimation. Columns 1, 2, and 3 for PPP participation. Columns 4, 5, and 6 for PPPLF participation. Columns 1 and 4 represent the sample of small banks. Columns 2 and 5 represent the sample of medium banks. Columns 3 and 6 represent the sample of large banks. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE OA.5. First Stage Regressions, PPP

	Full	Small	Mid	Large	WLS
SBA	0.322*	0.409***	0.743**	0.0774	-0.0798
	(0.0446)	(0.0980)	(0.370)	(0.166)	(0.0409)
INDMIX	7.914**	7.485***	3.797	28.21***	14.82*
	(0.251)	(0.639)	(7.565)	(7.753)	(2.310)
COUNT	0.0112**	0.0113***		0	-0.00549
	(0.000225)	(0.00144)			(0.00444)
COLLATERAL	0.00780	0.0108***	0.00496	0.00529	-0.0172
	(0.00253)	(0.00209)	(0.00658)	(0.00393)	(0.00805)
CONSTANT	0.0325***	0.0325***	0.0261***	0.00376	0.0381**
	(0.00000314)	(0.00119)	(0.00586)	(0.00357)	(0.000771)
N	3904	3795	84	25	3904

Note: First stage IV estimation with dependent variable PPP, the ratio of a bank's PPP participation to total assets in 2020H1. SBA is the ratio of bank Small Business Administration lending to total small business and farm lending in 2019H2; $INDMIX$ estimates the similarity of a bank's lending portfolio to that of the SBA at 2019H2 (see text for specification); $COUNT$ is a count of documents on file for a bank at the discount window; $COLLATERAL$ is the bank's total collateral pledged to the discount window program. Columns 2, 3, and 4 represent the sample of small, medium, and large banks respectively. Column 5 estimated by weighted least squares, with observations weighted by total assets. Standard errors in parentheses are clustered by bank size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.6. High & Low Covariates, PPP

	Deposits High	Deposits Low	Tier1Cap High	Tier1Cap Low
PPP	0.261***	0.569***	0.361***	0.355***
	(0.00847)	(0.0188)	(0.000840)	(0.00786)
COMMIT	-0.225***	-0.222***	-0.197***	-0.218***
	(0.0198)	(0.0550)	(0.0287)	(0.0428)
DEPOSITS	0.331***	-0.0665***	0.0533***	0.0168**
	(0.0367)	(0.0155)	(0.00585)	(0.00849)
TIER1CAP	0.225***	0.198***	0.208***	0.0214
	(0.0294)	(0.00753)	(0.00863)	(0.0174)
SME18H2	-0.219***	-0.196***	-0.288***	-0.140***
	(0.00359)	(0.00194)	(0.000447)	(0.00583)
PROB	0.284***	-0.0528	0.212***	-0.0276
	(0.00575)	(0.0442)	(0.00746)	(0.0559)
TRADEABLE	-0.0747***	-0.0609***	-0.0856***	-0.0127***
	(0.00206)	(0.00675)	(0.00633)	(0.00467)
SMALLBANK	-0.101***	-0.0405***	-0.129***	-0.0360***
	(0.000940)	(0.00376)	(0.00117)	(0.00155)
MIDBANK	-0.0843***	-0.0370***	-0.162***	-0.0215***
	(0.0000347)	(0.00271)	(0.00119)	(0.00183)
CONSTANT	-0.121***	0.144***	0.159***	0.0925***
	(0.0375)	(0.0183)	(0.00726)	(0.0157)
N	1924	1836	1745	2015

Note: Sample divided into two subsets by high and low covariate values. Observations are considered high if they are greater than the sample median, and low otherwise. Columns 1 and 2 report results for high and low sub-samples based on $DEPOSITS$ respectively. Columns 3 and 4 report results for high and low sub-samples based on median value of $TIER1CAP$ respectively. Standard errors in parentheses are clustered by bank size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.7. High & Low Covariates, PPP

