

Regression Analysis of Small Business Lending in Appalachia

Introduction

Drawing on the insights gathered from the literature review, this chapter will test the influence of bank consolidation, credit scoring, the number of branches, the minority population share, median household income, metropolitan and distressed county status, and small business firm size in three econometric models to analyze lending outcomes for all lenders, mid-size banks and SBA lenders. The chapter will assess the impact on lending levels of demographic and economic factors such as income levels, the portion of minorities on a county level, and the metropolitan/non-metropolitan and distressed/non-distressed status of counties. The chapter will also examine the impact of firm size of the small business sector on lending such as the number of businesses with four or fewer employees. In addition, NCRC was able to secure data from Dun and Bradstreet on the credit scores of small businesses on a county level for Appalachia. The chapter will therefore add an examination of the impacts of creditworthiness on the level of lending. Finally, the chapter will scrutinize the effect on lending of banking characteristics on a county level including the level of concentration and the number of branches.

One of the significant inquiries for the regression analysis is probing the extent to which banks of various asset sizes respond to the credit needs of the smallest businesses in Appalachia as well as businesses in distressed counties. The literature suggests that smaller institutions with assets under \$1 billion will be more responsive to the needs of the smallest businesses. Accordingly, NCRC will assess the impacts of demographic and economic factors on mid-size bank lending. In addition, NCRC has obtained SBA loan data, and will determine if SBA lending patterns resemble those of the smaller or larger banks making non-government backed loans. The literature is surprisingly silent on patterns of SBA lending so an econometric analysis of SBA lending represents value added.

This chapter has developed models for the three different types of lenders. These three models have the following dependent variables: 1) lending by all lenders of all asset sizes

reporting CRA small business loan data, 2) lending by mid-size banks with assets between \$250 million and \$1 billion, and 3) SBA lending.

For each model, the chapter will describe an expectation or hypothesis of the impacts of various demographic, economic and structural variables. For example, it will describe the expected impact of the metropolitan or non-metropolitan status of a county on the level of lending. In some cases, additional descriptive analysis will further illustrate the expectations of how the variable will impact lending. In other cases, references will be made back to previous chapters in describing the expectations of the variable's impact. After describing the expectations for each of the variables, NCRC will review the actual impact of each variable and explain whether the actual impact matched our expectations.

NCRC tested for collinearity and heteroskedasticity; the models were free from these problems. The data for our regressions were on a county level. A number of researchers use national surveys sponsored by the Federal Reserve that contain data on a firm level. Researchers are also starting to use the CRA small business loan data on a county or census tract level. NCRC's models were based on county level data due to the availability of concentration indices on a county level, credit score data on a county level, and because counties were relatively small in terms of population in many cases in Appalachia.

Data for the year of 2003 was used for this study. NCRC opted against longitudinal analysis because the CRA small business data has experienced definitional changes (for example, reporting of renewals changed) over the years. The Appalachian region was in a weak recovery in 2003, which must be kept in mind when examining the results of the data analysis.

Below is a description of the variables used in each model, the expectations of the variables' impacts per the literature review and descriptive data analysis, and results of the regressions. For each model, we developed two versions: a core model that contained demographic, economic and banking variables and a full model that included business demographic variables. In developing the models, NCRC had also tested introducing one

business demographic variable at a time to the core model in order to determine if the impacts of the variables were consistent in different models. Overall, the variables were consistent in their impacts. The intermediate models between the core and full model are not presented here in the interests of space. The full models discussed in this report did not violate the classical assumptions of regression analysis.

Finally, some of the variables had up to five categories such as the credit score variable which was expressed as quintiles of risk. Some of the full models below did not have all the categories for variables such as the credit score variable. The discarded categories were not significant and caused collinearity.

Following is a list of variables in the regression analysis.

