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ABSTRACT: Several theories of externalities and asymmetric information suggest a positive role for government programs to assist credit markets, though potential distortions by special interests carry attendant dangers. We examine the empirical association between funding by several federal government programs and subsequent economic performance, measured six ways, for nonmetropolitan U.S. counties during the 1990s. Significant differences are found across programs, performance measures, and market types. Observed tradeoffs suggest a need to compare policy objectives with acceptable costs in many cases. Overall, the results are consistent with theoretical predictions and with some standard policy objectives.

Keywords: federal credit programs; growth; volatility

JEL codes: H81, O18, R11

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1. Introduction

The U.S. federal government in recent years has, directly or indirectly, assisted more than one-third of all non-federal borrowing, with a total value of associated federal subsidies estimated as high as one-third of the amount borrowed (Gale, 1991). Such credit programs are also common in other countries. A few previous studies have attempted to quantify whether these programs provide measurable benefits that offset or justify their costs, including Gale (1991), Craig et al. (2005, 2007, 2008), and Shaffer and Collender (forthcoming) for the U.S.; and Sala-i-Martin (1997), Calomiris and Himmelberg (1999), and Wurgler (2000) for other countries. Such studies have reported mixed results, suggesting a need for additional study of this important question.

This paper focuses on U.S. nonmetropolitan areas during the 1990s and, within that sample, tests for empirical associations between selected U.S. federal credit programs and subsequent economic performance measured in six ways. Because theory suggests that the economic interactions with the programs studied here are likely to be systematically different between metropolitan and nonmetropolitan types of markets – as discussed below – it is particularly useful to compare the findings here with those obtained for metropolitan areas by Shaffer and Collender (forthcoming). While most prior studies have focused on income growth rates as the sole measure of benefits (e.g., Sala-i-Martin, 1997; Wurgler, 2000; Collender and Shaffer, 2003; Craig et al., 2005), other literature has emphasized the importance of additional dimensions of economic performance, as discussed below. Craig et al. (2007, 2008), in two rare exceptions, find a positive impact of SBA guaranteed lending on average employment in local markets. The programs in our sample span both direct lending and credit guarantees in the areas of business credit and housing loans by four major federal agencies.

As in Shaffer and Collender (forthcoming), we measure economic performance alternately in terms of the mean and standard deviation over time of growth rates in real per capita income, the mean and standard deviation over time in the growth rates of local establishment employment, the mean level of real per capita income, and the standard deviation over time of the level of real per capita income. We control for several factors previously found to be significantly related to economic performance, including both demographic and financial factors. We control for the local market structure of financial intermediation because 75 percent of all net credit advanced is channeled through financial intermediaries

(Moran, 1985) and because other studies have established an empirical linkage between financial structure and growth (e.g., Collender and Shaffer, 2003). Likewise, Craig et al. (2005) control for local deposit concentration and find a significant effect in their growth model with time fixed effects.

Our results indicate that funding levels are significantly associated with various measures of economic performance, that different programs are associated with differing effects, that some but not all of the effects are systematically different between nonmetropolitan markets and the metropolitan markets studied by Shaffer and Collender (forthcoming), and that tradeoffs are often observed in which an apparent benefit in one dimension of economic performance is offset by a cost in another dimension. Although the data and methods cannot definitively establish causality, the empirical associations accord with several theoretical predictions and policy objectives, as well as suggesting additional avenues for future research. The differences that emerge between metropolitan and nonmetropolitan regions suggests that different policies may be optimal for the two types of regions, and that specific representation from each type of region is important in the policymaking process, to the extent that government expenditures are injected locally and have a local component of impact.

The remainder of this paper is organized as follows. Section 2 reviews previous studies and provides a conceptual framework to motivate and interpret the empirical analysis. Section 3 discusses our data and sample. Section 4 outlines our empirical research design and presents the empirical model. Section 5 reports the empirical results and characterizes some aspects of robustness. Section 6 summarizes the findings, enumerates some issues for future study, and concludes.

2. Prior Studies and Related Concepts

Shaffer and Collender (forthcoming) provide an extensive review of mechanisms proposed in previous studies by which government programs to assist credit markets could potentially confer net economic benefits, so our theoretical discussion here will be more brief and focused. Overall, prior literature has identified multiple reasons why such programs could alternately help or hinder the efficient allocation of credit and associated economic performance. Many of those reasons view government programs as able to mitigate some market failure, due to informational constraints or externalities. Other considerations acknowledge that limitations in the policy-making process or implementation might introduce offsetting distortions under which government involvement could perhaps undermine the efficiency of credit allocation and outcomes. Given these contrasting conceptual factors and predictions, the net impact of these programs is an empirical question.

While the direct costs of government credit programs are relatively easy to document, only a few studies have explored their empirical benefits, and those results have been mixed. Gale (1991) estimated aggregate welfare losses from U.S. federal credit subsidies of about 0.25-0.4 percent of GDP, or $10-15 billion in 1987. A survey by Schwarz (1992) concluded that directed credit programs in the U.S. have had a limited impact on growth, in part because their objective is often aimed at equity rather than growth. Cross-country analysis by Sala-i-Martin (1997) found no significant association between government spending (including investment) and economic growth, while Odedokun (1996) found lower incremental output-capital ratios in developing countries with more directed credit through development bank lending. More recent analysis by Wurgler (2000) has found that state ownership in the economy is negatively correlated with economic growth rates, apparently due to misallocation of resources. On the other hand, Calomiris and Himmelberg (1999) documented several dimensions of economic benefit from Japanese programs of directed credit in the machine tool industry; and Craig et al. (2005) estimated a small but statistically significant positive empirical association between loan guarantees by the U.S. Small Business Association (SBA) and local economic growth, explaining this association as a reduction in adverse selection and moral hazard made possible by the SBA's implicit subsidy. Hunter (1984) and DeYoung et al. (2008) found that more generous loan guarantees under SBA programs were associated with higher loan default rates, but Hancock and Wilcox (1998) found that the volume of SBA-guaranteed loans shrank less than other loans in response to declines in bank capital in the early 1990s, thus providing an apparently stabilizing influence in the face of economic and regulatory shocks.

Shaffer and Collender (forthcoming) found systematic patterns of benefits and costs associated with selected federal credit programs in U.S. metropolitan areas. However, there are reasons to expect different patterns in nonmetropolitan areas. Informational asymmetries that hinder private capital markets may be more severe in large, complex, metropolitan markets than in small, homogeneous, relatively transparent nonmetropolitan communities. One example of this property is adverse selection among borrowers, which theory and empirical evidence have indicated to be worse in markets with more lenders (Broecker, 1990; Riordan, 1993; Nakamura, 1993; Shaffer, 1998). Likewise, free rider problems are likely to be more severe in larger markets with more lenders. Similarly, any other externalities that could distort private-sector investment decisions and lead to economic underperformance are likely to be less severe in smaller communities. This reasoning would suggest greater scope for government financing programs to mitigate informational hindrances to economic growth and similar market failures in metropolitan areas than in nonmetropolitan areas.

