

Kupiec, Paul H.

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Paul H. Kupiec

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Did prudent risk management practices or weak customer demand reduce PPP lending by the largest banks?

Paul H. Kupiec
Resident Scholar, The American Enterprise Institute
1789 Massachusetts Ave. Washington DC, USA 20036
paul.kupiec@aei.org

Abstract

Regulatory data on bank participation in the Paycheck Protect Program (PPP) reveal large cross-sectional differences among banks. Small bank PPP loan originations far outpaced their overall share of total lending while large bank originations lagged historical norms. Statistical analysis attributes a large share of the variation in PPP loan activity to differences in bank operational characteristics, but large differences remain. The unexplained differences could owe to systematic differences in risk management practices or bank PPP loan demand. Analysis of data on bank-specific average PPP loan size produces results that are inconsistent with a loan demand explanation. Absent good measures of PPP loan demand, the source of the observed differences in bank PPP loan activity cannot be definitively identified using bank regulatory data alone.

I. Introduction

On March 26, 2020, the US Congress passed the CARES Actⁱ— a \$2 trillion coronavirus relief package that included a variety of initiatives designed to offset predicted economic damage caused by virus-related lockdowns and business interruptions. Included among CARES Act provisions was the Paycheck Protection Program (PPP), a \$349 billion Small Business Administration (SBA) special lending program designed to keep small businesses from furloughing employees by providing temporary bridge financing in the form of a government-guaranteed forgivable loan.

The economic success of the PPP was predicated on the expeditious participation of banks. From the earliest days of the program, politicians and the press have been critical of large banks participation in the PPP program. In a July 2020 report,ⁱⁱ the Small Business Administration took extra effort to emphasize the importance of small banks participation in the PPP, reporting that banks with under \$10 billion in assets funded 44 percent of all PPP loans originated through June. In October, the House Select Subcommittee on the Coronavirus Crisis issued a reportⁱⁱⁱ that was highly critical of large bank PPP participation, arguing that many large banks “processed bigger PPP loans for wealthy customers at more than twice the speed of smaller loans for the neediest small businesses.” (p.2)

In this paper, regulatory data are used to analyze bank participation in the PPP program.^{iv} The analysis documents large differences in PPP lending patterns across banks. In particular, the largest banks originated a far smaller share of PPP loan balances compared to their historical share of total lending and their share of Commercial and Industrial loans, the loan category most closely associated with a PPP loan.

Many banks did not make any PPP loans which somewhat complicates the statistical analysis. A two-step Heckman selection methodology is used to model bank PPP dollar loan originations based on bank characteristics that could potentially influence lending decisions. These models explain much of the cross-sectional variation in bank PPP lending patterns using measures of bank staffing, liquidity, and business specializations. After controlling for differences in bank characteristics, it is still the case that large banks financed significantly fewer PPP loans per dollar of asset size than smaller banks.

It is conceivable that the observed difference in PPP participation is driven by a heightened perception of legal and reputation risk at large banks given their historical experience with government loan guarantee programs. Participation in government guaranteed mortgage lending programs created significant legal and reputational problems for large banks following the prior financial crisis. Notwithstanding large banks' negative experiences with government guaranteed lending programs, it is also possible that the remaining differences in bank PPP loan originations could be driven by demand differences, especially if large banks have a larger share of customers who are PPP ineligible.^v

If large banks on average serve larger businesses, then it could be the case that large banks faced weaker demand for PPP loans because their customers were too large to participate in the PPP or had access to capital market sources of funding and thereby ineligible for PPP loans. If this were true, one would expect the average size of PPP loans made by large banks to be larger than the average size of PPP loans made by smaller community banks.

Surprisingly, analysis of regulatory data on bank average PPP loan size produces the opposite pattern—average PPP loan sizes appear to shrink monotonically as bank asset size increases beyond a \$100 billion threshold. The analysis shows very large and highly statistically significant reductions in average PPP loan size for banks larger than \$250 billion in assets. While these results seem inconsistent with a loan demand explanation, lacking good measures of bank-specific PPP loan demand, it is not possible to completely discount the possibility that PPP lending difference owe in part to systematic differences in PPP loan demand.

An outline of the paper follows. Section II summarizes the terms and conditions required to qualify for a PPP loan and to qualify for PPP loan forgiveness. Section III reviews the history of the PPP rollout including government official and press accounts that were critical of various aspects of large bank participation in the PPP. Section IV discusses why large banks in particular might view PPP loans as a significant source of legal and reputational risk. Section V presents the statistical analysis of regulatory data on bank PPP lending and Section VI concludes.

II. The Paycheck Protection Program

Small businesses with 500 or fewer employees—including nonprofits, veteran organizations, tribal concerns, self-employed individuals, sole proprietorships, and independent contractors—whose business was negatively impacted by COVID-19 pandemic were eligible to apply for PPP loans. The initial \$349 billion tranche of PPP loans was exhausted within the first two weeks of the program. On April 24, 2020, the Paycheck Protection Program and Health Care Enhancement

Act added \$310 billion in additional PPP funds. According to SBA data, by the time the window for PPP loan originations expired, a total of \$519 billion in PPP loans were outstanding.