Explanatory Variables		
Core Model		
% Black	Percent of Black population	Percent
%Hispanic	Percent of Hispanic population	Percent
MedianHH income	Median Household Income	Number
MSA/NonMSA	Metro or Non-metro county status	Dummy (1 – MSA, 0 – NonMSA)
Distressed/Nondistressed	Distressed or Non-distressed county status	Dummy (1- Distressed, 0 – Non-distressed)
Personal Inc Grwth	Personal Income Growth	Percent
HHI, ICB + Thrift @50% county level	HHI index	Number
Number of Branches	Number of all lenders' branches	Number
Number of Branches (mid banks)	Number of mid-size banks' branches	Number

Size (number of Employees)		
Size_1	Percent of SB with 1 – 4 Employees	Dummy ^{14*}
Size_2	Percent of SB with 5 – 9 Employees	Dummy*
Size_3	Percent of SB with 10 -19 Employees	Dummy*
Size_4	Percent of SB with 20 – 49 Employees	Dummy*
Size_5	Percent of SB with 50 + Employees	Dummy*

Credit Score		
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* “1” is assigned to a county where percent of small businesses in a particular category is above median for Appalachia; “0” is assigned to a county where percent of small businesses in a particular category is below Appalachian median

CS1	Low risk small businesses in terms of credit score	Dummy*
CS2	Moderate risk small businesses in terms of credit score.	Dummy*
CS3	Medium risk small businesses in terms of credit score.	Dummy*
CS4	High risk small businesses in terms of credit score.	Dummy*
CS5	Very high risk small businesses in terms of credit score.	Dummy*

Dependent Variables

All lenders

Log#SBL	Logarithm of the number of Small Business Loans made by all lenders	Number
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Mid-size banks

LogMid-sizebankloans	Logarithm of the number of small business loans made by mid-size banks	Number
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SBA 7a Program

7a prg loans	Number of loans made through the SBA 7a Program	Number
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Model 1 – All Lenders (see Appendix Table 31)

Metropolitan Statistical Area/Non-Metropolitan Statistical Area (MSA/NonMSA)

Expectation: The numbers of lenders and small businesses are greater in metropolitan areas; supportive infrastructure such as counseling agencies, law firms, appraisal firms, and other entities needed for lending are in greater supply in metropolitan areas. All else equal, the number of small business loans should be greater in metropolitan areas. In addition, the descriptive analysis above also suggested that the loans-to-small business ratio was greater in MSA than NonMSA counties in the Appalachian portion of nine states.

Results: In the core model, the MSA/Non MSA variable was significant with more lending occurring in MSAs. However, in the full model with credit score and size of business variables, the MSA/NonMSA variable was insignificant. Expectations were partially matched in the core model but not in the full model. Perhaps other factors such as small business demographic variables rather than the metropolitan status of the county have a stronger influence on lending levels.

Distressed/Non-Distressed Counties

Expectation: NCRC's descriptive analysis suggests that lending levels are lower in distressed counties. Distressed counties have higher levels of poverty and unemployment, and overall economic conditions that are less conducive to small business lending.

Results: The results are consistent with the expectations. In each model this variable was significant and had a negative sign.

Minority Level in County (Percent Black and Percent Hispanic Variables)

Expectation: The literature suggests that discrimination against minority owned businesses is a serious possibility that cannot be dismissed. In Appalachia, however, the descriptive analysis above suggested that lending was higher as the minority level in a county was greater. It is possible that a regional characteristic could be increasing lending to minority-owned businesses and/or counties with a substantial minority population in Appalachia. In contrast, minority-owned businesses in other parts of the country do not fare as well in access to credit as discussed in the analysis above.

Results: Results contradicted the findings in the literature but were consistent with the descriptive analysis above. In particular, in the core and full models minority variables were statistically significant and had positive signs, which indicated that lending was higher as the minority population in a county was higher. This can have the following explanation: in Southern Appalachia, the highest growth areas are the counties north of Atlanta, Georgia where there has also been the highest growth in the Hispanic population, so there should be a positive and direct association with the number of business loans, although this could be an indirect effect induced by the regional growth trend. However, an income growth variable was introduced in the model (see below), suggesting that the level of Hispanics in a county is having a positive and independent impact in small business lending levels in Appalachia.

Deal-flow considerations may explain the increase in lending associated in predominantly African-American counties. Lending to African-American businesses may be higher in substantially African-American counties because the high concentration of African-American businesses in those counties increases the likelihood that African-American businesses will receive loans. Again, African-American small business owners' experience in Appalachia is likely to be different than their experience in other parts of the country.

A report of the Minority Business Development Agency¹⁵ found that minority-owned businesses grew dramatically, at 35%, between 1997 and 2002 whereas the total number of firms grew only 10%. In particular, African-American-owned firms grew 45% and Hispanic-owned firms at 31%. It is possible that the percent of the African-American and Hispanic population is a proxy for the minority-owned businesses. If this is the case, the relationship between number of small business loans in a county and minority population is expected to be positive.