	SME19H2 High	SME19H2 Low	Prob High	Prob Low
PPP	0.430***	0.522***	0.504***	0.303***
	(0.000410)	(0.00692)	(0.00945)	(0.00243)
COMMIT	-0.172***	-0.286***	-0.463***	-0.0560
	(0.000179)	(0.0552)	(0.00968)	(0.0502)
DEPOSITS	-0.0734***	0.140***	0.187***	-0.109***
	(0.000648)	(0.0242)	(0.0124)	(0.00678)
TIER1CAP	0.0287***	0.211***	0.234***	0.138***
	(0.000195)	(0.0182)	(0.00663)	(0.0191)
PROB	0.0917***	0.223***	-0.126***	-1.658***
	(0.0000220)	(0.0798)	(0.00206)	(0.112)
TRADEABLE	-0.0494***	-0.0309***	-0.0876***	-0.0382***
	(0.0000822)	(0.00610)	(0.000193)	(0.00696)
SMALLBANK	-0.0539***	-0.0168***	-0.0408***	-0.126***
	(0.0123)	(0.00283)	(0.000524)	(0.00127)
SME19H2		-0.730***	-0.265***	-0.152***
		(0.00355)	(0.000862)	(0.00617)
MIDBANK		-0.0250***	-0.0563***	-0.108***
		(0.00271)	(0.000324)	(0.00105)
CONSTANT	0.148***	-0.00101	-0.0339***	0.279***
	(0.0117)	(0.0275)	(0.0117)	(0.0127)
N	1990	1770	1829	1931

Note: Sample divided into two subsets by high and low covariate values. Observations are considered high if they are greater than the sample median, and low otherwise. The high initial SME lending share sub-sample failed to converge under our base specification. In response, we drop the SME19H2 and MIDBANK variables from our base specification for this sub-sample in column 1. Columns 1 and 2 report results for high and low sub-samples based on $SME19H2$ respectively. Columns 3 and 4 report results for high and low sub-samples based on median value of $PROB$ respectively. Standard errors in parentheses are clustered by bank size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.8. First Stage Regressions, PPPLF

	Full	Small	Mid	Large	Weighted
SBA	0.346*	0.384*	0.689	-0.651	-2.138
	(0.0345)	(0.201)	(1.194)	(0.678)	(0.498)
INDMIX	7.258**	7.203***	-12.40	1.640	13.27*
	(0.318)	(1.320)	(13.27)	(2.897)	(1.347)
COUNT	0.0174***	0.0175***			0.0262
	(0.000248)	(0.00165)			(0.0102)
COLLATERAL	0.0116	0.0106***	0.0506***	0.0129	0.0483**
	(0.00329)	(0.00390)	(0.0179)	(0.0151)	(0.00259)
CONSTANT	-0.0000319	-0.0000702	0.00199	0.00886	0.00450
	(0.0000339)	(0.000969)	(0.00998)	(0.0115)	(0.00146)
N	3859	3757	78	24	3859

Note: First stage IV estimation with dependent variable $PPPLF$, the ratio of bank PPPLF borrowing to total assets in 2020H1. SBA is ratio of bank SBA lending to total business and farm lending in 2019H2; $INDMIX$ estimates the similarity of a bank's lending portfolio to that of the SBA at 2019H2 (see text for specification); $COUNT$ is a count of documents on file for a bank at the discount window; $COLLATERAL$ is the bank's total collateral pledged to the discount window program. Columns 2, 3, and 4 represent the sample of small, medium, and large banks respectively. Column 5 estimated by weighted least squares, with observations weighted by total assets. Standard errors in parentheses are clustered by bank size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE OA.9. Changes in Specification PPPLF