Another consideration is that a metropolitan area, by virtue of representing larger numbers of consumers and producers, may be able to muster more effective representation in the federal policymaking process than could any of the much more numerous and fragmented nonmetropolitan communities. This difference is a two-edged sword. On the one hand, if representation is effective in optimizing the policy decisions for local welfare, then we might expect federal credit programs to be associated with larger increments in economic performance in metropolitan areas than in nonmetropolitan counties. This implication would reinforce the predictions of the informational considerations above. On the other hand, if such representation becomes captive to special interest groups, then stronger representation in the policymaking process could actually lead to worse economic performance in metropolitan areas than in nonmetropolitan counties, due to diversion of resources away from productive uses to less productive special interests. Thus, any systematic difference between nonmetropolitan and metropolitan areas with regard to the associations between federal credit programs and local economic performance remains an important empirical question, making it imperative to assess nonmetropolitan areas separately.

Stabilization, by smoothing out the cyclicality of available credit, is another potential benefit of federal credit programs. Then lower volatility of per capita income levels, employment levels, and growth rates could result. Conversely, if government credit programs entail a more centralized component of allocative decisions than the private lending sector, then the analysis of Sah (1991), Sah and Stiglitz (1991), Rodrik (199), and Almeida and Ferreira (2002) implies that economic performance should be more variable where government credit programs are more active.[1] The importance of assessing the degree of volatility in income levels follows Cameron and Tracy (1998), Haider (2001), Moffitt and Gottschalk (2002), Hacker (2006), and Shin and Solon (2008). Similarly, the importance of studying volatility in growth rates is supported by Cole and Obstfeld (1991), Obstfeld (1994), Agénor (2003), and Martin (2008). In addition, Kurz (2004) establishes that the ex ante social cost of aggregate economic volatility is large, implying that the potential economic benefits of stabilization are substantial; and Ramey and Ramey (1995) find that countries with higher volatility in

[1] However, the cross-sectional test proposed by Alemieda and Ferreira (2002) may give misleading results if government credit programs have multiple goals, such that (for example) funding is injected into some low-performing markets to prevent further decline, but into other markets with the effect of enhancing productivity and growth. Accordingly, we do not include tests of cross-sectional variability below, focusing our second-moment tests instead on intertemporal volatility.

growth rates— both in general and as specifically induced by government spending— exhibit slower average growth. Other studies emphasize the importance of studying levels of economic aggregates as measures of performance (Klenow and Rodríguez-Clare, 1997; Hall and Jones, 1999; Bils and Klenow, 2000; Craig et al., 2007, 2008).

These diverse considerations motivate the importance of continued empirical research on the linkages between government credit programs and multiple dimensions of economic performance. We concur with the perspective of Calomiris and Himmel (1991), who caution against drawing definitive conclusions regarding the effectiveness of government credit programs from any isolated empirical example. We thus offer the following analysis as part of a larger research program aimed at characterizing government credit programs across a range of times and settings.

3. Sample and Data

This research uses a unique dataset constructed from four principal sources: Data on local lending through federal direct and guaranteed loan programs from the *Consolidated Federal Funds Reports* (CFFR; see www.census.gov/govs/www/cffr.html), data on local economic performance from the Bureau of Economic Analysis (BEA) of the Department of Commerce, local demographic data from the Census Bureau, and banking data from the FDIC. The dataset is complementary to that used by Shaffer and Collender (forthcoming) and, except for the CFFR data, similar to that used by Collender and Shaffer (2003). We refer readers to those studies for detailed discussions of the data.

Table 1 lists the variables and their sources. Our unit of analysis is individual counties. Different agencies define U.S. counties somewhat differently because of anomalies among states and changes over time. To ensure consistency across data sets and over time, we aggregate Virginia's independent cities with the county that surrounds them, and aggregate certain counties in Montana and Wisconsin for which treatment is not uniform across agencies. Because of data reporting problems, we omit Arkansas.

Our measures of market concentration of banks and deposit control are derived from the FDIC's annual Summary of Deposits report. Local employment growth rates are calculated from Bureau of Economic Analysis (BEA) estimates of county-level employment. Similarly, per capita personal income is calculated from BEA estimates of county populations and personal incomes adjusted for inflation using the national consumer price index. To control for educational attainment, we use data from the Bureau of the Census on the percentage of adult population in each county graduated from high school at the start of the relevant decade.

3.1 Program Characteristics

Our objective is to investigate the impact of federal lending on local economic well-being. To do so, we focus on direct and guaranteed or insured loan programs. Direct loan programs include those that make commodity loans and purchases, emergency loans, farm ownership loans, farm operating loans, soil and water loans, irrigation system rehabilitation and betterment loans, intermediary relending programs, rural housing repair and housing loans for low income families, economic injury disaster loans, physical disaster loans, loans for small businesses, direct investment loans, water and waste disposal systems for rural communities, community facilities loans, and rural economic development loans.

Guaranteed or insured loan programs include those that make farm operating loans, farm ownership loans, soil and water loans, business and industrial loans, small business investment companies, small business loans, state and local development company loans, bond guarantees for surety companies, certified development company (504) loans, foreign investment guarantees, water and waste disposal systems for nonmetropolitan communities, community facilities loans, rural electrification and rural telephone loans and loan guarantees, rehabilitation mortgage insurance, mortgage insurance of homes especially of low and medium income families and veterans homes, and nursing homes, higher education insured loans.

Our data set only includes a small portion of these loan programs—those that have credible local information on their lending activities and that were funded for the entire decade of the 1990s. Because we are interested in evidence concerning program design, we chose two types of lending that are undertaken through both direct and guaranteed programs and through multiple agencies with at least one agency being the USDA: those aimed at small businesses (including farms) and those aimed at housing. At least one other federal agency undertakes similar lending, with SBA dominating small business lending and HUD dominating housing lending. In addition, both types of programs are undertaken through direct and guaranteed programs.[2]

We omit infrastructure lending from our study for two principal reasons. First, the flows of both costs and benefits from infrastructure projects are attenuated over time. Second, the costs and benefits associated with these projects often cross county lines so that the local funding and impact is difficult to track. For example, rural electric loans go to borrowers who may be located in one county but provide electric service to a much wider, multicounty area.

[2] USDA guaranteed housing loans and direct housing loans were reported together as a single variable, making it impossible to measure the direct and guaranteed components separately.

3.2 Sample Statistics and Correlations

Table 1 also reports descriptive statistics for the data set. Comparing these figures with the metropolitan statistics reported in Shaffer and Collender (forthcoming), we see that metropolitan markets experienced similar rates of growth over the sample period as nonmetropolitan markets in both employment and real per capita personal income. Intertemporal standard deviations of both growth rates were roughly twice as large in nonmetropolitan markets as in metropolitan markets, however. The average level of real per capita income was notably lower in nonmetropolitan markets than in metropolitan markets.

Mean per capita funding levels were similar across metropolitan and nonmetropolitan markets for total funds in the federal programs included in our sample (TF), SBA direct business lending, and SBA business credit guarantees; however, these similarities mask differing levels of heterogeneity in mean per capita funding across markets within each category. Nonmetropolitan markets received relatively higher funding levels than metropolitan markets from listed business programs and from each listed USDA program, but relatively less from listed housing programs, total listed non-USDA programs, and each listed HUD and Veteran's Administration program.

Structurally, nonmetropolitan and metropolitan markets are quite different. The nonmetropolitan markets in our sample have an average of only eight banking offices (versus 129 for MSAs, according to Shaffer and Collender, forthcoming), a correspondingly higher HHI (0.40 versus 0.16), and slightly higher levels of aggregate deposits ($6.4 billion versus $5.6 billion). Standard deviations and coefficients of variation (ratios of the standard deviation to the mean) on the number of banks indicate that nonmetropolitan markets are structurally more homogeneous in both absolute and relative terms than metropolitan markets, the latter being skewed by a few outliers such as New York, Los Angeles, and Chicago. Nonmetropolitan markets are more heterogeneous than metropolitan markets, however, with regard to bank deposit concentration, real bank deposits per capita, and levels of education.