PPP loans are fully guaranteed by the US SBA. The loans were originated by banks and other SBA-approved lenders. Lenders received a fee from the SBA for underwriting the loans.^{vi} PPP loans carry a 1-percent interest rate and a maturity of 2-years if originated before June 5, and 5-years if originated subsequently.^{vii} PPP loans do not require collateral. Loan interest payments are fully deferred for borrowers who apply for loan forgiveness and are deferred for 2 months (6 months) for borrowers who are not seeking forgiveness.^{viii} PPP loan principal and interest can be 100 percent forgiven if the borrower's use of the loan proceeds satisfies specific PPP criteria.

The requirements for total loan forgiveness are: (i) 60 percent of PPP loan proceeds must be used for payroll expense within a 24-week period after the funds are disbursed; (ii) the borrower must retain the employees used to determine the eligible PPP loan balance; (iii) employees making less than \$100k prior to the crisis must receive at least 60 percent of their pre-crisis salary.^{ix} After satisfying PPP payroll requirements, any remaining PPP balances must be used to cover eligible expenses incurred during the 24-month period.^x

To qualify for a PPP loan, the applicant had to be a qualified small business and make several attestations. A successful applicant must attest that, "Current economic uncertainty makes this loan request necessary to support the ongoing operations of the Applicant."^{xi} The applicant had to further attest, "The funds will be used to retain workers and maintain payroll or make mortgage interest payments, lease payments, and utility payments, as specified under the Paycheck Protection Program Rule; I understand that if the funds are knowingly used for unauthorized purposes, the federal government may hold me legally liable, such as for charges of fraud."

In order to approve a PPP loan, lenders were responsible for: confirming the receipt of borrower certifications; confirming the receipt of information demonstrating that a borrower had employees for whom the borrower paid salaries and payroll taxes on or around February 15, 2020; confirming the dollar amount of the applicant's average monthly payroll costs; and following applicable Bank Secrecy Act requirements. Lenders were permitted to rely on borrower certifications and representations.

III. The PPP rollout

The PPP program faced difficulty before it began because of its proposed 0.5 percent interest rate on PPP loans.^{xii} Industry reaction suggested that the rate was unlikely to attract lender participation and the rate was quickly increased to 1 percent. Still the program got off to a slow start in part because of delays in issuing program guidance and conflicts within the initial guidance issued by the US Treasury and SBA.^{xiii}

Early accounts monitoring the PPP criticized the largest banks for delays in approving PPP loan applications. It should have been no surprise that incomplete or conflicted guidance on PPP loan eligibility and forgiveness criterion would slow PPP loan application processing in banks that followed good risk management protocols. Large banks' focus on ensuring that borrowers met

eligibility requirements was likely heightened by the legal expenses and reputational damage associated with banks' participation in government guaranteed mortgage programs prior to the financial crisis.

After the issuance of additional SBA guidance in mid-April, large bank originations of PPP loans not only increased, but increased to the point that large banks were accused of quickly approving large loans applications and "draining" the first tranche of PPP funds.^{xiv} Critics claimed that large banks intentionally slowed the processing or even rejected PPP applications from new small PPP borrowers while they expeditiously processed the applications of large customers with existing bank relationships.^{xv}

Ostensibly, large banks were being criticized for exercising sound underwriting standards.^{xvi} Given the information asymmetries banks faced when processing PPP applications from new customers versus applications from customers with existing borrowing relationships, it would be surprising if loan processing times were not different.

Once the program got underway, controversy emerged surrounding the applicant's required attestations. To qualify for a loan, the application did not require any proof that a business had been adversely impacted by the COVID-crisis. Press accounts^{xvii} revealed that several large public companies inappropriately borrowed using the PPP. In response, the Treasury issued new qualifying guidance and pledged to review the applications of loans larger \$2M. It offered amnesty for existing PPP borrowers who did not meet the amended qualifying requirements if they returned their loan proceeds. \$30B in PPP loans were reportedly returned under amnesty.^{xviii}

As the PPP program progressed, large banks continued to draw criticism from officials and the press. Critics focused on the magnitude of the PPP fees collected by large banks,^{xix} the speed in processing truly small business applications, and the alleged disparate treatment of minority businesses.^{xx}

IV. Potential legal and reputational risk for PPP lenders

PPP loans are guaranteed by the US government which makes institutions originating PPP loans subject to several federal laws that enable the government to collect damages from lenders in cases where fraud or intentional misrepresentations cause losses for government agencies that guarantee loans. For example, the False Claims Act establishes liability for a variety of false or fraudulent conduct, including when a person or institution "knowingly presents or causes to be presented a false claim for payment or approval" or "knowingly makes, uses, or causes to be made or used, a false record or statement material to a false or fraudulent claim."^{xxi}

Before the 2008 financial crisis, the largest US banks routinely made Federal Housing Administration (FHA) loans. FHA loans are government guaranteed mortgages that are designed to help first-time home purchasers with little or no down payments and those with less than perfect credit histories purchase homes. When the housing bubble deflated, the FHA suffered massive mortgage loan defaults and was on the brink of insolvency.

The government claimed that FHA-originating banks did a poor job enforcing FHA underwriting standards and used the False Claims Act to extract tens of billions of dollars in fines from banks,

the revenues from which were used to replenish the FHA’s coffers. Table 1 reports the largest government fines imposed on financial institutions for mortgage loan-related misrepresentations involving government loan guarantee programs that suffered losses in the financial crisis. These totals include monetary settlements with FHA, FannieMae and FreddieMac.