	Drop Cov.	Total Cap.	Lag %ΔSME	$\%\Delta SMEPPP$	$\%\Delta SMELT$	HighPPPLF
PPPLF	0.201***	0.243***	0.304***	0.850***	-0.0608***	
	(0.0115)	(0.00593)	(0.00435)	(0.0222)	(0.0152)	
SMALLBANK	-0.0325***	-0.0120***	-0.0229***	0.0320***	0.0209***	-0.0198***
	(0.000137)	(0.00251)	(0.00212)	(0.00310)	(0.00168)	(0.00202)
MIDBANK	-0.0221***	-0.0181***	-0.0212***	-0.00424***	-0.0153***	-0.0217***
	(0.000364)	(0.00158)	(0.00152)	(0.000387)	(0.00123)	(0.00154)
LIQUID		0.159***	0.113***	-0.0851***	0.0165	0.117***
		(0.00110)	(0.00257)	(0.0121)	(0.0106)	(0.00376)
COMMIT		-0.130***	-0.0845**	0.0906***	-0.0569	-0.0742*
		(0.0337)	(0.0397)	(0.00814)	(0.0427)	(0.0414)
DEPOSITS		0.00300	0.0245***	-0.0279	0.0550**	0.0324***
		(0.00273)	(0.00527)	(0.0242)	(0.0241)	(0.00782)
TOTCAP		0.109***				
		(0.00842)				
SME18H2		-0.205***	-0.176***	0.185***	-0.0812***	-0.198***
		(0.000387)	(0.000504)	(0.00481)	(0.00551)	(0.000717)
PROB		0.0463	-0.00976	-0.586***	0.0736***	0.0174
		(0.0445)	(0.0429)	(0.0237)	(0.00124)	(0.0369)
TRADEABLE		-0.0226***	-0.0377***	0.0313***	-0.0425***	-0.0453***
		(0.00205)	(0.00377)	(0.000404)	(0.00718)	(0.00406)
%ΔSME18			0.00650***			
			(0.0000517)			
TIER1CAP			0.117***	0.0429***	0.0943***	0.153***
			(0.0103)	(0.0129)	(0.0198)	(0.0120)
highppplfSBL20Q2						0.0506***
						(0.00104)
CONSTANT	0.0909***	0.0842***	0.0668***	-0.0226	-0.0101	0.0578***
	(0.000119)	(0.00714)	(0.00942)	(0.0190)	(0.0231)	(0.0115)
N	3760	3760	3716	3792	3799	3760

Note: Column 1 drops all covariates. Column 2 replaces $TIER1CAP$ with $TOTCAP$, total bank capital. Column 3 includes %ΔSME18, lagged growth in SME lending 2018H2 to 2019H2. Column 4 replaces $\%\Delta SME$ with $\%\Delta SMEPPP$, average annualized growth in the sum of SME lending and PPP lending between 2019H2 and 2054H2. Column 5 replaces dependent variable $\%\Delta SME$ with $\%\Delta SMELT$, cumulative growth in SME lending between 2019H2 and 2025H2. Column 6 replaces $PPPLF$ with $HIGHPPPLF$, equal to 1 if a bank's $PPPLF$ value is greater than the median value and 0 otherwise. Standard errors in parentheses are clustered by bank size. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.10. Changes in Sample, PPPLF

	Truncate	1-99	9-95	DFAST	NONDFAST
PPPLF	0.231***	0.345***	0.283***	0.654	0.279**
	(0.00263)	(0.0154)	(0.00478)	(2.339)	(0.111)
LIQUID	0.0399***	0.163***	0.0934***	0.636	0.0934***
	(0.00469)	(0.000690)	(0.00389)	(0.399)	(0.0280)
COMMIT	0.0505***	-0.155***	-0.0346	-1.922	-0.0475
	(0.0185)	(0.0526)	(0.0300)	(1.223)	(0.0635)
DEPOSITS	0.0334***	0.0325***	0.0223***	0.172	0.0433
	(0.00212)	(0.00294)	(0.00552)	(0.637)	(0.0357)
TIER1CAP	0.102***	0.234***	0.0983***	-1.235	0.168***
	(0.00615)	(0.00927)	(0.0113)	(1.053)	(0.0334)
SME18H2	-0.103***	-0.269***	-0.150***	-0.426	-0.189***
	(0.00133)	(0.00170)	(0.000718)	(0.745)	(0.0189)
PROB	-0.0306	0.0462	0.0420	4.051	0.00765
	(0.0258)	(0.0673)	(0.0287)	(4.498)	(0.107)
TRADEABLE	-0.0218***	-0.0588***	-0.0258***	0.485	-0.0508***
	(0.00690)	(0.00107)	(0.00511)	(0.388)	(0.0159)
SMALLBANK	0.0282***	-0.0972***	0.000189		
	(0.00231)	(0.00469)	(0.000933)		
MIDBANK	0.0274***	-0.0925***	-0.000505		
	(0.00140)	(0.00408)	(0.000516)		
CONSTANT	-0.00451***	0.141***	0.0401***	0.104	0.0272
	(0.000747)	(0.0112)	(0.00747)	(0.539)	(0.0328)
N	3593	3760	3760	27	3733

