

# Appendix

## Additional Information on the Statistical Significance Tests

This report presents an observational study on FDIC-insured financial institutions that compares data on MDIs with data on non-MDI community banks and non-MDI noncommunity banks. In the study, the assignment of subjects to groups is nonrandom and outside the control of the observer.

Although our results indicate statistically significant differences between certain metrics of MDIs and non-MDI banks, the results do not establish that being an MDI is a primary reason for these differences. This is because of the possible existence of confounding factors. For example, the markets in which MDIs operate may differ on average from those of other banks, even though institutions from both subject groups that operate within the same market seem similar. Further research could compare MDIs and non-MDI banks within the same geographic area or that engage in similar lines of business.

The report considers a variety of data sources, including financial reports, residential mortgage lending data, and SBA-guaranteed small business lending data, which provide a more holistic picture of differences and similarities. However, since not all institutions engage in all activities, findings should be interpreted as representative of institutions from a particular subject group that engage in that activity rather than as representative of the subject group more broadly. As of December 31, 2018, MDIs comprised only 149 of 5,406 FDIC-insured financial institutions. Thus, when we break down our analysis by MDI type, some analyses contain a relatively small number of observations and results could be driven by outliers. For this reason, unless otherwise specified, we report the median value of a variable because of its robustness to outliers, especially when compared with the arithmetic mean.

For more information on the exact construction of our measures, see the discussion within the sections on pages 37 and 59.

This report follows a policy of only mentioning differences between subject groups when those differences are found to be statistically significant using a threshold of 10 percent. In other words, the differences we highlight are unlikely to occur if the groups were undistinguishable. Within the report, many of the differences we find have a statistical p-value substantially smaller than the 10 percent threshold, but we do not separately report the level of significance.

Our testing procedure entails running a median regression that includes institution-level observations for all subject groups where differences in median across the groups are captured by dummy variables indicating an institution's membership. For a given comparison between subject groups, the difference between the resulting coefficients are tested against the 10 percent threshold where those falling under the threshold are denoted as statistically significant. Unless otherwise noted, these regressions did not include additional controls and made standard assumptions about the distribution of errors. More information specific to each section is provided below.

## Statistical Tests — Financial Performance

In analyzing financial performance, we use institution-level data from the December Call and Thrift Financial Reports each year from 2001 through 2018. From these data, we calculate the following financial ratios for each bank: pretax return on average assets, annualized net interest income, annualized noninterest income, annualized noninterest expense, annualized provisions, and efficiency ratio. Each ratio is calculated by dividing

the appropriate income statement item by an institution's five-quarter average assets. Using these metrics, we then compare various subgroups from the set of MDI and non-MDI community banks along several dimensions. The comparisons are always pair-wise but may contrast performance within a specific year or across multiple years.

The data consist of annual observations at the institution level. While adjustments were made for mergers, we do not adjust our metrics to account for the fact that not all institutions exist throughout the period. While observations across institutions within any given year may be plausibly independent, observations for the same institution across years are unlikely to meet this assumption. To account for the lack of independence across years, we test differences between subject groups for each year and we test differences in trends. The tests within a year follow the general outline for our statistical testing described above. To test for differences across multiple years, we include a set of indicator variables that denote which subject group and which year the observation belongs to and then perform a joint statistical test of the year-wise equality for the interactions specific to the two subject groups. A subject group is described as having a different trend only when the results of the joint statistical test meet our 10 percent threshold.

### Statistical Test — Geographic Services Areas and Home Mortgage Disclosure Act Mortgage Lending

In these sections, we explore the computed geographic service areas of banks that operate all of their branches in metropolitan areas. The methodology used to compute each bank's geographic service area is described elsewhere in this report. We used demographic variables and LMI tract indicators from the FFIEC census data for this analysis. Each bank has a value for each outcome variable of interest (for example, share of geographic service area population living in LMI tracts, share of geographic service area population that is African American, etc.).

We perform a median regression for each outcome variable of interest. We treat the years as separate samples and run a separate test for each year so no institution has more than one observation per regression. We assume that observations across institutions within a year are independent.

To compare MDIs with non-MDIs, we include indicator variables showing membership in the MDI, non-MDI community banks, or non-MDI noncommunity banks. To compare the subgroups of the MDI banks, we use the analogous median regression with indicators for each separate MDI group and for the non-MDI groups. To test the differences, we test the pair-wise equality of coefficients pertaining to two subject groups. A subject group is described as having a different value only when the results of the statistical test meet our 10 percent threshold.

We use a similar method for statistical testing for Home Mortgage Disclosure Act (HMDA)- reported mortgages. In this analysis, we also test differences for outcome variables of interest across years within the same subject group. We test these differences using an indicator variable for 2016 and use clustered standard errors to account for the non-independence of errors across years for the same institution.

### Statistical Test — Small Business Administration Commercial Lending

In this section, we look at institutions headquartered in a metropolitan area that made loans through the Small Business Administration's 7(a) program.

For our analysis, we look at the loan size, share of loans to borrowers located in an LMI tract, and the population share of a particular minority among the tracts to which an institution made a loan. For each variable, we take the median value from among the set of loans made by the institution. We do not adjust for differences in the number of loans across institutions. To be included, a bank has to originate a loan in the indicated year and, while we do adjust for mergers, we do not account for differences in the set

of participating institutions between the two years. Comparisons are made between two control groups consisting of non-MDI community banks and non-MDI noncommunity banks, and either MDIs as a whole or between distinct categories of MDI banks and the two control categories.

In our statistical testing of differences between subject groups, our procedure largely resembles that described above where we perform a median regression on the institution-level data. We treat the years as separate samples and run a separate test for each year so no institution has more than one observation per regression. We

assume that observations across institutions within a year are independent. To compare MDIs with non-MDIs, we include indicator variables denoting membership in the MDI, non-MDI community banks, or non-MDI noncommunity banks. To compare the subgroups of the MDI banks, we use the analogous median regression with indicators for each separate group of MDI classification and for the non-MDI groups. To test the differences, we test the pair-wise equality of coefficients pertaining to two subject groups. A subject group is described as having a different value only when the results of the statistical test meet our 10 percent threshold.