Table 1: Financial crisis fines related to government guaranteed mortgage fraud^{xxii}

| Bank | fine in \$ billions |
|-----------------|------------------------|
| Bank of America | 76.1 |
| JPMorgan Chase | 43.7 |
| Citigroup | 19.0 |
| Deutsche Bank | 14.0 |
| Wells Fargo | 11.8 |
| RBS | 10.1 |
| BNP Paribas | 9.3 |
| Credit Suisse | 9.1 |
| Morgan Stanley | 8.6 |
| Goldman Sachs | 7.7 |
| UBS | 6.5 |

Notes: Fines paid through Jan 2018.
Source: Keefe, Bruyette and Woods

Banks have reacted to these fines by refraining from doing any new business with the FHA.^{xxiii} Today, virtually all FHA loans are originated by nonbanks. Nonbanks are not required to have the deep capitalization levels regulations require of banks. If the government were to use the False Claims Act to impose large fines on an institution with little capital, it could bankrupt the company and frustrate the government’s ability to collect.

There are many criteria that determine if a business qualifies to borrow using the PPP and the maximum permissible size of the PPP loan. Moreover, these loans can only be forgiven to the extent that the borrower uses the proceeds for specific purposes described in the law. It is not hard to imagine there might be a few unscrupulous businesses that stretch the truth to get a bigger loan than allowed by law or use creative accounting to qualify for loan forgiveness. In fact, there are many news accounts alleging widespread PPP fraud.^{xxiv}

There is always the risk that, despite safe harbor provisions in the PPP program,^{xxv} public reaction to widespread PPP fraud could induce politicians to blame the fraud on banks and use existing statutes to try to recover PPP funds. From the government’s perspective, it is cost effective to focus enforcement actions on a few large banks rather than hundreds of small banks. Moreover, large banks have the earnings available to absorb large fines without impacting regulatory capital buffers. Similarly, the larger the amount of excess capital over required minimum regulatory levels, the larger the fine that can be absorbed without triggering a failure.

V. Bank participation in the PPP

Table 1 summarizes banks’ participation in the PPP according to several bank asset size categories. The statistics are calculated using data reported in bank June 30, 2020 regulatory “call” reports.^{xxvi} The September 30, 2020 bank call report data portray a similar picture.

The data in Table 1 show that the largest banks originated a much smaller share of total PPP loan balances than one might expect based on their share of total system lending and their share of total commercial and industrial (C&I) lending. While banks with total assets in excess of \$1 trillion originated a third of all C&I loans and nearly a third of the balances of all loan types, they only originated 13.5 percent of total PPP loan balances originated by the banking system. By way of comparison, the smallest banks by asset size—those with assets under \$1 billion—originated 13.55 percent of all PPP loans even though their overall share of bank lending was only 7 percent.

Table 2: Bank participation in the PPP by bank asset size categories

| bank size category | Total end-June PPP balances (\$000s) | PPP loans to total bank system PPP loans (pct) | PPP loans to total bank category loans (pct) | Bank category total loans to bank system total loans (pct) | Bank category C&I loans to bank system total C&I loans (pct) |
|---------------------------------------|--|---|---|---|---|
| assets > \$1 trillion | 65,455,000 | 13.50 | 1.88 | 32.22 | 33.19 |
| \$100 billion < assets < \$1 trillion | 94,687,444 | 19.53 | 3.14 | 27.95 | 30.56 |
| \$10 billion < assets < \$100 billion | 127,100,322 | 26.22 | 5.95 | 19.78 | 18.70 |
| \$1 billion < assets < \$10 billion | 131,863,687 | 27.20 | 9.37 | 13.03 | 12.13 |
| assets < \$1 billion | 65,671,520 | 13.55 | 8.66 | 7.02 | 5.41 |

Notes: Data are calculated from June 30, 2020 regulatory report data. PPP and overall loan rates calculated from September 30, 2020 regulatory reports are little changed from June totals, and are not reported in the interest of brevity.

The following analysis investigates whether the sizable differences in PPP participation across the bank size groupings reported in Table 2 can be explained by differences in operational considerations like liquidity, business line specialization or staffing constraints, or if other factors are at play. Two possibilities that could be systematically influencing PPP participation include differences in risk management sensitivity to legal and reputational risk and differences in demand for PPP loans. Systematic difference in loan demand could arise if larger banks faced muted demand for PPP loans because a larger share of their customer base was ineligible.

For one reason or another, nearly 17 percent of all insured depository institutions chose not to make any PPP loans. Because of the predominance of zero observations on PPP bank loans, it would be inappropriate to use ordinary least squares (OLS) regression to analyze the data. The data are censored at 0, and consistent estimates of explanatory variable coefficients require techniques that control for the censored dependent variable.

The Heckman (1976) two-step methodology is used to correct for a censored dependent variable.^{xxvii} The first step involves specifying and estimating a probit model that estimates the probability that each bank will participate in the PPP. The second step involves a linear regression model that includes data on the banks that do decide to lend. This model includes the bank characteristics that could determine difference in loan balances, and in addition, for each

bank, an estimate of its inverse Mills ratio calculated from the first-step probit model estimates. The third step involves resampling the data with replacement and re-estimating the model many times in order to calculate “bootstrap” coefficient standard errors for the linear regression model coefficient estimates, because the OLS model estimates are biased.