Note: Column 1 truncates base specification data set at 2.5%-97.5%. Column 2 winsorizes at the 1%-99% level. Column 3 winsorizes at the 5%-95% level. Column 4 reduces the sample to DFAST banks only. Column 5 reduces the sample to NONDFAST banks only. Standard errors in parentheses are clustered by bank size. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.11. Changes in Estimation PPPLF

	OLS	Std. SE	Robust SE	Reg. Cluster	TOBIT	WLS SME Share
PPPLF	0.278**	0.288**	0.288**	0.288***	0.278***	0.594***
	(0.00702)	(0.112)	(0.114)	(0.0907)	(0.0726)	(0.0000521)
LIQUID	0.112**	0.110***	0.110***	0.110**	0.113*	0.100***
	(0.00321)	(0.0279)	(0.0343)	(0.0481)	(0.0684)	(0.00772)
COMMIT	-0.0664	-0.0728	-0.0728	-0.0728	-0.0657**	-0.115
	(0.0502)	(0.0640)	(0.0681)	(0.0447)	(0.0325)	(0.127)
DEPOSITS	0.0308	0.0335	0.0335	0.0335	0.0308	0.0310***
	(0.00893)	(0.0360)	(0.0425)	(0.0368)	(0.0482)	(0.00300)
TIER1CAP	0.132*	0.154***	0.154***	0.154***	0.132***	0.0451
	(0.0137)	(0.0336)	(0.0485)	(0.0457)	(0.0456)	(0.0714)
SME18H2	-0.186***	-0.188***	-0.188***	-0.188***	-0.186***	-0.0217**
	(0.00155)	(0.0193)	(0.0214)	(0.0199)	(0.0210)	(0.00857)
PROB	0.0249	0.0110	0.0110	0.0110	0.0250	-0.260
	(0.0518)	(0.107)	(0.116)	(0.0865)	(0.0539)	(0.231)
TRADEABLE	-0.0352*	-0.0456***	-0.0456**	-0.0456**	-0.0350	-0.00388
	(0.00386)	(0.0159)	(0.0185)	(0.0217)	(0.0277)	(0.00977)
SMALLBANK	-0.0187*	-0.0206	-0.0206	-0.0206	-0.0186	-0.0327***
	(0.00226)	(0.0227)	(0.0355)	(0.0413)	(0.0464)	(0.00835)
MIDBANK	-0.0195**	-0.0209	-0.0209	-0.0209	-0.0194	-0.0239***
	(0.00153)	(0.0249)	(0.0374)	(0.0303)	(0.0347)	(0.00511)
CONSTANT	0.0580	0.0564	0.0564	0.0564	0.0577	0.0381*
	(0.0141)	(0.0365)	(0.0503)	(0.0548)	(0.0678)	(0.0219)
N	3963	3760	3760	3760	3962	3760

Note: Column 1 uses OLS estimation. Column 2 replaces clustered SEs with standard SEs. Column 3 replaces clustered SEs with robust SEs. Column 4 clusters by region using the 4 standard regions of the U.S.: Northeast, South, Midwest, and West. Column 5 uses tobit estimation. Column 6 reports WLS with weights by SME share. Standard errors in parentheses are clustered by bank size. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.12. High & Low Covariates, PPPLF