To the extent that banking structure affects local economic growth rates, as found by prior studies, it is relevant that geographic regulations in U.S. banking have been progressively relaxed over the past 30 years, with nonmetropolitan markets experiencing geographic liberalization at a slower pace. Entry by nonlocal banks has also been less likely after liberalization. The relatively slow rate of entry into nonmetropolitan markets has been documented by Amel and Liang (1992, 1997) and Berger et al. (2004). Despite these observations, control of local banking markets by out-of-market banks is surprisingly similar in nonmetropolitan and metropolitan markets: out-of-market banks controlled 27 percent of nonmetropolitan bank offices (versus 29 percent of metropolitan, according to Shaffer and

Collender, forthcoming) and 26 percent of nonmetropolitan bank deposits (versus 28 percent of metropolitan, ibid).

Some striking differences between pairwise correlations in the metropolitan and nonmetropolitan samples should be noted. The correlation between the numbers of in-market and out-of-market owned bank offices is 0.01 in nonmetropolitan areas but 0.48 in metropolitan markets (ibid). That is, in-market and out-of-market office numbers often exhibit similar structures in metropolitan markets but not in nonmetropolitan markets. A corresponding contrast arises in in-market versus out-of-market controlled deposits. Finally, the correlation between employment growth and per capita real income growth, while consistently positive and statistically significant, was much higher in metropolitan (0.38) than in nonmetropolitan (0.09) markets (ibid).

4. Research design and empirical model

Our choice of empirical method is influenced by several unique considerations of the federal credit programs under analysis. First, funding allocated in a given year may be disbursed over several years, rather than within the current calendar year. For example, in some types of business lending such as direct farm operating loans, partial disbursements may occur at intervals even though the full loan amount has been authorized and approved. The difference between the federal fiscal year (currently starting on October 1) and the calendar year can also add a complication. In addition, funds remaining at the end of a fiscal year revert to the Treasury in many programs, so there is an incentive for program staff to obligate remaining funds in the final months of the fiscal year. These funds are almost never disbursed until the next fiscal year and their impact on local economies certainly lags the disbursement. Thus, reported funding figures do not correspond exactly to the actual pattern of available funds.

A second consideration is that the pattern of economic performance associated with a one-time injection of credit is likely different from that associated with an ongoing flow of funding over several years. A third special consideration is that the likely mechanisms relating actual disbursements to aggregate local economic performance suggest some temporal lags, with any benefits ultimately accumulating over several years. These considerations all indicate that a strict year-by-year panel estimation, as commonly employed in other recent empirical growth studies, could yield grossly misleading results.

Therefore, we allow for intertemporal integration of both the program inputs and the subsequent economic performance by comparing funding patterns averaged over a five-year period (1990-1995) with economic performance over a subsequent five-year period (1996-2000). Some prior empirical studies of endogenous growth have employed a similar intertemporal aggregation of data (e.g., King and Levine, 1993; Levine, 1998; Levine and Zervos, 1998; Collender and Shaffer, 2003).

Some of the programs, at least, will likely generate new jobs and income within the first year or two of the disbursement of funds. Although most housing loans would finance the acquisition of existing housing stock, rather than spawning new construction, any business loans made for new or growing businesses will likely be followed shortly by new jobs and income. One question of interest for public policy and welfare is how the benefits of such programs are distributed between the short run and the long run.[3] Our use of consecutive non-overlapping five-year time periods implicitly focuses on medium-term benefits; this point is discussed in more detail below.

Another benefit of our choice of relative time periods is to mitigate the potential for spurious (reverse) causality. Although, like other empirical growth studies, our data and techniques cannot definitively settle the question of causality, measuring the statistical associations with a multi-year lag reduces the likelihood that changes in economic outcomes are driving changes in funding.[4] Our lag structure permits a generic interpretation of the estimates in terms of Granger-type causality.

Nevertheless, it is likely that some of the business funding in the earlier five-year period may result in legitimately stronger economic outcomes prior to the start of the second five-year period in our sample. For example, funds allocated in 1991 and disbursed in 1992 may yield stronger economic growth in 1993 and 1994. Even if the higher levels of income and employment persist beyond 1995, growth measures would fail to capture this benefit across the time periods defined in our model. Thus, to that extent, our growth estimates will tend to understate any net economic benefits of business funding, particularly those arising in the short run. Overall, therefore, our use of non-overlapping five-year

[3] In a different context, Davis and Haltiwanger (1992), Rob (1995), and Davis et al. (1996) have shown that the employment benefits of small firms are mitigated by the fact that jobs at small firms are, on average, more transitory than at large firms.

[4] Because federal funding decisions are based on centrally established and administered policy objectives and criteria, one might argue that the potential for reverse causality is much smaller in our research question than in previous empirical growth studies that focused on purely market-driven explanatory factors, such as banking structure. Nevertheless, to the extent that the policy process is itself endogenous (either in the long run or as a function of local representation in the allocative decisions), some potential for reverse causality might remain in our sample, so that the mitigation afforded by using consecutive five-year periods is useful.

periods represents a necessary compromise in balancing these two effects of business credit.[5] Housing loans, by contrast, may have a similar impact on the local economy as infrastructure investments, which are typically longer term. In that regard, truncating the performance measures after five years may understate the long-run component of benefits.

At the same time, any persistent economic benefit will be captured by the levels of income and employment, which is another reason to examine these outcomes in addition to pure growth rates. It is not clear how the use of lagged data might affect the measured association with economic stability; by its nature, any benefit in the dimension of greater stability must necessarily persist somewhat over time, so that missing the first year or two of such an effect should not alter the qualitative findings.

To avoid bias due to rent-seeking and capture effects by specific sectors or industries, we measure economic performance at the aggregate level within local geographic markets. Our primary measures revolve around real per capita income, which we characterize variously by its average level over five years, average annual growth rate over five years, standard deviation of annual levels over five years, and standard deviation of average annual growth rate over five years. As a secondary measure, we also look at the market-wide number of jobs, measured alternately as the average annual growth rate over five years and standard deviation of the annual growth rate over five years.

We should note that, while the policy goal of business funding is to stimulate production, income, employment, and other traditional measures of economic outcomes, housing credit follows a different policy goal. It is entirely possible that housing loans could fully succeed in meeting their policy objectives (facilitating home ownership by a larger segment of the population) without yielding any measurable changes in the levels, growth rates, or dispersion of income or jobs. An interesting and hitherto overlooked question is whether housing credit programs exhibit costs, or perhaps unexpected benefits, in those dimensions.[6]

The regressions described above are estimated in several different ways, as a check of robustness and to reveal more detail about the empirical associations. Separate regressions were run for each of the

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[5] Likewise, to the extent that funding in 1996 and 1997 may have spawned increased economic activity in 1998 and 1999, measuring the funding levels only prior to 1996 will leave more unexplained noise in our regression equations, but will not reduce the significance or validity of the estimated coefficients on earlier funding levels.

[6] One mechanism by which broader home ownership might be expected to result in higher subsequent levels of income and employment is suggested by McAndrews (1991). In addition, lenders often view home ownership as linked with job stability and creditworthiness.

six measures of economic performance described above. For each such measure, one regression model included funding from each of the federal programs listed in Table 2 as a separate variable, along with a control vector described below. The initial regressions employed least squares (OLS) estimates, using the White (1980) robust standard errors to correct for heteroscedasticity, with results summarized in Table 4. A separate set of regressions aggregated these funding variables in various ways, both to explore sensitivity to levels of aggregation and to permit formal hypothesis tests concerning differential effects of different programs, as reported in Table 5.