Median Household Income

Expectation: NCRC's descriptive analysis revealed that lending was lower in low- and moderate-income census tracts. We therefore expect that lending will be higher as the median household income of a county is greater.

Results: Consistent with the expectations. Each model showed that the median household income variable was significant and had a positive sign indicating that lending levels were higher in counties with higher median income levels.

Level of Concentration (HHI Index)

Expectation: NCRC obtained from the Federal Reserve Board data on the level of concentration in each county in Appalachia. The Herfindahl-Hirschman (HHI) index

¹⁵ *The State of Minority Business Enterprises: A Preliminary Overview of the 2002 Survey of Business Owners*, Minority Business Development Agency of the U.S. Department of Commerce, September, 2005.

measures the level of concentration. The literature contains a lengthy discussion on the impacts of consolidation; it appears that markets dominated by larger firms are likely to experience drop-offs in lending. The descriptive analysis in Appendix Table 26 appears to support this hypothesis. In Appalachian counties with below median HHI, the median number of small business loans was 1,120. In counties with above median, HHI, the median number of loans was 287 (see Appendix Table 26).

Results: The results were consistent with the expectations. The HHI index variable was statistically significant in each model and had a negative sign which indicated that higher levels of bank concentration in a county led to lower levels of small business lending.

Branches

Expectation: Existing studies suggest that banks make more small business loans as they increase their number of branches in a community. NCRC's descriptive analysis was consistent with previous studies. The median number of branches in Appalachian counties was 11 according to Appendix Table 27. In counties with above median number of branches, the median number of loans by all banks was 1,287. In counties with below median number of branches, the median number of loans was 235.

Results: Consistent with the expectations. The number of branches variable was significant in each model and had a positive sign suggesting that banks had higher levels of lending to small businesses when they had more branches in the area.

Income Growth

Expectation: This variable measures the change in personal income on a county level. First, all incomes of persons residing in a county are summed. Second, the income growth variable is derived by computing the percentage increase or decrease between the aggregate personal income level in 2003 and the income level of 1998. As income levels increase, it is expected that lending levels would also increase.

Results: The results were partially consistent with the expectations. Aggregate income growth was associated in a statistically significant manner with higher levels of small business lending in the core model. The sign was positive in the full model but the coefficient was not statistically significant. NCRC had also anticipated that the income growth variable would have made the minority variables insignificant because counties experiencing fast income growth tended to be Appalachian counties with high minority levels. However, introducing the income growth variable did not impact the significance of the minority variable.

Size - Number of Employees in Small Business

Expectation: The literature reports that the smallest businesses (those with 1 to 4 employees) were the least likely to borrow. NCRC's initial hypothesis was that the regression analysis would show that lending levels were lower in counties with above median percentage of these businesses. The descriptive data analysis in Appendix Table 28 appeared to provide support for our hypothesis. In counties with below median percentages (60 percent) of small firms with 1 to 4 employees, banks made a median of 717 loans; in counties with above median percentages, banks made 473 loans.

In the next two categories of employment size (5 to 9 employees and 10 to 19 employees), all banks had a greater median number of loans in counties with above median percent of firms in these employment sizes. For instance, in counties with an above median percent of firms with 10 to 19 employees, banks issued a median of 817 loans while in counties with a below median percent of firms in this category, banks made a median of 465 loans.

Lending patterns were mirror opposites for the next two categories of firm size (20 to 49 employees and 50 and above). The median number of total loans was considerable higher by about 100 loans in counties with below median percent of firms with 20 to 49 employees than in counties with above median percent of these firms. In contrast, the median number of loans from all banks was about 400 loans greater in counties with above

median percent of firms with greater than 50 employees than in counties with below median percent of these firms. Banks appeared to make much greater numbers of small business loans in counties with above median percent of firms with greater than 50 employees but fewer loans in counties with above median percent of firms with 20 to 49 employees. Not too much should be read into this yet, because the median percentages of these firms per county were relatively small (3.95% for firms with 20 to 49 employees and 2.44% for firms with greater than 50 employees). But further research may find that something is going on – perhaps the largest firms are supporting their smaller business counterparts with subcontracts to a greater extent in counties with above median number of these firms. The subcontracting could then stimulate more loan demand.

Overall, the descriptive data analysis suggests that less lending occurs when there was above median percentages of the smallest firms (1 to 4 employees) than when there was an above median percentage of the largest firms.