It is conjectured that a bank’s decision to participate in the PPP program depends on staffing constraints and its existing business specialization. Staff capacity is measured by the dollar value of total assets per bank employee. It is expected that the staff capacity necessary to take on PPP loan processing will be negatively related to assets per employee. It is further conjectured that banks that specialize in trust and fiduciary businesses will be unlikely to participate in PPP programs. The degree of specialization is measured using the ratio of a bank’s total fiduciary and related assets to its total assets. PPP loans are categorized as commercial and industrial (C&I) loans. It is conjectured that banks that specialize in C&I lending will be more likely to participate in the PPP, and C&I specialization is measured by the ratio of a banks C&I loans to its total loans. Summary statistics on all variables used in the analysis are reported in Table A in the Appendix.

Table 3 reports the maximum likelihood estimates of the PPP bank participation model. All of the coefficient estimates are significant at the 1 percent level and the signs are consistent with prior expectations. The likelihood ratio test statistic, significant at the 1 percent level, indicates that the three bank characteristics add significant explanatory power to the probit model.

Table 3: Probit estimates of bank PPP participation

| | Constant | Assets-to-employees | Total fiduciary and related assets-to-assets | C&I loans-to-assets |
|----------------------------|----------|---------------------|--|---------------------|
| Coefficient estimate | 0.784* | -0.004* | -0.079* | 3.167* |
| Standard error estimate | 0.036 | 0.001 | 0.023 | 0.381 |
| Z-statistic | 21.87 | -3.64 | -3.48 | 8.31 |
| | - | | | |
| Log likelihood | 2153.86 | | | |
| | - | | | |
| Null log likelihood | 2264.93 | | | |
| Likelihood ratio statistic | 222.14* | | | |

Notes: Heckman model selection equation estimates. The dependent variable is a dichotomous variable; 1 indicates participation in the PPP program as of June 2020. All bank characteristics other than PPP loan balances are March 31, 2020 values. The regression is based on 5052 observations. '*' indicates that the coefficient estimate is statistically different from 0 at the 1 percent level.

The second stage of the Heckman methodology includes only banks that made PPP loans and attempts to explain the observed variation in the log of bank PPP loan balances with the variation in a specific set of bank characteristics. The model includes a constant and seven bank

characteristics: the log of bank assets, an indicator variable for large banks interacted with the log of banks assets, the ratio of bank loans to assets, the ratio of bank total equity to assets, the ratio of a bank Federal Reserve deposits to assets, the ratio of bank C&I loans to assets, the ratio of bank loan and lease loss reserves to assets, and the bank's inverse Mills ratio calculated using first step probit model estimates. Summary statistics for these variables used in the analysis are reported in Table A in the Appendix.

The log of bank assets is included to capture bank size effects. Bank size is interacted with an indicator variable that takes on the value of 1 for banks larger than \$100 billion. This interaction term allows banks larger than \$100 billion to have a different coefficient estimate on the bank size variable than smaller banks. A threshold of \$100 billion is chosen so that enough banks are above the threshold to generate meaningful statistical results.

The second-stage model also includes the ratio of bank loans-to-assets as a measure of bank business specialization. It is anticipated that banks more focused on lending (as compared to capital markets or fiduciary services) are more likely to be aggressive PPP lenders. The ratio of bank equity-to-assets is included to measure bank sensitivity to legal and reputational risks. PPP loans have a 0 regulatory risk weight and are excluded from bank regulatory leverage ratio calculations, so equity-to-asset ratios should not be important from a regulatory capital perspective. However, banks with higher equity-to- asset ratios could feel more exposed to the legal risk from PPP lending since their larger capital buffers create the capacity to extract more in government fines should fraud prove problematic.

The share of assets invested in Federal Reserve deposits is a measure of bank liquidity. It is anticipated that more liquid banks will originate more PPP loans. The bank C&I loan ratio is a second measure of business specialization and is expected to be positively related to PPP lending. The share of bank assets committed to loan loss reserves is a measure of the credit quality of an institution's existing customer base which could impact a bank's willingness to lend even though PPP loans are fully guaranteed.^{xxviii} The inverse Mills ratio controls for data censoring effects on the regression coefficient estimates.

Second-stage regression model estimates are reported in Table 4 along with coefficient standard error estimates calculated using 1000 bootstrap replications. The model explains 74 percent of the observed variation in the log of PPP loan balances. The estimates in Table 4 show that there is a statistically significant positive relationship between bank PPP loan balances and bank asset size, but that the size coefficient estimate for banks larger than \$100 billion in assets (1.115 - 0.102) is smaller than the coefficient estimate for smaller banks (1.115). These regression results establish that, controlling for bank characteristics related to PPP lending, on average, larger banks made fewer dollars of PPP loans per dollar of assets.