Because a Jarque-Bera test strongly rejected normality of the residuals in both the nonmetropolitan and metropolitan samples, each regression was also estimated using the Least Absolute Distance (LAD) estimator in TSP, with coefficient standard errors calculated under the assumption of a Laplace distribution of the residuals.[7] LAD estimates are maximum likelihood and hence asymptotically unbiased and efficient when the errors follow the Laplace distribution (Narula and Wellington, 1982) although, like OLS, LAD can yield biased estimates when residuals are asymmetrically distributed. Though LAD is more robust than OLS in the presence of outliers or non-normal residuals, its standard errors cannot be corrected for heteroscedasticity (Smith and Huang, 1995). The OLS estimator is consistent and unbiased, as well as the minimum variance linear estimator, even if the residuals are not normally distributed (Judge et al., 1980, p. 298). Given these tradeoffs, Martin and Simin (1999) suggest using both OLS and a robust estimator such as LAD, where similar estimates under the two methods would suggest that the OLS estimates are reliable while substantial disagreement implies influential outliers. That is the approach we follow here, reporting the LAD estimates as a complementary set of results to the OLS estimates.

The conditioning information set in each regression comprises a control vector of variables found to be significantly associated with economic performance in previous empirical growth studies and listed in Table 2. The logarithm of county population is a measure of market size as in Glaeser et al. (1995) and Cetorelli and Gambera (2001). Previous theory and empirical findings suggest that this variable will be positively associated with economic performance, implying positive coefficients with respect to average levels or growth rates of income or employment, but negative coefficients with respect to the intertemporal standard deviation of income or employment.

Population density or employment has been found significantly related to several measures of

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[7] See surveys of LAD estimators by Narula and Wellington (1982) and Dielman (2005).

economic performance, possibly due to scale effects or to superior matching between firms and workers in denser markets. Andersson et al. (2007) find that the correlation between workers' skills and productivity at the establishment level is larger in counties with denser populations. Ciccone and Hall (1996) find that population densities at the county level help explain differences in productivity levels across states. Carlino et al. (2005) find more patents per capita in metropolitan areas with higher employment densities, while Strumsky et al. (2005) find that the number of patents is positively related to the population density across metropolitan areas. These findings suggest that density will be positively associated with economic performance in our sample.

Previous studies have also found significant associations between banking structure and economic growth. Earlier studies of this type reported international comparisons, as in King and Levine (1993), Rajan and Zingales (1998), Levine et al. (2000), and Cetorelli and Gambera (2001), while Collender and Shaffer (2003) found similar results at the county level for U.S. data. King and Levine (1993) used a variable similar to our *rdeppc* to control for the relative supply of funds and the intensity of financial intermediation. The three measures of bank structure and financial intermediation used here are generally based on these previous models and findings.

Education reflects the accumulated level of human capital and is expected to be positively associated with economic performance. The initial level of per capita income is intended to capture the convergence effect noted by Barro and Sala-i-Martin (1992), and would thus exhibit a negative association with subsequent economic performance. Both variables are similar to those used in other studies of economic growth such as Glaeser et al. (1995), Rajan and Zingales (1998), Levine et al. (2000), Cetorelli and Gambera (2001), and Collender and Shaffer (2003).

County type indicators are defined by the USDA (Cook and Mizer, 1994); see Appendix 1, "County Types," for more details. We initially considered additional county type indicators besides retirement destination, federal lands, and transfer dependent but ultimately omitted them due to statistical considerations such as high correlations with certain funding variables.

In additional regressions not reported in the tables, we included the natural logarithm of per capita local direct government expenditure for 1996-97 (obtained from the *County and City Data Book,* 2000 edition) as a control for other government funding. This specification serves merely as a check for robustness of the primary results, and is not our preferred specification for the following reason. In a general equilibrium setting, any increased economic activity associated with federal credit programs would generate additional county-level government revenue, which could support higher levels of local direct government expenditure. This endogeneity bias implies that controlling for local government expenditure would tend to mask or dilute the actual empirical associations between federal credit programs and local economic performance. At any rate, the inclusion of local government expenditure did not alter the signs or significance levels of the estimated coefficients on the federal credit programs studied here, nor did it materially change their magnitudes. The variable was significant in only half of the regressions, and never at the 0.01 level.

The basic regression equation to be estimated is:

$$y = \alpha + x\beta + z\gamma + \varepsilon \quad (1)$$

where y is a measure of economic performance during 1996-2000, x is a vector of federal funding measures during 1990-1995, z is a vector of market-specific control variables, ε is a stochastic error term, α is the intercept parameter to be estimated, and β and γ are parameter vectors to be estimated. Table 2 lists the names, definitions, sources, and summary statistics of all dependent and independent variables used in the regressions. A separate regression is estimated for each measure of economic performance, and alternative specifications utilize various levels of aggregation for the funding variables x.

Table 3 presents pairwise correlation coefficients between each funding variable and each measure of economic performance, as a preliminary step to motivate the subsequent multivariate regressions. In the first column, statistically significant positive correlations (exceeding 0.3) appear between the intertemporal standard deviation of the annual growth rate of real per capita income over 1996-2000 (YgthSD) and the 1990-1995 levels of funding across all programs included in Table 1 (TF), the business funding subset of those programs (TB), and total USDA programs included in Table 1 (TU). Positive correlations exceeding 0.3 are also apparent between the intertemporal standard deviation of real per capita income over 1996-2000 (rpciSD) versus TF and TB, respectively. For individual programs, correlations greater than 0.3 appear between YgthSD and each of the USDA business credit programs (UBDL and UBGL), as well as between rpciSD and UBGL. As shown in Table A1 in Appendix 2, no strong collinearity exists among the other variables in the sample.

5. Regression Results

Table 4 reports the estimated OLS regression coefficients on each funding variable versus each measure of economic performance. Each regression was structured to represent funding levels from all of the federal programs listed in Table 1, regardless of the level of aggregation or disaggregation. Thus, TF was the sole funding variable in one set of regressions, with a separate regression for each measure of economic performance; TB and TH were the two funding variables in a second set of regressions; TU and NU were the two funding variables in a third set of regressions; and the eight program-specific funding variables were included as a vector of funding variables in a fourth set of regressions.[8]

At the highest level of aggregation, total funding across the included programs (TF) was significantly associated with five of the six measures of economic performance, both in the OLS estimates of Table 4 and the LAD estimates of Table 6. Total program funding was associated with benefits in terms of a higher average level of real per capita income (rpci) and lower volatility of employment growth (EgthSD) but with worse performance in terms of more volatile income growth (YgthSD), volatile income levels (rpciSD), and slower employment growth (Empl). Total business funding (TB), total USDA funding (TU), and the USDA's subset of direct business funding (UBDL) exhibited exactly the same pattern of association with economic performance. Scrutiny of Table 2 indicates that these respective subsets comprise the major portion of TF and thus it is to be expected that they exhibit similar patterns of coefficients. In particular, TB averages 77 percent of TF, TU averages 71 percent of TF, and UBDL averages 52 percent of TF. Indeed, these comparisons suggest that the results for TU, TB, and TF were driven primarily by a single program, UBDL. Thus, direct business lending by the USDA appears to be significantly associated with benefits in terms of more stable employment growth and higher subsequent levels of real per capita income, but at a cost of more volatile income levels and growth along with slower average employment growth. Indirect business funding by the USDA (UBGL) exhibits similar coefficients except for a reversed sign in the rpci regression and insignificance in the EgthSD regression.