Results: In the full model, the variable for businesses with 10-19 employees was significant in determining small business lending volumes. In particular, lenders had higher levels of lending as the number of these businesses was greater in a county. This was somewhat consistent with our hypothesis and descriptive data analysis. While all lenders did not have lower levels of lending in counties with a high number of the smallest businesses per our hypothesis, lenders made more loans when the small businesses of larger employee sizes were present in greater numbers. In particular, the regression analysis was consistent with the descriptive data analysis, which suggested that banks would have higher lending levels in counties with above median numbers of firms with 10 to 19 employees.

Credit Score

Expectation: The literature suggests that credit scoring has allowed larger, transaction based lenders to make more loans to small businesses. In contrast, smaller lenders tend not use credit scores, meaning that their lending levels are unaffected by credit scores. A number of studies report that smaller lenders employ the relationship model in which

underwriting decisions are more qualitative in nature and depend on the lender's knowledge of the character and reputation of local small businesses. NCRC obtained Dun and Bradstreet (D&B) credit score data to test these propositions.

D&B's commercial code credit score predicts the likelihood that a company will pay its bills in a severely delinquent manner (90 days past due), or obtain legal relief from creditors, or cease operations over the next year without paying all outstanding loan amounts. The score ranges from 101 to 670, with 101 representing the highest risk of serious delinquency and 670 representing the lowest risk. The credit score data can also be expressed as quintiles of risk, with 1 representing the lowest risk and 5 representing the highest risk of serious delinquency. On a county level, the D&B data reveals how many businesses are in each quintile of risk. D&B uses a sample from its database of 16 million small businesses to develop credit scores based upon demographic characteristics of the small businesses, public records, payment performance, and financial ratios (such as liquidity and efficiency ratios).¹⁶

Appendix Table 29 shows the largest portion of small businesses in Appalachia was in the credit score category of low risk scores. Moreover, the differences among the distribution of businesses in categories of credit scores were not as large as would be expected. The table shows that 26% of all Appalachian small businesses had the low risk credit scores, 17.2% had moderate risk, 13.7% had medium risk, 23.6% had high risk, and 18.7% had very high risk scores.

Considering categories of counties, the largest differences occurred among the distribution of businesses with low risk and very high risk credit scores. The portion of businesses with low risk credit scores in non-distressed counties was about 3 percentage points greater than the portion of businesses with low risk credit scores in distressed counties. Likewise, the portion of businesses with low risk credit scores was about 5 percentage points greater in MSA counties than NonMSA counties. On the other end of the scale, the portion of

¹⁶ D&B Risk Management Solutions, *Understanding the D&B Commercial Credit Score*, Copyright 2002, D&B, Inc.

businesses with very high risk scores was about 2.5 percentage points greater in NonMSA counties than MSA counties. The difference between the portion of businesses with very high risk scores in non-distressed and distressed counties was just under 1 percentage point.

In sum, only the difference in the distribution of businesses with low risk scores between MSA and NonMSA counties was particularly striking. The difference in the distribution of very high risk scores was not large among the categories of counties. Thus, it is plausible that credit score distribution and the metropolitan/non-metropolitan or distressed/non-distressed status of counties were not correlated or interacting with each other.

The data suggests that banks, including larger ones, were using credit scoring and had lower small business lending levels in counties with higher portions of higher risk scores (high risk is represented as low scores in D&B's scoring system, see above). According to Appendix Table 30, in counties with above median portions of low risk scores, the median loan level was 877 loans. In contrast, the median loan level was 382 loans in counties with below median portion of low risk scores. Starting with the second lowest risk category (moderate risk) and continuing through the other quintiles of risk, the median lending levels were larger in below median portions of the risk category and were smaller in above median portions of the risk category. For example, in counties with below median portions of moderate risk scores, the median number of loans was 734. In counties with above median portions of moderate risk scores, the median number of loans was 440.

It is therefore to be expected that lending would be higher in counties populated by small businesses with low risk credit scores and would be lower in counties populated by businesses with high and very high risk credit scores.

Results: The full model showed that only the low risk category was significant and had the expected sign. Banks had higher lending levels in counties with high numbers of the lowest risk businesses. Interestingly, banks did not have statistically significant lower levels of lending in counties with above median portions of higher risk scores. Despite the insignificance, the signs were in the expected direction; that is, lending would be lower if

the variables had been significant. The results suggest that banks were most sensitive to higher portions of low risk businesses, with significantly higher levels of lending in counties with above median portions of these businesses. This was consistent with expectations. The lack of significant impacts of the other credit score quintiles did not necessarily refute the initial expectations. The initial expectations would be refuted completely only if lending was higher as greater portions of higher risk businesses were present.