The regression estimates also show that banks that held a larger share of their assets as deposits at the Federal Reserve at the beginning of the quarter and banks that were more focused on lending (as compared to capital markets or fiduciary activities) are expected to have larger PPP balances. The inverse Mills ratio is highly statistically significant which confirms the need to use the Heckman correction for censored data. The ratio of C&I loans to assets, and loan and lease

reserves to assets, were borderline significant in the initial OLS estimates but turned out to be insignificant once consistent bootstrap standard error estimates were calculated.^{xxix}

The equity-to-asset ratio was included to test the conjecture that banks with large equity-to-asset ratios might limit their PPP participation by exercising especially cautious underwriting to minimize their legal and reputational risk exposure should the government take future actions to recover fraudulent PPP disbursement. Table 4 shows that the coefficient estimate on this variable is statistically insignificant, which is inconsistent with this conjecture. Even if excess capital is not a prime concern, large banks could still shun PPP lending based on perceptions of the associated legal and reputational risks.

Table 4: Estimates of the relationship between selected bank characteristics and bank PPP loan balances

| Variable | Coefficient estimate | Bootstrap standard error estimate | z-statistic |
|--|----------------------|-----------------------------------|-------------|
| Constant | -1.934* | 0.197 | -9.82 |
| Log assets | 1.115* | 0.015 | 73.86 |
| I(>\$100 billion)*Log assets | -0.102* | 0.012 | -8.81 |
| Loans-to-assets | 0.403* | 0.061 | 6.65 |
| Equity-to-assets | -0.132 | 0.462 | -0.29 |
| Federal Reserve balances-to-assets | 0.663* | 0.123 | 5.39 |
| C&I loans-to-assets | 0.606 | 0.524 | 1.16 |
| Loan and lease loss reserves-to-assets | 1.274 | 2.516 | 0.51 |
| Inverse Mills ratio | -1.538* | 0.415 | -3.71 |
| Adjusted R-Squared | 0.74 | | |

Notes: Heckman selection model estimates of the treatment effect regression. The dependent variable is a bank-specific average PPP loan size as of June 30, 2020. Logarithms are base 10. All bank characteristics other than PPP loan balances are March 31, 2020 values. '*' indicates that the coefficient estimate is statistically different from 0 at the 1 percent level. I(-assets-) is a dichotomous indicator function that equals 1 when bank assets are within the indicated range. The regression is based on 4217 bank observations with positive PPP balances. All regression coefficient standard errors are estimated using 1000 bootstrap resamples.

The results in Table 4 show that, controlling for other important factors that affect bank lending decisions, large banks on average originated fewer dollars of PPP loans per dollar of bank assets. One possible reason large banks could have underperformed small banks is if on average the customers of large banks were less inclined to apply for PPP loans. This could be the case, for example, if a larger share of large bank customers exceeded the 500 employee PPP qualifying limit or if a larger share of large bank customers had access to capital markets funding which would render them ineligible for the PPP program. Regulatory data do not include a proxy measure of the PPP loan demands faced by individual banks. However, it may be possible to get

some indication of the importance of systematic differences in large and small bank PPP loan demand by examining the average size of PPP loans.

If, on average, the largest banks attract larger customers than smaller banks, then customer PPP loan demand at smaller banks should on average be comprised of applications for smaller PPP loan amounts. A larger average loan size at the largest banks would be consistent with the conjecture that, on a relative bank size basis, large bank PPP loan originations lagged the performance of smaller banks because of difference in customer characteristics. If this conjecture is true, the customers of large banks that did qualify for PPP loans would qualify for larger loans on average, and larger banks would originate fewer PPP loans per dollar of assets because a larger share of large bank customers would be ineligible for the PPP program.

The possibility that systematic difference in PPP loan demand could be in part responsible for the observed differences in bank PPP participation is investigated by analyzing the average size of bank PPP loans using the Heckman methodology to correct for the censored dependent variable. An identical first-stage probit selection model is used to estimate the probability that a bank makes any PPP loans. The second stage regression models average bank PPP loan size as a function of a constant, the bank's inverse Mills ratio estimate, and the same set of bank specific characteristics used in the PPP loan balance equation. However, in this regression, bank size enters the equation with different coefficients for different size-groupings. Three indicator variables are used to identify: (i) banks with assets greater than \$250 billion; (ii) banks with assets between \$100 billion and \$250 billion; and (iii) banks with assets between \$25 billion and \$100 billion. Four size variables are used to model bank size effects on average PPP loan size: the log of assets and the log of assets interacted with the three indicator variables. Again model coefficient standard errors are estimated using 1000 bootstrap resampling replications.

The regression results in Table 5 are inconsistent with the conjecture that large bank's PPP borrowers are on average much larger than PPP borrowers at small banks. In fact, Table 5 estimates suggest that, past a threshold bank size of \$100 billion in assets, there is statistically significant evidence that the average PPP loan size is monotonically declining in bank size. Holding other factors constant, the results indicate that the average size of a PPP loan at the largest banks, banks with over \$250 billion in assets, is almost \$23,000 smaller than the average size at community banks smaller than \$25 billion in assets. While the coefficient estimate for the size category \$25-\$100 billion is negative, the coefficient estimate is not statistically different from zero at conventional test levels.

The regression results in Table 5 are not consistent with the conjecture that the observed differences between large and small bank PPP participations are driven by systematic differences in PPP loan demand. Data on the average PPP loan size do not suggest that the largest banks served the largest businesses, at least regarding their PPP lending. While suggestive, these results cannot rule out a demand-driven explanation for the observed difference in PPP performance as the regulatory data do not include good proxy variables for measuring bank-specific PPP loan demand.