Total housing funding, by contrast, was not significantly associated with most measures of economic performance, but was marginally associated with higher rates of employment growth (Empl) in the OLS estimates and more strongly so in the LAD estimates. Funding by the programs other than the USDA (NU) was significantly associated with benefits in terms of higher levels of real per capita income (rpci) and with higher rates of employment growth (Empl) in both OLS and LAD estimates.

At a more disaggregated level, business credit guarantees by the SBA (SBGL) are associated with significantly faster and more stable employment growth and with higher real per capita income levels in both

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[8] As a check of robustness, we also fitted regressions (not reported in the tables) with various subsets of these funding variables as well as subsets of the control vector. The patterns of signs and significance levels of the estimated funding variables were similar across these alternate specifications.

OLS and LAD estimates, while the SBA's direct business lending (SBDL) is associated with significantly more stable employment growth but more volatile income levels in both OLS and LAD regressions.

Direct and guaranteed housing credit extended by the USDA (UHL) is associated with benefits in terms of more stable levels (OLS only) and growth rates of real per capita income, as well as higher levels of income and faster employment growth. OLS estimates indicate similar benefits of direct housing credit by HUD (HHDL) in more stable levels and growth rates of income, but these effects are not significant in the LAD estimates. Finally, housing credit guarantees are not robustly associated with any of our measures of economic performance, regardless of the sponsoring agency.

It is notable that six of the program categories (TF, TB, TU, UBDL, UBGL, and UHL) are significantly associated with all but one measure of economic performance; this includes most of the aggregated categories, along with all of the USDA program categories. Overall, these estimates indicate that some targeted federal funding is not neutral with respect to nonmetropolitan economic performance, but in certain cases is associated with tradeoffs between economic stability and economic growth, or between job performance and income performance; and in other cases may be associated with just one or two dimensions of economic performance. Given recent findings by Kurz (2004) and Martin (2008) that economic volatility is more costly in the macroeconomy than previous research had suggested, these findings shed important light on the local economic consequences of government credit policy and open doors for useful further research.

Considering these same results from the dimension of economic performance, we see from Tables 4 and 6 that income growth is more stable (YgthSD is lower) where UHL is higher or where USDA business credit (UBDL, UBGL, or their associated aggregates, TB and TU) is lower. Marginally significant effects appear for HHDL (OLS only) and for HHGL (both OLS and LAD). Thus, housing credit extended by the USDA appears to be associated with lower volatility of income growth, but business credit extended by the same agency, either directly or indirectly, exhibits the opposite effect. The volatility of income levels (rpciSD) displays generally the same signs and significance levels as the volatility of income growth rates.

Employment growth, by contrast, is more stable (EgthSD is lower) where USDA direct business credit (UGDL, or its associated aggregates, TB, TU, or TF) is higher. Small business credit guarantees by the SBA (SBGL) are also associated with more stable employment growth, marginally in the OLS estimates but more robustly in the LAD estimates. No other funding variables are consistently associated with EgthSD in both OLS and LAD regressions.

The explanatory power of the regressions on the average level of real per capita income (rpci) is very high, as reflected by adjusted R-squares approaching 0.9. Much of the explanatory power is due to the variable mrpci, which in this specification functions as a lagged endogenous variable. The average level of real per capita income is higher in the presence of higher funding levels in most of the individual business credit programs (UBDL, SBDL, and SBGL) as well as in the USDA's housing credit (UHL) or in the presence of lower levels of USDA business guarantees (UBGL). Again, the aggregates TB, TU, and TF display significant coefficients of the same sign as their underlying components, with NU also emerging as significant due to the business lending (direct and indirect) of the SBA. First-order income trends (Ygth), interestingly, are not significantly associated with any of the programs in our study.

The average growth rate of employment (Empl) exhibits a pattern of signs and significance of coefficients roughly similar to that of EgthSD. In particular, jobs grew faster in the presence of higher USDA housing credit (UHL) and SBA business credit guarantees (SBGL). These two programs also underlie the positive coefficients on TH and NU. By contrast, jobs grew more slowly in the presence of higher USDA business funding (either direct or indirect) or its associated aggregates (TU, TB, and TF). The similarity between the coefficients on Empl and those on EgthSD suggests an additional set of tests on the coefficient of variation of job growth, defined as EgthSD / Empl. These estimates, not reported in the table, indicate a negative coefficient significant at the 0.05 level for UBDL and of its aggregates (TU, TB, and TF) in both OLS and LAD regressions. Small business credit guaranteed by the SBA (SBGL) also displays a negative coefficient, marginally significant in the OLS estimates but highly significant ($p < 0.0005$) in the LAD estimates. These results exactly mirror those for EgthSD and indicate that the EgthSD estimates are not invalidated by the Empl results.

Formal hypothesis t-tests (Table 5) provide a more quantitative assessment of the differences apparent in Table 4. The first row indicates that the vector of program-specific funds is jointly significant at conventional levels in all regressions except Ygth. The second row establishes the joint significance of our control vector in all regressions. The third row indicates that the various credit programs exhibit significantly different coefficients, so that the disaggregated vector of program-specific funds provides a significantly better fit to the measures of economic performance than does the scalar TF, except for the regression of Ygth. The fourth row rejects the joint hypothesis that all business credit programs share a common coefficient and all housing credit programs share a common coefficient except in the regressions on EgthSD and Ygth; equivalently, it indicates that aggregating the individual program funds into the two categories "business" versus "housing" results in a significant loss of information or fit except when economic performance is measured by either EgthSD or Ygth. The fifth row rejects the joint hypothesis that all USDA credit programs share the same coefficient and that all non-USDA credit programs in our sample share the same coefficient except in the regression on Ygth; equivalently, it indicates that aggregation by agency (USDA versus all others) results in a significant loss of fit except when economic performance is measured by Ygth.

The final two rows test hypotheses about full aggregation into a scalar funds variable, versus partial aggregation along different dimensions. The sixth row indicates that no significant information is lost between the business/housing dichotomy versus scalar funding, except when economic performance is measured as the average growth rate of employment. The seventh row indicates a similar result for the USDA/other agency dichotomy versus scalar funding, except when economic performance is measured as either the average level of real per capita income or the average growth rate of employment.

Table A3 in Appendix 2 presents the estimated OLS coefficients for the control vector in the disaggregated funding regressions, along with the adjusted R-squares for those regressions.[9] Market size, as measured by the natural logarithm of county population, was statistically significant in every regression, though with varying signs. Larger population was associated with more stable growth of real per capita income and employment, higher average levels of real per capita income, and (marginally) higher average growth rates of employment, but also with slower growth of real per capita income. Population density was significant in half of the regressions but always displayed a positive point estimate, indicating that more densely populated nonmetropolitan counties exhibited higher average levels of per capita income as well as faster growth of real per capita income and employment. These results largely conform to prior theory and evidence of urbanization economies in economic performance.

Banking structure was significant in most of these regressions, though not always in the same way. The number of banks was significant in only two regressions, indicating that income growth was more stable and per capita income levels were higher where fewer banks operated. This finding contrasts with that by Collender and Shaffer (2003), where the number of banks was significantly associated with average growth rates of real per capita income in most nonmetropolitan specifications (including the longrun model 4 for 1984-96 and the shortrun model 3 with and without lagged independent variables) and in some metropolitan specifications (including the shortrun model 3 and locally owned banks in the 1984-96 longrun model).