	Deposits High	Deposits Low	Tier1Cap High	Tier1Cap Low
PPPLF	0.263***	0.369***	0.217***	0.282***
	(0.00705)	(0.0125)	(0.0114)	(0.00496)
LIQUID	0.0375**	0.178***	0.120***	0.121***
	(0.0159)	(0.00648)	(0.00517)	(0.000253)
COMMIT	-0.119***	-0.00755	-0.0495*	-0.0740
	(0.0242)	(0.0682)	(0.0290)	(0.0537)
DEPOSITS	0.330***	-0.0394***	0.0107	0.0349***
	(0.0524)	(0.000580)	(0.00828)	(0.00569)
TIER1CAP	0.213***	0.146***	0.157***	0.0564***
	(0.0419)	(0.00276)	(0.0111)	(0.00227)
SME18H2	-0.197***	-0.173***	-0.278***	-0.110***
	(0.00306)	(0.000483)	(0.0000284)	(0.00331)
PROB	0.224***	-0.257***	0.159***	-0.208***
	(0.000512)	(0.0784)	(0.00900)	(0.0746)
TRADEABLE	-0.0655***	-0.0318***	-0.0626***	0.0101**
	(0.00682)	(0.00373)	(0.00691)	(0.00442)
SMALLBANK	-0.0885***	-0.00705	-0.0931***	-0.0188***
	(0.00205)	(0.00580)	(0.000199)	(0.00354)
MIDBANK	-0.0849***	-0.0104***	-0.128***	-0.00908***
	(0.00237)	(0.00376)	(0.000339)	(0.00291)
CONSTANT	-0.134***	0.0921***	0.160***	0.0482***
	(0.0494)	(0.00871)	(0.00851)	(0.0129)
N	1924	1836	1745	2015

Note: For PPPLF participation. Sample is divided in to two subsets by high and low covariate values. Observations are considered high if they are greater than the median value and low otherwise. Columns 1 and 2 are based on the median value of $DEPOSITS$, with column 1 restricting to the high subset and column 2 low. Columns 3 and 4 are based on the median value of $TIER1CAP$, with column 3 restricting to the high subset and column 4 low. Standard errors in parentheses are clustered by bank size. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE OA.13. High & Low Covariates, PPPLF

	SME19H2 High	SME19H2 Low	Prob High	Prob Low
PPPLF	0.352***	0.226***	0.387***	0.185***
	(0.000418)	(0.00781)	(0.00459)	(0.00783)
LIQUID	0.0445***	0.180***	0.120***	0.0921***
	(0.000465)	(0.00363)	(0.00265)	(0.00957)
COMMIT	0.00414***	-0.0623	-0.315***	0.0926*
	(0.000516)	(0.0667)	(0.0229)	(0.0550)
DEPOSITS	-0.0507***	0.0985***	0.200***	-0.120***
	(0.00118)	(0.0216)	(0.00233)	(0.0120)
TIER1CAP	0.00562***	0.153***	0.206***	0.0950***
	(0.000581)	(0.0183)	(0.00197)	(0.0238)
PROB	-0.0151***	0.0442	-0.281***	-1.550***
	(0.000119)	(0.100)	(0.0193)	(0.0962)
TRADEABLE	-0.0437***	-0.00528	-0.0652***	-0.0239***
	(0.0000124)	(0.00546)	(0.00256)	(0.00924)
SMALLBANK	-0.0549***	0.0131***	-0.0245***	-0.0908***
	(0.0177)	(0.00447)	(0.00163)	(0.0000312)
SME19H2		-0.612***	-0.231***	-0.135***
		(0.0150)	(0.00114)	(0.00533)
MIDBANK		0.00147	-0.0480***	-0.0799***
		(0.00307)	(0.00102)	(0.000761)
CONSTANT	0.141***	-0.00341	-0.0624***	0.255***
	(0.0166)	(0.0268)	(0.00562)	(0.0153)
N	1990	1770	1829	1931