Table 5: Estimates of the relationship between selected bank characteristics and bank average PPP loan size

| Variable | Coefficient estimate | Bootstrap standard error estimate | z-statistic |
|---|----------------------|-----------------------------------|-------------|
| Constant | -344.95* | 54.48 | -6.33 |
| Log assets | 55.93* | 2.25 | 24.87 |
| I(>\$250B)*Log assets | -22.65* | 1.93 | -11.73 |
| I(\$100B < assets < \$250B) *Log assets | -12.24** | 6.24 | -1.96 |
| I(\$25B < assets < \$100B) *Log assets | -3.74 | 2.30 | -1.63 |
| Loans-to-assets | 29.29* | 10.09 | 2.90 |
| Equity-to-assets | 118.52* | 39.87 | 2.97 |
| Federal Reserve balances to assets | 113.49* | 18.13 | 6.26 |
| C&I loans-to-assets | 507.56* | 141.90 | 3.58 |
| Loan and lease loss reserves-to-assets | -1148.80* | 332.42 | -3.46 |
| Inverse Mills ratio | 171.52 | 148.51 | 1.15 |
| Adjusted R-Squared | 0.24 | | |

Notes: Heckman selection model estimates of the treatment effect regression. The dependent variable is a bank-specific average PPP loan size as of June 30, 2020. All bank characteristics other than PPP loan balances are March 31, 2020 values. '*' indicates that the coefficient estimate is statistically different from 0 at the 1 percent level. '**' indicates that the coefficient estimate is statistically different from 0 at the 5 percent level. I(-assets-) is a dichotomous indicator function that equals 1 when bank assets are within the indicated range. The regression is based on 4217 bank observations with positive PPP balances. All regression coefficient standard errors are estimated using 1000 bootstrap resamples. Logarithms are base 10.

VI. Conclusions

Analysis of regulatory data on bank PPP loan participations show stark difference between the behavior of large and small banks. Smaller banks were aggressive originators of PPP loans while the largest banks dramatically underperformed relative to their historical patterns of aggregate loan shares. The systematic difference in PPP participation observed between large and small banks cannot be easily explained by difference in bank liquidity, equity, business specialization or the quality of a banks existing loan book. The observed behavioral difference may be explained by systematic differences in PPP loan demand or by systematic differences in banks' willingness to carry the legal and reputational inherent in PPP participation. An analysis of the determinants of bank average PPP loan size does not support the loan demand explanation, but the information content of regulatory data relating to bank-specific loan demand or banks' risk appetite is too limited to support the rejection of either explanation.

Table A: Sample Summary Statistics

| | Mean | Median | StdDev | .05 Quantile | .25 Quantile | .75 Quantile | .95 Quantile |
|---|--------|--------|--------|--------------|--------------|--------------|--------------|
| assets(000s) per employee | 7.26 | 5.08 | 32.41 | 2.86 | 4.07 | 6.62 | 11.67 |
| total fiduciary and related assets to assets | 1.98 | 0.00 | 81.37 | 0.00 | 0.00 | 0.00 | 0.22 |
| C&I loans to total loans | 0.08 | 0.07 | 0.07 | 0.00 | 0.04 | 0.11 | 0.22 |
| PPP participation indicator | 0.83 | 1.00 | 0.37 | 0.00 | 1.00 | 1.00 | 1.00 |
| PPP loan balances (000s) | 95958 | 9685 | 702755 | 0 | 1366 | 37220 | 264680 |
| Log base 10 of assets (assets in 000s) | 5.46 | 5.38 | 0.65 | 4.60 | 5.04 | 5.77 | 6.64 |
| loan-to-asset ratio | 0.64 | 0.68 | 0.16 | 0.32 | 0.56 | 0.76 | 0.84 |
| equity-to-asset ratio | 0.13 | 0.11 | 0.07 | 0.08 | 0.10 | 0.13 | 0.20 |
| Federal Reserve deposits to assets | 0.10 | 0.08 | 0.10 | 0.02 | 0.04 | 0.13 | 0.28 |
| C&I loans to assets | 0.08 | 0.07 | 0.07 | 0.00 | 0.04 | 0.11 | 0.22 |
| loan and lease loss reserves to assets | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.02 |
| PPP average loan size (000s) | 75.71 | 62.40 | 86.38 | 0.00 | 29.65 | 101.01 | 193.87 |
| sample size | 5052 | 5052 | 5052 | 5052 | 5052 | 5052 | 5052 |
| Summary data for PPP participating banks | | | | | | | |
| assets(000s) per employee | 6.26 | 5.11 | 14.62 | 3.00 | 4.11 | 6.54 | 11.13 |
| total fiduciary and related assets to assets | 0.06 | 0.00 | 0.48 | 0.00 | 0.00 | 0.00 | 0.22 |
| C&I loans to total loans | 0.09 | 0.07 | 0.07 | 0.01 | 0.04 | 0.12 | 0.22 |
| PPP loan balances (000s) | 114960 | 14746 | 767817 | 684 | 4331 | 49277 | 325999 |
| Log base 10 of assets (assets in 000s) | 5.53 | 5.45 | 0.62 | 4.70 | 5.12 | 5.82 | 6.66 |
| loan-to-asset ratio | 0.66 | 0.69 | 0.15 | 0.37 | 0.58 | 0.76 | 0.84 |
| equity-to-asset ratio | 0.12 | 0.11 | 0.04 | 0.08 | 0.10 | 0.13 | 0.18 |
| Federal Reserve deposits to assets | 0.10 | 0.07 | 0.08 | 0.02 | 0.04 | 0.12 | 0.25 |
| C&I loans to assets | 0.09 | 0.07 | 0.07 | 0.01 | 0.04 | 0.12 | 0.22 |
| loan and lease loss reserves to assets | 0.01 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| PPP average loan size (000s) | 90.71 | 73.04 | 87.06 | 22.47 | 46.71 | 111.81 | 207.66 |
| sample size | 4217 | 4217 | 4217 | 4217 | 4217 | 4217 | 4217 |