Model 2 – Mid-Size Banks (see Appendix Table 32)

Metropolitan Statistical Area/Non-Metropolitan Statistical Area (MSA/NonMSA)

Expectation: The descriptive data analysis above showed that mid-size banks made a greater number of their loans in NonMSA counties and had a higher market share of loans in NonMSA counties than MSA counties. However, the median number of mid-size bank loans was greater in MSA than NonMSA counties. Mid-size banks probably dispersed more of their loans over a greater number of NonMSA counties than other banks. But on a per county basis, it is to be expected that mid-size banks would be making fewer loans in NonMSA counties than MSA counties.

Results: The results show that the MSA/NonMSA variable was not significant in either the core or the full model. Just as with all banks, it appears that MSA/NonMSA status did not have a statistically significant impact on lending. This finding was somewhat contrary to initial expectations, but suggests that in and of itself, MSA/NonMSA status did not exert a large influence on lending for mid-size or other banks.

Distressed/Non-Distressed Counties

Expectation: Mid-size banks had a higher market share of loans in distressed than non-distressed counties. But just like other banks, mid-size banks had a lower median number of loans in distressed than non-distressed counties. Perhaps, mid-size banks did not lower

their lending to the same extent as other banks in distressed counties, thereby accounting for their larger market share in distressed counties. Nevertheless, the lower median number of loans in distressed counties suggests that mid-size bank lending would be lower in distressed counties.

Results: In the core model, the distressed/non-distressed variable was significant and negative. This was consistent with initial observations, meaning that lending was lower in distressed counties. In the full model, however, the distressed/non-distressed variable became insignificant. In contrast, the distressed/non-distressed variable was significant and negative for all lenders in the full model. Two effects may be occurring here that cancel each other out. On the one hand, mid-size banks may indeed have a niche in distressed counties, which would boost their market share of loans in distressed counties. On the other hand, distressed economic conditions in distressed counties may lower lending levels of banks in general.

Minority Level in County (Percent Black and Percent Hispanic Variables)

Expectation: The literature reports that smaller and mid-size banks with assets below \$1 billion are more likely to make loans to minority-owned businesses. It is possible that this could also apply to counties with high levels of minorities, suggesting that the minority level of a county may be a positive and statistically significant variable. However, the descriptive data analysis suggested that mid-size bank market share of loans was actually the lowest in counties with 20% to 50% minorities although mid-size banks had a higher median number of loans in counties with 20% to 50% minorities than in counties with less than 20% minorities. Although the descriptive data was mixed, the initial expectations were that mid-size banks would have lending patterns similar to other banks; that is, lending levels would be higher in counties with more minorities.

Results: The impact of the percent African-American and Hispanic variables were consistent with expectations in the full model and core model. Race variables were

significant and had positive signs; this implied that mid-size bank lending was higher in counties with higher levels of minority population.

Median Household Income

Expectation: The expectation for this variable was the same as for all lenders; namely lending would be higher as median household income was greater in a county.

Results: The core model was consistent with expectations but with a coefficient that was very small. The full model was not consistent with expectations because the variable was statistically insignificant.

Concentration

Expectation: Some theories suggest that smaller banks perceive opportunities in more concentrated markets as customers become dissatisfied with services offered by oligopolies. These theories suggest that lending by mid-size banks would be higher in concentrated markets. The descriptive data, however, in Appendix Table 26 reveals that mid-size banks made a median number of 8 loans in counties with above median levels of HHI and 66 loans in counties with below median levels of HHI. The median mid-size bank market share of loans was also lower in counties with above median levels of HHI and higher in counties with below median levels of HHI. Overall, the descriptive data analysis suggests that mid-size banks would make less loans in Appalachian counties with higher concentration levels.

Results: The level of concentration was associated with lower mid-size bank lending in the core model, and was consistent with initial expectations. In contrast, the level of concentration was insignificant in the full model. It did not appear that mid-size banks were seizing competitive opportunities by offering more loans in concentrated markets, however, higher levels of concentration were not associated with less mid-size bank lending as it was for other lenders.