Note: For PPPLF participation. Sample divided by high and low covariate values. Observations high if above median value, and low otherwise. The high initial SME lending share sub-sample failed to converge under our base specification. In response, we drop the SME19H2 and MIDBANK variables from our base specification for this sub-sample in column 1. Columns 1 and 2 report results for high and low sub-samples based on $SME19H2$ respectively. Columns 3 and 4 report results for high and low sub-samples based on $PROB$ respectively. Standard errors in parentheses are clustered by bank size. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table OA.14. Late Sample PPP Conditioned for Lagged Growth

	Full	Small	Medium	Large	WLS
PPP	-0.298***	-0.295**	1.661	-0.160	1.315***
	(0.0120)	(0.131)	(4.157)	(2.413)	(0.205)
LIQUID22	0.0501***	0.0534**	-0.114	0.0223	-0.106***
	(0.00378)	(0.0259)	(0.260)	(0.490)	(0.00804)
COMMIT22	0.0985***	0.123	-0.996	-1.218	-0.949***
	(0.0191)	(0.104)	(0.714)	(1.217)	(0.0180)
DEPOSITS22	-0.0472***	-0.0377	-0.361	-1.200**	-0.620***
	(0.00758)	(0.0452)	(0.438)	(0.526)	(0.0444)
TIER1CAP22	-0.0505***	-0.0502**	-0.338	-1.237	-0.00716
	(0.000110)	(0.0242)	(0.497)	(1.267)	(0.173)
SME22H1	0.0479***	0.0460*	-0.977	0.0707	-0.0419
	(0.000883)	(0.0240)	(2.282)	(0.848)	(0.0268)
%ΔSME1922	0.00117***	0.00119***	-0.0801	-0.0366	-0.00191***
	(0.0000144)	(0.000233)	(0.0881)	(0.0354)	(0.000375)
PROB22	-0.0489**	-0.0455	-1.274	6.154	1.297
	(0.0247)	(0.181)	(1.673)	(3.801)	(1.162)
TRADEABLE22	0.0230***	0.0224	0.0795	0.537	0.0128
	(0.000823)	(0.0149)	(0.294)	(0.384)	(0.0283)
SMALLBANK	0.0606***				-0.0932***
	(0.00102)				(0.00433)
MIDBANK	0.0182***				-0.108***
	(0.000667)				(0.00590)
CONSTANT	0.0293***	0.0807**	0.400	1.103*	0.623***
	(0.00919)	(0.0380)	(0.389)	(0.577)	(0.0718)
N	3760	3661	76	23	3760

Note: Table 5 estimation with $\%\Delta SME1922$, average annual SME lending growth from 2019 through 2022, added. IV estimation with dependent variable $\%\Delta SME22$, average annualized growth in small business and farm lending between 2022H1 and 2023H1. PPP is the ratio of PPP participation to total assets in 2020H1; $LIQUID22$ is total liquidity in 2022H1; $COMMIT22$ is unused commitments in 2022H1; $DEPOSITS22$ is total deposits in 2022H1; $TIER1CAP22$ represents tier 1 capital ratio; $SME22H1$ is a measure of small business and farm lending normalized by total assets in 2022H1; $PROB22$ is aggregate measure of past-due and non-accrual loans relative to total assets in 2022H1; and $SMALLBANK$ and $MIDBANK$ indicate small and medium-sized banks, respectively. Columns 2, 3, and 4 represent small, medium, and large bank samples respectively. Column 5 reports WLS results for full sample. Standard errors in parentheses are clustered by bank size. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table OA.15. Late Sample PPP Conditioned for Lagged Growth with Lending Levels Dropped