The deposit Herfindahl-Hirschman Index was significant in all but two regressions, with higher market concentration associated with lower income levels, slower but more stable income growth, and more volatile employment growth. The income growth result is consistent with that obtained by Collender and Shaffer (2003) for short-run metropolitan and farm-dependent samples and for some long-run specifications.

[9] LAD estimates of these coefficients are available from the authors, along with estimates from regressions using more aggregated measures of funding.

Real bank deposits per capita was likewise significant in all but two regressions, indicating that more intensive utilization of financial intermediation was associated with more stable growth of income and jobs, higher average levels of real per capita income, but slower employment growth. Collender and Shaffer (2003) found this variable associated with significant differences in the average annual growth rates of real per capita income in most longrun specifications.

The average 1990-1995 level of real per capita income was significant in all but two regressions, associated with higher subsequent levels of real per capita income as well as more volatile growth of jobs and income. Real per capita income levels exhibited high persistence, with a coefficient in the rpci regression near unity and estimated precisely. No evidence of convergence was apparent in these estimates.

Education was significant in only two regressions, associated with faster and more stable job growth. Unlike many previous studies, including Collender and Shaffer (2003) for similar county-level U.S. data, we fail to find evidence that education is significantly associated with faster income growth, once other factors are controlled for. State per capita income was significant in only two regressions, associated with lower volatility of real per capita income levels and growth.

The selected county types exhibited limited explanatory power. Employment grew faster in retirement destinations. Income growth rates were slower and less volatile in transfer-dependent counties and in counties with extensive federal lands. The latter counties were also weakly associated with more volatile income levels. Curiously, transfer-dependent counties did not exhibit markedly lower average levels of real per capita income than other counties.

Among the statistically significant coefficients on federal credit program variables, it is instructive to note the magnitudes of the estimated associations. No significant associations appeared for housing credit guaranteed by the Veterans Administration, nor for the average annual growth rate of real per capita income. This latter finding points to the importance of studying multiple measures of economic performance, since a narrow focus on income growth rates alone could lead to misleading conclusions. In the following discussion, we describe the change in each performance measure resulting from an increase equal to one sample standard deviation in the various funding variables. Because of the large number of possible combinations (13 program categories times six performance measures), we do not discuss every possibility individually, but focus on the most aggregated, most extreme, and most interesting subsets.

A one-standard-deviation increase in total funding across the programs studied would be associated with statistically significant increases of 77 basis points in the standard deviation of annual income growth rates (or about 21 percent of the sample mean), 4.2 percentage points in the standard deviation of the annual income level (or about 7.0 percent of the sample mean), and just $53 in the average annual per capita income (rpci). It is also associated with statistically significant decreases of 7.3 basis points in the standard deviation of annual employment growth rates (3.1 percent of the sample mean) and 6.9 basis points in the average annual rate of employment growth (6.0 percent of the sample mean).

Where significant, the signs and magnitudes of program subcategories were mostly similar to those of the total funding variable (TF). Only one program category, housing credit by the USDA, was associated with a significantly improved (reduced) volatility of income growth (YgthSD), but this was also the only program category associated with a significantly worse (higher) volatility of employment growth (EgthSD). Direct business lending by the SBA (SBDL), where significant, was associated with a substantially larger effect than other program categories; this included an 18 basis point improvement (reduction) in the volatility of employment growth (7.7 percent of the sample mean), a 5.6 percent worse (higher) volatility of real per capita income (9.3 percent of the sample mean), and a $330 gain in annual per capita income (2.9 percent of the sample mean). The largest magnitude of association with average annual employment growth rates was for business loans guaranteed by the SBA, where a one standard deviation increase was associated with a 15 basis point increase in annual job growth rates (an impressive 13 percent of the sample mean).

Summarizing the magnitudes of the significant funding coefficients, we see two cases in which an increase of one standard deviation in the funding variable is associated with a change of more than 10 percent of the sample mean in economic performance: the 21 percent increase in the standard deviation of annual growth rates of real per capita income associated with total funding, and the 13 percent increase in the annual growth rate of employment associated with SBA-guaranteed business loans. Four other coefficients implied changes in economic performance of between 5 and 10 percent of the sample mean associated with an increase of one standard deviation in a funding variable: total funding versus YgthSD and Empl, and SBDL versus EgthSD and rpciSD.

5.1 Comparison of Metropolitan and Nonmetropolitan Results

Comparing these results with the pattern of coefficients in the metropolitan regressions of Shaffer and Collender (forthcoming), we find marked contrasts and a few similarities. The most obvious contrast is that far more of the associations between program funding and economic performance measures were statistically significant in the nonmetropolitan markets than in the metropolitan sample. This contrast may reflect a variety of factors, including the greater complexity of metropolitan economies and the smaller metropolitan sample; it may also reflect differences in informational asymmetries and special interest representation, as discussed above. Another contrast is that aggregation of program funds into more general categories resulted in a significant loss of fit in every metropolitan regression, versus only a subset of nonmetropolitan regressions.

Coefficient signs are unchanged across the two samples in a dozen cases: for UBGL, UHL, and HHGL in the YgthSD regressions; for TB, TU, and UBDL in the EgthSD regressions; for TF and HHDL in the rpciSD regressions; and for TH, NU, SBGL, and UHL in the Empl regressions. These associations thus appear robust with respect to the size or degree of urbanization. Of these, all the associations with employment growth rates and volatility were beneficial, an important result not previously studied, but which is consistent with an oft-stated goal of various government programs to promote employment.

Likewise, the associations between housing credit by the USDA and less volatile income growth, and between direct housing credit by HUD and less volatile income levels, were beneficial. In these dimensions, it appears that possible distortions by special interests and other pitfalls of government credit programs are outweighed by positive effects, for all types of communities.

By contrast, three of the consistently significant associations were detrimental: between the volatility of income growth and guaranteed credit by HUD for housing and by the USDA for business, and between the volatility of income levels and total federal credit funding. These second-moment costs have not been previously recognized, and point to the importance of extending the study of economic performance to multiple measures that include second-moment effects.

Significant reversals of sign among the federal credit variables occurred across the two samples in only two cases: UHL in the rpci regression and TF in the Empl regression. Of these, housing credit by the USDA was associated with higher average real per capita income in the nonmetropolitan counties but with lower average income in MSAs. Total federal credit funding, conversely, was associated with faster employment growth in the metropolitan sample but slower employment growth in the nonmetropolitan sample. While the USDA reversal might reflect different program objectives in the two types of markets, such an explanation would be less plausible for the broader aggregate TF. More generally, these differences might reflect contrasting interactions with other local economic forces, systematic differences in informational asymmetries, or different levels of influence by special interest groups. Available data cannot distinguish among these or other possible explanations. Hence, this important question warrants further study.

5.2 Tradeoffs, Multipliers, and Further Discussion

The tradeoffs evident for most credit programs, in which apparent benefits in some dimensions of economic performance were offset by worse performance in others, not only point to the dangers of focusing exclusively on a single measure of economic performance but also require policymakers to think carefully about their objectives and about which costs are acceptable in pursuit of those objectives. On the other hand, a few credit programs exhibited no tradeoffs under the limited set of performance measures studied here. Housing credit by the USDA (UHL) was associated with significant benefits in five of the six performance measures, and never exhibited a significantly adverse effect. SBGL appeared beneficial in three regressions and was never significantly detrimental. HHDL exhibited beneficial coefficients in two regressions and was never detrimental. By contrast, UBGL exhibited detrimental coefficients in four regressions and never appeared significantly beneficial, while HHGL was never beneficial and exhibited a single detrimental coefficient. SBGL appeared favorable without significant tradeoffs and UBGL appeared detrimental without favorable offsets.