ⁱ S.3548, “The Coronavirus Aid, Relief, and Economic Security Act” or CARES Act.

ⁱⁱ The Small Business Administration, “Paycheck Protection Program (PPP) Report,” available at, [Paycheck Protection Program \(PPP\) Report, Approvals through 06/30/2020 \(sba.gov\)](https://www.sba.gov/payprotection/ppp-report-approvals-through-06-30-2020), last accessed 12/14,2020.

ⁱⁱⁱ Select Subcommittee on the Coronavirus Crisis Staff Report, October 2020, “Underserved and Unprotected: How the Trump Administration neglected the Neediest Small Businesses in the PPP,” available at, <https://coronavirus.house.gov/sites/democrats.coronavirus.house.gov/files/PPP%20Report%20Final%20%283%29.pdf>, last accessed 12/14/2020.

^{iv} Throughout the paper, “banks” refer to all depository institutions that are insured by the Federal Deposit Insurance Corporation and are required to file quarterly Reports of Condition and Income, or so-called “call” reports.

^v There could be other possible explanations for the performance discrepancy. For example, the largest banks are part of large bank holding companies. It is possible that a large bank’s parent holding company used a non-bank affiliate to originate PPP loans.

^{vi} The SBA pays lenders fees of 5 percent for loans under \$350K; 3-percent for loans between \$350K and \$2 M; and 1-percent for loans over \$2M. According to a Dec 2, 2020 New York Times story, “1 Percent pf P.P.P. Borrowers Got Over One-Quarter of the Loan Money,” available at, <https://www.nytimes.com/2020/12/02/business/paycheck-protection-program-coronavirus.html>, last accessed 12/14/2020, PPP lenders collected about \$18B in fees.

^{vii} The Paycheck Protection Program Flexibility Act of 2020 (Pub. L. 116-142, available at, <https://www.govinfo.gov/content/pkg/PLAW-116pib1142/html/PLAW-116publ142.htm>, last accessed 12/14/2020) signed into law on June 5 changed the maturity of PPP loans, the deferral terms of PPP loan payments, and the criteria for PPP loan forgiveness.

^{viii} The terms of PPP loans were modified after the initial tranche of funds was exhausted. The length of the interest deferral period depends on the date the loan was originated.

^{ix} If the borrower reduces the number of employees from the number specified in the PPP application, or reduces their pre-crisis salary by more than 40 percent, the borrower will not be eligible for full loan forgiveness.

^x Qualifying expenses include: expenses for health care benefits; mortgage interest, rent, and utility payments; interest payments on other debts incurred before February 15, 2020; and, refinancing an SBA emergency injury disaster loan.

^{xi} See the SBA application form for a PPP loan, available at, <https://www.sba.gov/document/sba-form-2483-paycheck-protection-program-borrower-application-form>, last accessed 12/14/2020.

^{xii} See, for example, the April 2, 2020 report in the ABA Banking Journal, “SBA Increases Rate, Clarifies Terms on Paycheck Protection Program Loans,” available at, <https://bankingjournal.aba.com/2020/04/treasury-sba-to-increase-rate-on-paycheck-protection-program-loans/#:~:text=In%20the%20new%20guidance%2C%20SBA,from%20participating%20in%20the%20program.>, last accessed 12/14/2020.

^{xiii} See for example, a May 6, 2020 article in the American Banker, “PPP is a compliance minefield for banks,” available at, <https://www.americanbanker.com/opinion/ppp-is-a-compliance-minefield-for-banks>, last accessed 12/15/2020.

^{xiv} See for example, “Big banks cannot shut out small business from Paycheck Protection Program,” The Hill, April 23, 2020, available at, <https://thehill.com/blogs/congress-blog/politics/494355-big-banks-cannot-shut-out-small-businesses-from-paycheck>, last accessed 12/15/2020.

^{xv} See for example an April 18, 2020 story in the Los Angeles Times, “Coronavirus rescue loans for small business went to community lenders as big banks fumbled,” available at, <https://www.latimes.com/business/story/2020-04-18/small-business-loans-coronavirus-unemployment>, last accessed 12/14/2020, or an article appearing April 6, 2020 in The Wall Street Journal, “Big Banks Favor Certain Customers in \$350 Billion Small-Business Loan Program,” available at, <https://www.wsj.com/articles/big-banks-favor-certain-customers-in-350-billion-small-business-loan-program-11586174401>, last accessed 12/14/2020.