Income Growth Variable

Expectation: Just as with other lenders, it was expected that mid-size banks would increase their lending as income growth surged over time in a county.

Results: The income growth variable was positive and statistically significant in the core model but became statistically insignificant in the full model.

Number of Branches of Mid-Size Banks

Expectation: Mid-size banks appeared to thrive in counties with above median number of mid-size bank branches. Their market share of loans was 2.1 percent and 5.3 percent in counties with below median number of branches and in counties with above median number of branches, respectively, as displayed in Appendix Table 27.¹⁷ The median number of loans was 6 loans in counties with below median number of branches and 95 loans in counties with above median number of branches. We thus expected lending to be higher in counties with greater number of mid-size bank branches.

Results: The results were consistent with the expectations. Mid-size bank lending was higher as the number of mid-size bank branches was greater in a county in both the core and full models.

Number of Employees in Small Business

Expectation: The literature dwells on the “relationship” lending of mid-sized banks which is geared to serving the smallest businesses. We expected to see greater numbers of loans by mid-size banks in counties with greater numbers of firms with 1 to 4 employees and 5 to 9 employees. The descriptive analysis suggests that mid-size banks may have a market

¹⁷ NCRC used the FDIC database, Summary of Deposits, to identify branches located in Appalachian counties and to identify branches of mid-size banks headquartered in Appalachia. See <http://www2.fdic.gov/sod/index.asp> for this database.

niche with the firms with 5 to 9 employees. Their median market share of loans was one percentage point higher in counties with above median percent of firms with 5 to 9 employees than in counties with below median percent of these firms (see Appendix Table 28). Moreover, the median number of loans in counties with below median number of firms with 5 to 9 employees was 13. In contrast, the median number of loans in counties with above median number of firms with 5 to 9 employees was 37.

Results: The results were not consistent with the descriptive statistics. None of the size categories of businesses, including the number of businesses with 5 to 9 employees, had a statistically significant impact on lending. The sign on the coefficient for the 5 to 9 employee variable was in the expected direction (positive) while the signs for the other size categories were negative.

Credit Score

Expectation: The literature, as discussed above, finds that credit scoring is not a statistically significant factor in mid-size bank lending and underwriting. Mid-size banks often employ relationship lending in which first-hand knowledge of local small businesses replace the quantitative analysis and/or credit scoring as the means for making loans to small businesses. In contrast, larger banks engage in transactional lending that mostly rely upon credit scoring and other quantitative techniques for underwriting and issuing loans (Mitchell, 2004 and Berger and Udell, 2001).

The descriptive analysis reveals that mid-size banks' lending patterns were similar to other banks when considering credit score. As shown in Appendix Table 30, mid-size banks had a higher median number of loans (37) in counties with above median levels of businesses with low risk credit scores, but they had lower median number of loans (13) in counties with below median number of low risk scores. The patterns were reversed for mid-size banks in the other risk categories; that is the number of loans was lower with above median number of businesses in the higher risk categories. Notwithstanding the descriptive data

analysis, we are going to rely on the extensive literature and expect the credit scoring variables to be statistically insignificant.

Results: The results were consistent with the expectations. The credit score variable was not statistically significant. Mid-size banks' lending levels were not affected by the distribution of credit scores on a county level in Appalachia. Mid-size banks appeared to be applying the relationship model of lending.

Model 3 – SBA Loans (see Appendix Table 33)

Overall, the expectations for SBA lending were similar to mid-size bank lending because of the possibility that the “relationship” model of lending was employed to a large extent in SBA lending. This section will report on the results for each variable.

Metropolitan Statistical Area/Non-Metropolitan Statistical Area (MSA/NonMSA)

Expectation: The descriptive data analysis revealed that the SBA 7(a) program had a higher market share of loans in NonMSA than MSA counties. Accordingly, the initial expectation was that SBA 7(a) loans would be higher in NonMSA counties.

Results: In the core model and full models, the variable capturing metropolitan/non-metropolitan status of a county was negative and statistically significant, meaning that SBA 7(a)-guaranteed lending actually was lower in metropolitan counties. This finding was different from all banks and mid-size banks. It suggests a focus of SBA 7(a)-guaranteed lending in Appalachian non-metropolitan areas that was distinct and significant from a policy perspective.