One point to note is that the short-run impact of government funds on the level of local income should be positive (indeed, dollar for dollar) to the extent that the funds injected into the local market are derived elsewhere (such as by taxes, bond issuance, or monetization of federal debt). This positive impact, which is an automatic property of aggregate financial accounting, should be observed regardless of whether the funds are used for short-term consumption or invested to stimulate long-term growth.[10] However, whether the funding is one-time or ongoing, the financial accounting alone would not generate a change in the subsequent growth rates or volatility of income or employment, and any such impact would require some additional mechanism such as enhanced local productivity. Indeed, in the absence of enhanced local productivity, a one-time injection of funds in year 1 could easily result in *slower* growth rates in year 2, if local income levels subsequently revert to their previous long-run equilibrium path. Aggregate financial accounting would not by itself generate a higher level of employment as a direct result of government funding, so any empirically observed impact of this sort would provide additional insight into the uses and benefits of the funding.

Moreover, a refined interpretation of the empirical association between government funding and levels of real per capita income (rpci) suggests a distinction between direct financial accounting effects and longer-term productivity gains in the funded market. In particular, each dollar of federal funding will initially raise the aggregate local income by one dollar; if any portion of those funds is used to purchase productive

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[10] The authors are indebted to Charles Calomiris for this observation, which was also discussed in Shaffer and Collender (forthcoming).

inputs or to invest in productive assets, as opposed to funding pure consumption, then a further increase in aggregate local income should be observed, either contemporaneously or subsequently (see also Sadoulet and de Janvry, 2001, for further discussion). Thus, a multiplier effect can be measured if the funding programs have a long-run component of welfare enhancement, in which the estimated coefficients on the respective funding variables in the rpci regressions exceed unity. This, then, is the more stringent test of program effectiveness as measured in the rpci regressions.

It should be noted that this multiplier test may be excessively stringent, for three reasons. First, some of the allocated funds are implicitly derived from the local tax base, so that a smaller positive value of the regression coefficient would be consistent with some form of enhanced productivity. Second, the great majority of funds allocated within 1990-1995 would have been disbursed prior to the start of the 1996-2000 performance period, and hence will not show up in the form of funding injections into 1996-2000 income. Third, any guarantees that lower a borrower's interest rate will, in effect, merely transfer income from the lender to the borrower; if the lender is local, as is often the case with housing loans or small business loans, the net change in aggregate market income is zero or negligible.

At any rate, in both OLS and LAD estimates, three programs exhibit regression coefficients significantly greater than unity in the rpci regressions: SBDL, SBGL, and UHL (respectively, all SBA business credit, whether direct or guaranteed, and the USDA's housing funding). The point estimates on the associated coefficients range between 3.7 and 5.1, much larger than unity. The 95 percent confidence intervals for these coefficients span approximately 4.06 to 6.15 for SBDL, 2.86 to 4.62 for SBGL, and 2.27 to 5.29 for UHL in the rpci regressions. Thus, we can confidently conclude that these programs, at least, are associated with a strong positive multiplier effect in real per capita income levels that exceeds the direct short-run effects resulting from aggregate financial accounting alone.

6. Summary and Conclusion

This paper has explored the empirical associations between selected U.S. federal credit programs and subsequent economic performance in nonmetropolitan counties through the 1990s. Our findings indicate that funding levels are significantly associated with several measures of economic performance. Different federal programs have different measured effects and tradeoffs appear between benefits in one dimension of economic performance versus costs in other dimensions of economic performance. Comparing these results against those of Shaffer and Collender (forthcoming) reveals contrasts in some dimensions.

Total aggregate federal funding across the included programs was associated with significant nonmetropolitan benefits in terms of a higher average level of real per capita income and more stable employment growth, but at the cost of more volatile income growth, volatile income levels, and slower employment growth. The same pattern appeared for total business funding, total funding by the USDA, and direct business lending by the USDA. Housing lending by the USDA was associated with higher average real per capita income levels. Total federal credit funding was associated with faster slower employment growth.

Contrasts between nonmetropolitan and metropolitan results might reflect a variety of factors, including the greater complexity of metropolitan economies, the smaller number of metropolitan observations, systematically different informational asymmetries, or different degrees of representation and distortion by special interests. A natural question is whether these contrasts represent intrinsic limitations of the programs, or instead a combination of intrinsic benefits plus some diversion of resources to special interests. This question applies both to diverse outcomes in nonmetropolitan versus metropolitan markets and to tradeoffs across different measures of economic performance, such as growth versus stability. Our data cannot resolve these important questions, which are thus left to future research.

Overall, the empirical findings are consistent with several theoretical predictions based on externalities and informational asymmetries, and with some standard policy objectives. The tradeoffs across performance measures point to the dangers of focusing exclusively on any single measure of economic performance, as well as illustrating the need for policymakers to consider explicitly their objectives and acceptable costs. A few programs, however, exhibited no tradeoffs in our estimates. Most strikingly, housing credit by the USDA was associated with significant benefits in five of the six performance measures without significant adverse effects.

Other issues could be usefully explored by future research. Given the possibility that our lag structure might overlook part of the growth effects of business credit (though probably not the main effects on levels or stability of income or employment, nor on any effects of housing credit), future research could investigate alternative lag structures for business credit, taking care not to misconstrue pure financial transfers as net social benefits. Similarly, because the policy goals of housing credit mainly focus on housing conditions and local quality of life rather than on income or employment per se, future research could expand on the housing component of our study by examining alternative measures of outcomes such as local homeownership rates or local housing quality.

An informational problem noted above, in which centralized allocative decisions associated with federal direct credit programs may incorporate less borrower-specific information than lending decisions made by local private investors, suggests that direct credit programs may spawn more inefficient outcomes than guaranteed credit programs. However, this hypothesis could not be tested in our estimates owing to the aggregation of direct and guaranteed USDA housing credit in the available data for the years that we examined. Because those figures in more recent years are disaggregated into direct housing loans and guaranteed housing loans, this question could be addressed using a more recent sample, and remains open for future research.

Another issue for further research would be to compare the economic outcomes measured here against those associated with non-government-funded business lending and housing loans. On the one hand, if benefits are observed in some government funding programs but larger benefits were associated with similar loans made without government assistance, then one might still question the optimality of the government funding programs to the extent that they divert funds away from more productive uses (a point similar to that raised by Calomiris and Himmelberg, 1999, as discussed above). On the other hand, in cases where no measurable benefit is associated with a particular government program, it might nevertheless be difficult to interpret the programs as wasteful if similar outcomes were found for comparable lending without government assistance, under the assumption that market competition enforced optimality of the purely private-sector lending decisions.