	Full	Small	Medium	Large	WLS
PPP	-0.298***	-0.297**	-2.214	-0.189	0.750***
	(0.0108)	(0.132)	(3.471)	(2.426)	(0.108)
LIQUID22	0.0466***	0.0501*	-0.233	0.00191	-0.108***
	(0.00386)	(0.0260)	(0.304)	(0.421)	(0.00896)
COMMIT22	0.0975***	0.123	-0.481	-1.291**	-0.838***
	(0.0198)	(0.104)	(0.532)	(0.543)	(0.00179)
DEPOSITS22	-0.0340***	-0.0247	-0.400	-1.218***	-0.603***
	(0.00762)	(0.0451)	(0.349)	(0.436)	(0.0432)
TIER1CAP22	-0.0562***	-0.0557**	-0.687	-1.232	-0.0324
	(0.000248)	(0.0239)	(0.757)	(1.246)	(0.177)
%ΔSME1922	0.00116***	0.00118***	0.00926	-0.0369	-0.00151***
	(0.0000154)	(0.000230)	(0.0877)	(0.0352)	(0.000347)
PROB22	-0.0233	-0.0203	-2.285	6.048	1.131
	(0.0248)	(0.180)	(1.919)	(3.849)	(1.135)
TRADEABLE22	0.0185***	0.0180	0.287	0.522	0.0213
	(0.000833)	(0.0147)	(0.253)	(0.325)	(0.0357)
SMALLBANK	0.0653***				-0.0660***
	(0.00102)				(0.00356)
MIDBANK	0.0183***				-0.0874***
	(0.000726)				(0.00193)
CONSTANT	0.0216**	0.0776**	0.552	1.134***	0.607***
	(0.00934)	(0.0381)	(0.359)	(0.376)	(0.0701)
N	3760	3661	76	23	3760

Note: Table 5 estimation with $\%\Delta SME1922$, average annual growth in SME lending from 2019 through 2022 added and $SME22H1$, SME lending stock in 2022H1, dropped. IV estimation with dependent variable $\%\Delta SME22$, average annualized growth in small business and farm lending between 2022H1 and 2023H1. PPP is the the ratio of a bank's PPP participation to total assets in 2020H1; $LIQUID22$ is total liquidity in 2022H1; $COMMIT22$ is unused commitments in 2022H1; $DEPOSITS22$ is total deposits in 2022H1; $TIER1CAP22$ represents tier 1 capital ratio; $PROB22$ is aggregate measure of past-due and non-accrual loans relative to total assets in 2022H1; and $SMALLBANK$ and $MIDBANK$ indicate small and medium-sized banks, respectively. Columns 2, 3, and 4 represent small, medium, and large bank samples respectively. Column 5 reports WLS results for full sample. Standard errors in parentheses are clustered by bank size. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

TABLE OA.16. Late Sample PPPLF Conditioned for Lagged Growth

	Full	Small	Medium	Large	WLS
PPPLF	-0.330***	-0.328**	-0.286	-2.085	-1.516***
	(0.0110)	(0.133)	(0.648)	(1.786)	(0.0772)
LIQUID22	0.0313***	0.0341	-0.183	-0.0179	-0.0304
	(0.00425)	(0.0261)	(0.253)	(0.562)	(0.0650)
COMMIT22	0.0145	0.0350	-0.647	-2.039	-0.301***
	(0.0166)	(0.0745)	(0.448)	(1.368)	(0.107)
DEPOSITS22	-0.0931***	-0.0814*	-0.482	-2.012**	-1.167***
	(0.0113)	(0.0454)	(0.464)	(0.781)	(0.0238)
TIER1CAP22	-0.0498***	-0.0492**	-0.453	-0.523	-0.162
	(0.000536)	(0.0246)	(0.493)	(1.381)	(0.202)
SME22H1	0.0276***	0.0267	-0.239	-0.881	-0.0863
	(0.000925)	(0.0261)	(0.618)	(1.150)	(0.0568)
%ΔSME1922	0.00106***	0.00108***	-0.0317	-0.0781*	-0.00160***
	(0.0000166)	(0.000263)	(0.0357)	(0.0422)	(0.000327)
PROB22	0.120***	0.113	-0.974	3.256	0.968**
	(0.00421)	(0.181)	(1.817)	(3.858)	(0.480)
TRADEABLE22	0.0149***	0.0140	0.176	0.324	0.217***
	(0.000752)	(0.0162)	(0.183)	(0.414)	(0.0377)
SMALLBANK	0.0529***				0.0373***
	(0.000647)				(0.0145)
MIDBANK	0.0163***				-0.00558
	(0.000454)				(0.00879)
CONSTANT	0.0768***	0.119***	0.529	1.915**	1.036***
	(0.0118)	(0.0401)	(0.397)	(0.867)	(0.0265)
N	3760	3661	76	23	3760