Distressed/Non-Distressed Counties

Expectation: The descriptive data analysis found that the SBA 7(a) program's market share of loans did not differ that much in distressed or non-distressed counties. Therefore, it

would be expected that the distressed/non-distressed status of the county would not have much of an impact on SBA 7(a)-guaranteed lending. As stated above, the SBA 7(a) program focuses on small businesses who “might not be eligible for business loans through normal lending channels.” A program goal of this nature could include targeting economically distressed areas for small business loans, but the SBA 7(a) program description on the SBA website does not include information on whether geographical targets have been established for the program.

Results: This variable was not significant in any of the models, whereas it was significant and negative for all lenders. The result for SBA-guaranteed lending was the same as for mid-size banks, meaning that mid-size bank lending and SBA-guaranteed lending may not be negatively influenced by distressed counties in contrast to lending conducted by all banks.

Minority Level in County (Percent Black and Percent Hispanic Variables)

Expectation: The descriptive analysis above documented that SBA 7(a)-guaranteed lending did not reach minority-owned businesses in proportion to the minority population either nationally or in Appalachia. Accordingly, it was expected that larger portions of the African-American or Hispanic population would result in lower levels of SBA 7(a)-guaranteed lending.

Results: In the core and full models, the variable capturing the portion of the African-American population was negative and statistically significant. The Hispanic population variable was negative in sign but not statistically significant in the models. The findings for the African-American and Hispanic variables contrasted with all lenders and mid-size banks; for all lenders and mid-size lenders, loan volumes were higher in counties with greater numbers of minorities.

Median Household Income

Expectation: The SBA program intends to target small businesses who would not otherwise receive loans. Given this orientation, the initial expectation would be that SBA-guaranteed lending was less likely than non-government backed lenders to be higher in counties with higher median income levels.

Results: The results were consistent with the expectations. The median household income variable was insignificant in the core and full models. Income levels in a county did not influence SBA-guaranteed lending.

Concentration

Expectation: The descriptive statistics in Appendix Table 26 reveal that the number of median SBA loans was lower in counties with above median HHI and was higher in counties with below median HHI. It was therefore expected that SBA-guaranteed lending would be lower in counties with higher levels of banking industry concentration.

Results: Partially contrary to expectations, the core model showed that SBA-guaranteed lending was higher when the concentration level was higher. In the full model, the concentration variable was not statistically significant. Overall, this was a positive finding in that SBA-guaranteed lending may not be as sensitive as non-guaranteed lending to higher levels of concentration on a county level. In contrast to SBA-guaranteed lending, the full model for all lenders revealed lower levels of lending as HHI was higher on a county level.

Income Growth

Expectations: Counties experiencing higher levels of personal income growth also probably experienced higher levels of small business formation and growth. It would be expected that SBA-guaranteed lending would be higher in counties experiencing faster rates of

income growth. This could even include poorer counties, as long as the income growth was fast in these counties.

Results: Contrary to expectations, the income growth variable did not have a statistically significant impact on SBA 7(a)-guaranteed lending.

Branches

Expectation: The descriptive data analysis in Appendix Table 27 reveals that median and average levels of SBA-guaranteed lending were higher in counties with above median number of branches and lower in counties with below median number of branches. Thus, the expectation was that SBA-guaranteed lending would be higher in counties with greater number of branches.

Result: In the core and full models, the number of SBA-guaranteed loans was higher in counties with greater number of branches. This finding was consistent with the expectations.

Number of Employees in Small Business

Expectation: The descriptive data analysis in Appendix Table 28 does not provide good clues regarding expectations of SBA-guaranteed lending to businesses of various sizes. In all the business size categories (except for firms with more than 50 employees), the SBA 7(a) program guaranteed a greater average number of loans in counties with below median number of firms in the particular size category than loans in counties with above median number of firms. Based on the purpose of the 7(a) program, it would be expected that SBA-guaranteed lending would be higher in counties with greater number of smaller businesses.

Results: In the full model, the variable for small businesses with 5-9 employees was significant and negative in sign. The variable for small businesses with 1 to 4 employees

was statistically insignificant as was the variable for small business with 10 to 19 employees. SBA-guaranteed lending was not lower in counties with higher numbers of the smallest businesses (1 to 4 employees), but was lower in counties with greater portions of businesses with 5 to 9 employees. Perhaps, SBA-guaranteed lending was more focused than all lenders on the smallest firms with 1 to 4 employees since: 1) the 1 to 4 employee variable was the only variable in the 7(a) model that was not negative in sign, and (2) the only statistically significant variable for the all lender model was the variable for firms with 10 to 19 employees.