^{xvi} Given the information asymmetries banks faced when processing PPP applications from new customers versus applications from customers with existing borrowing relationships, it would be surprising if loan processing times were not different.

^{xvii} See, for example, Forbes, April 24, 2020, “Many Public Companies That Got PPP Loans Had Lots in the Bank,” available at, <https://www.forbes.com/sites/eriksherman/2020/04/24/public-companies-ppp-loans-money/?sh=e17a1f640d23>, last accessed 12/15/2020.

^{xviii} Fox Business, July 6, 2020, “Companies Return \$30B in coronavirus relief loans from PPP,” available at, <https://www.foxbusiness.com/money/companies-returned-30b-in-coronavirus-relief-loans-from-ppp>, last accessed 12/15/2020.

^{xix} See for example a July 7, 2020, CNN Business Report, “Big banks stand to earn hundreds of millions from PPP loan fees,” available at, <https://www.cnn.com/2020/07/07/investing/banks-ppp-loan-fees/index.html>, last accessed 12/14/2020, or a July 9, 2020, or a story in Business Insider, “US banks could gain up to \$24.6 billion in processing fees for PPP loans,” available at, <https://www.businessinsider.com/banks-could-pick-up-24-billion-ppp-processing-fees-2020-7>, last accessed 2/14/2020.

^{xx} Select Subcommittee on the Coronavirus Crisis Staff Report, October 2020, “Underserved and Unprotected: How the Trump Administration neglected the Neediest Small Businesses in the PPP,” available at, <https://coronavirus.house.gov/sites/democrats.coronavirus.house.gov/files/PPP%20Report%20Final%20%283%29.pdf>, last accessed 12/14/2020.

^{xxi} 31 U.S. Code Section 3729(a)(1).

^{xxii} The totals in Table 1 are from a Feb. 24, 2018 article in MarketWatch, “Here is the staggering amount banks have been fined since the financial crisis,” available at, <https://www.marketwatch.com/story/banks-have-been-fined-a-staggering-243-billion-since-the-financial-crisis-2018-02-20>, last accessed 12/15/2020.

^{xxiii} See, for example, the May 9, 2019 story in The Wall Street Journal, “Banks Fled the FHA Loan Program. The Government Wants Them Back,” available at, <https://www.wsj.com/articles/banks-fled-the-fha-loan-program-the-government-wants-them-back-11557417600>, last accessed 12/15/2020.

^{xxiv} See, for example, a Nov 8, 2020 article in The Wall Street Journal, “Evidence of PPP Fraud Mounts, Officials Say,” available at, <https://www.wsj.com/articles/ppp-was-a-fraudster-free-for-all-investigators-say-11604832072>, last accessed 12/14/2020, or an Oct 6, 2020 story in Thomson Reuters, “\$4 billion in PPP loans already red flagged,” available at, <https://legal.thomsonreuters.com/blog/4-billion-in-ppp-loans-already-red-flagged/>, last accessed 12/14/2020, or a November 8 story in PYMNTS.com, “Hundreds Of Probes Into PPP Loan Fraud Have Been Opened,” available at, <https://www.pymnts.com/news/security-and-risk/2020/hundreds-probes-into-ppp-loan-fraud-have-been-opened/>, last accessed 12/14/2020.

^{xxv} The US Treasury has stated that, because of resource limitations, the SBA will focus investigations on PPP borrower attestations to PPP loans in excess of \$2M. See for example the April 30, 2020 report in the ABA Banking Journal, “SBA to Audit PPP Loans Above \$2 Million,” available at, <https://bankingjournal.aba.com/2020/04/sba-to-audit-ppp-loans-above-2-million/#:~:text=The%20Small%20Business%20Administration%20will,updated%20FAQ%20on%20the%20program.>, last accessed 12/14/2020.

^{xxvi} Call reports are publically available at, <https://www.fdic.gov/regulations/resources/call/call.html>, last accessed 12/15/2020.

^{xxvii} Heckman, James J. (1976). “The Common Structure of Statistical Models of Truncation, Sample Selection and Limited Dependent Variables and a Simple Estimator for Such Models”, in *Annals of Economic and Social Measurement*, 5(4): 475-497. See also the discussion in Greene, William H. (2012). “Incidental Truncation and Sample Selection”. *Econometric Analysis* (Seventh ed.). Boston: Pearson. pp. 912–27. See also Greene, William H. (2012). “Incidental Truncation and Sample Selection”. *Econometric Analysis* (Seventh ed.). Boston: Pearson. pp. 912–27.

^{xxviii} The ratio of loan and lease loss reserves to assets is a rough measure of the average credit quality of a bank's customer base, similar to an average customer credit score. Credit scores are used in many business decisions as more credit-worthy customers tend to be less problematic in many dimensions. See for example, "Credit Scores and Jobs: Reality Check for Job Hunters," CBSNews, July 22, 2010, available at, <https://www.cbsnews.com/news/credit-scores-and-jobs-reality-check-for-job-hunters/>, last accessed 12/15/2020.

^{xxix} Each bootstrap replication can take up to a minute of computation time depending on the speed of convergence of the probit maximum likelihood estimation routine, so 1000 bootstrap replications used to calculate coefficient estimate standard errors takes several hours to compute.