Note: Table 6 estimation with $\%\Delta SME1922$, average annual growth in SME lending from 2019 through 2022 added. IV estimation with dependent variable $\%\Delta SME22$, average annualized growth in small business and farm lending between 2022H1 and 2023H1. PPP is the the ratio of PPP participation to total assets in 2020H1; $LIQUID22$ is total liquidity in 2022H1; $COMMIT22$ is unused commitments in 2022H1; $DEPOSITS22$ is total deposits in 2022H1; $TIER1CAP22$ represents tier 1 capital ratio; $PROB22$ is aggregate measure of past-due and non-accrual loans relative to total assets in 2022H1; and $SMALLBANK$ and $MIDBANK$ indicate small and medium-sized banks, respectively. Columns 2, 3, and 4 represent small, medium, and large bank samples respectively. Column 5 reports WLS results for full sample. Standard errors in parentheses are clustered by bank size. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table OA.17. Late Sample PPPLF Conditioned for Lagged Growth with Lending Levels Dropped

	Full	Small	Medium	Large	WLS
PPPLF	-0.351***	-0.349***	-0.0955	-3.173	-1.524***
	(0.0105)	(0.131)	(0.654)	(3.340)	(0.0784)
LIQUID22	0.0288***	0.0316	-0.165	0.304	-0.0226
	(0.00417)	(0.0261)	(0.245)	(0.479)	(0.0633)
COMMIT22	0.0204	0.0411	-0.713	-1.039	-0.270***
	(0.0168)	(0.0746)	(0.455)	(0.772)	(0.101)
DEPOSITS22	-0.0875***	-0.0759*	-0.423	-2.044***	-1.174***
	(0.0118)	(0.0459)	(0.465)	(0.789)	(0.0204)
TIER1CAP22	-0.0528***	-0.0521**	-0.397	-0.412	-0.145
	(0.000457)	(0.0244)	(0.439)	(1.544)	(0.189)
%ΔSME1922	0.00106***	0.00108***	-0.0418	-0.0918*	-0.00161***
	(0.0000161)	(0.000268)	(0.0337)	(0.0525)	(0.000329)
PROB22	0.140***	0.133	-1.225	3.877	0.995**
	(0.00444)	(0.179)	(1.883)	(3.749)	(0.451)
TRADEABLE22	0.0113***	0.0105	0.174	0.502	0.222***
	(0.000911)	(0.0156)	(0.181)	(0.313)	(0.0390)
SMALLBANK	0.0566***				0.0335*
	(0.000746)				(0.0180)
MIDBANK	0.0173***				-0.00504
	(0.000473)				(0.00936)
CONSTANT	0.0737***	0.119***	0.463	1.724***	1.033***
	(0.0121)	(0.0403)	(0.385)	(0.655)	(0.0250)
N	3760	3661	76	23	3760

Note: Table 6 estimation with $\%\Delta SME1922$, average annual growth in SME lending from 2019 through 2022 added and $SME22H1$, SME lending stock in 2022H1, dropped. IV estimation with dependent variable $\%\Delta SME22$, average annualized growth in small business and farm lending between 2022H1 and 2023H1. PPP is the the ratio of PPP participation to total assets in 2020H1; $LIQUID22$ is total liquidity in 2022H1; $COMMIT22$ is unused commitments in 2022H1; $DEPOSITS22$ is total deposits in 2022H1; $TIER1CAP22$ represents tier 1 capital ratio; $PROB22$ is aggregate measure of past-due and non-accrual loans relative to total assets in 2022H1; and $SMALLBANK$ and $MIDBANK$ are indicator variables for small and medium-sized banks, respectively. Columns 2, 3, and 4 represent small, medium, and large bank samples respectively. Column 5 reports wLS results for full sample. Standard errors in parentheses are clustered by bank size. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$