Credit Score

Expectation: The intent of the SBA 7(a) program would suggest that SBA-guaranteed lending would be higher in counties with greater portions of moderate risk and high risk small businesses. The descriptive data analysis in Appendix Table 30, however, suggests that the 7(a) program guaranteed more loans in counties with higher numbers of lower risk business and fewer loans in counties with higher risk businesses. Since the intent of the program was not consistent with the data analysis, the initial expectation will split the difference between the program's purpose and the descriptive data. The initial expectation was that credit score distributions would not significantly impact the level of SBA-guaranteed lending on a county level.

Results: The full model showed SBA 7(a)-guaranteed lending was higher in counties with greater numbers of businesses in all credit risk quintiles except the moderate risk quintile. In other words, SBA-guaranteed lending basically remained unaffected by differences in the distribution of credit scores in counties. Since SBA-guaranteed lending was not lower in counties with the highest portion of medium or high risk businesses, the SBA program appeared to be serving its purpose in Appalachia by serving (and not avoiding) higher risk businesses.

Discarded Variables

This report discarded a few of the variables on business characteristics from the equations due to collinearity problems. It is nevertheless worthwhile to briefly discuss these variables as initial expectations were that they would influence the levels of lending in Appalachia.

Sector of Small Business

Expectation: The sector of small businesses appeared to be an important control variable for regressions. For example, the median percentage of services businesses in a county was 34.8 percent and the median percentage of retail businesses was 18.9 percent. The median number of loans in counties with above median percentages of services businesses was 470 loans higher than in counties with below median percentages of services firms (see Appendix Table 34). In contrast, the median number of loans was reversed in the case of retail firms, with a much higher median of loans in counties with below median percentages of retail firms.

Results: In the great majority of the equations, the sector variable was insignificant and created collinearity problems. Two versions of the variable were tried. In the first version, demographic data on the number of small businesses in each sector were employed. In the second version, data from Economic Research Service from the United States Department of Agriculture that characterizes county-wide dependence on a given sector was employed.

Ownership of Small Business

Expectation: Dun and Bradstreet's description of their credit scores states that corporations are considered less risky than sole ownerships. Thus, an initial hypothesis was that small business lending was less in counties with below median percentages of corporations and above median percentages of sole ownership firms. The descriptive data suggested this was the case. The median percentage of sole ownerships in a county was 30.6 percent. All

banks made 842 loans in counties with below median percentages of sole ownerships, and 434 loans in counties with above median percentages of sole ownerships (see Appendix Table 35). In contrast, lending was higher when the number of corporations in a county was greater.

Results: Variables that measured sole ownerships and corporations as a percent of small businesses created collinearity problems. This was solved by introducing a composite ownership variable which was a ratio of the sum of sole ownerships and partnerships divided by the percent of corporations in a county. However, this variable was not significant, motivating us to delete it from the equations.

Conclusion

The regression analysis produced significant findings of factors accounting for lending levels. One of these significant findings was that higher numbers of bank branches result in more small business loans for banks of all sizes and for SBA 7(a)-guaranteed lending. Furthermore, lower lending levels occurred in distressed counties than non-distressed counties. Sensible policies would be to encourage bank branch building in Appalachia and to pursue economic development in distressed counties. When counties move from distressed to non-distressed status, more small business lending would occur.

An important finding was that counties with higher levels of minorities had higher levels of small business loans in Appalachia. In contrast, counties with higher levels of bank consolidation and concentration had lower levels of lending. In addition, counties with the highest numbers of businesses with low risk credit scores had higher levels of loans.

As predicted by the literature, mid-size banks exhibited lending patterns that reflected relationship lending. The level of mid-size bank lending on a county level was unaffected by the distribution of credit scores. In addition, the distribution of small businesses by employee size did not impact mid-size bank lending unlike lending by all banks which was higher in counties with a higher portion of businesses with 10 to 19 employees. Also, levels

of concentration did not impact mid-size bank lending whereas lending by all lenders was lower in counties with higher levels of concentration.

The SBA 7(a) program also exhibited distinct lending patterns. It was the only type of lending that was lower in MSA counties relative to NonMSA counties in Appalachia. This suggested a non-metropolitan focus by the SBA program in Appalachia. A worrisome finding, however, was that the SBA program was the only type of lending that was not higher in counties with greater portions of African-Americans and Hispanics.