Table 1: Variable Definitions and Summary Statistics

Variable	*Definition*	*Mean*	*Std. Dev.*
YgthSD	standard deviation of annual growth rate of real per capita income, 1996-2000	0.0363	0.0394
EgthSD	standard deviation of annual growth rate of employment, 1996-2000	0.0234	0.0147
rpci	average real per capita income, 1996-2000	11.429	2.114
Ygth	average annual growth rate of real per capita income, 1996-2000	1.0214	0.0160
rpciSD	standard deviation of real per capita income, 1996-2000	0.6025	0.3750
Empl	average annual growth rate of employment, 1996-2000	1.0115	0.0161
	*Federal Funding Variables:**		
TF	total funds from listed programs	0.2634	0.3822
TB	funds from listed business programs	0.2016	0.3792
TH	funds from listed housing programs	0.0619	0.0648
TU	funds from listed USDA programs	0.1867	0.3749
NU	funds from listed non-USDA programs	0.0767	0.0748
UBDL	USDA direct business lending, average 1990-95	0.1358	0.3435
UBGL	USDA business credit guarantees, avg. 1990-95	0.0398	0.0640
SBDL	SBA direct business lending, avg. 1990-95	0.0041	0.0127
SBGL	SBA business credit guarantees, avg. 1990-95	0.0218	0.0268
UHL	USDA housing lending, avg. 1990-95	0.0111	0.0109
HHDL	HUD direct housing lending, avg. 1990-95	0.0003	0.0018
HHGL	HUD housing credit guarantees, avg. 1990-95	0.0426	0.0547
DHGL	Veteran's Administration housing credit guarantees, avg. 1990-95	0.0078	0.0209
	Market Control Variables:		
lpop	log of county population, in millions, 1990	-4.2079	0.9759
dens	population density per square mile, 1990	36.71	40.88
NB	number of banks with offices in the county	8.167	6.723
HHI	Herfindahl-Hirschman index of bank deposits in county	0.3960	0.2295
rdeppc	real bank deposits per capita	6.356	2.858
mrpci	average real per capita income, 1990-1995	10.53	1.96
HS90	% adults graduated from high school as of 1990	0.6748	0.1032
stpci	average real per capita income in state, 1995-2000	13.45	1.42
RT	retirement destination	0.0826	0.2754
FL	federal lands	0.1132	0.3169
TP	transfer-dependent	0.1693	0.3751

*Funding variables measured as average annual funding for years 1990-1995, per capita, in thousands of 1982-1984 constant dollars.

Table 2: Government Credit Programs Analyzed

Purpose:	*Business*	*Housing*
Agency:		
U.S. Department of Agriculture	Direct and guaranteed farm ownership and operating loans; Guaranteed rural business (business and industry; intermediary relending; rural economic development loans)	Direct rural housing programs (includes Section 502 low income housing loans; Section 504 very low income housing repair loans; rural rental housing loans)
U.S. Small Business Administration	Direct; guaranteed	--
U.S. Department of Housing and Urban Development	--	Direct; guaranteed
U.S. Department of Veterans Administration	--	Guaranteed

Table 3: Simple Correlation Coefficients, Funding vs. Economic Performance in Nonmetropolitan U.S. Counties

Panel A: Funding Aggregates

	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl
TF	0.380	-0.037	0.182	0.115	0.304	-0.100
TB	0.400	-0.025	0.141	0.122	0.306	-0.128
TH	-0.101	-0.068	0.247	-0.034	0.004	0.161
TU	0.390	-0.021	0.127	0.115	0.293	-0.135
NU	-0.011	-0.082	0.293	0.012	0.086	0.165

Panel B: Individual Program Funds

	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl
UBDL	0.344	-0.030	0.127	0.097	0.262	-0.118
UBGL	0.467	0.039	0.060	0.158	0.333	-0.175
SBDL	0.125	-0.011	0.035	0.072	0.090	-0.024
SBGL	0.082	-0.061	0.219	0.066	0.145	0.126
UHL	-0.172	-0.005	0.039	-0.040	-0.104	0.107
HHDL	-0.060	-0.042	0.026	-0.022	-0.055	-0.005
HHGL	-0.045	-0.078	0.259	-0.014	0.035	0.137
DHGL	-0.099	-0.000	0.063	-0.046	-0.021	0.085

Variable names are defined in Table 1.

Table 4: OLS Regression Coefficients on Funding Variables

Performance measure:	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl
TF	0.0202 (3.31)*	-0.0019 (-2.42)**	0.1384 (2.40)**	0.0015 (1.16)	0.1098 (2.79)*	-0.0018 (-1.98)**
TB	0.0208 (3.21)*	-0.0022 (-2.58)*	0.1268 (2.25)**	0.0015 (1.11)	0.1152 (2.76)*	-0.0023 (-2.30)**
TH	0.0029 (0.28)	0.0076 (1.38)	0.5146 (1.32)	0.0031 (0.55)	-0.0631 (-0.44)	0.0146 (1.93)***
TU	0.0205 (3.18)*	-0.0019 (-2.38)**	0.1023 (1.93)***	0.0013 (0.96)	0.1128 (2.73)*	-0.0026 (-2.44)**
NU	0.0134 (1.32)	0.00005 (0.01)	1.0720 (2.86)*	0.0085 (1.62)	0.0327 (0.26)	0.0179 (2.79)*
UBDL	0.0145 (2.35)**	-0.0018 (-2.43)**	0.1811 (2.25)**	0.0004 (0.25)	0.0902 (2.16)**	-0.0015 (-1.67)***
UBGL	0.1029 (4.06)*	-0.0041 (-0.61)	-1.1606 (-2.51)**	0.0118 (1.04)	0.4201 (2.00)**	-0.0193 (-3.36)*
SBDL	0.0990 (1.50)	-0.0289 (-1.65)***	5.1014 (4.88)*	0.0463 (1.42)	0.8760 (1.81)***	0.0147 (0.59)
SBGL	-0.0224 (-0.76)	-0.0211 (-1.68)***	3.7399 (4.26)*	0.0234 (1.54)	0.0874 (0.26)	0.0576 (4.11)*
UHL	-0.2438 (-5.39)*	0.0427 (1.65)***	3.7803 (2.50)**	0.0004 (0.01)	-0.9401 (-1.69)***	0.1007 (3.40)*
HHDL	-0.2951 (-1.73)***	-0.1639 (-1.13)	-0.6751 (-0.11)	-0.0671 (-0.62)	-5.635 (-2.91)*	-0.2121 (-1.35)
HHGL	0.0260 (1.89)***	0.0013 (0.20)	0.3595 (0.85)	0.0054 (0.78)	-0.1201 (-0.68)	0.0105 (1.32)
DHGL	-0.0122 (-0.50)	0.0309 (1.21)	-0.6705 (-0.63)	-0.0104 (-0.83)	0.4748 (0.43)	-0.0064 (-0.22)

White robust t-statistics in parentheses, significant at the *0.01, **0.05, and ***0.10 level. Each regression includes the control vector shown in Table A1. Last eight rows are from a single regression per column; TF was run in a separate regression; the other four funding variables were included in complementary pairs in separate regressions (TB and TH; TU and NU). This partitioning of funding variables ensured that each program in Table 1 was represented without double counting in each regression. Variable names are defined in Table 1.

Table 5: Hypothesis Tests on Funding Hypotheses (based on regressions reported in Table 4)

Performance measure:	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl	*degrees of freedom*
Hypothesis:							
Funds: none vs. by program	9.74*	2.46**	10.76*	1.65	6.99*	6.72*	8, 2207
No control vector	71.90*	37.86*	1357.6*	6.63*	71.34*	22.07*	11, 2207
Scalar funds vs. by program	11.13*	2.07**	10.87*	1.51	2.76*	7.11*	7, 2207
Funds, business or housing, vs. by program	12.56*	1.84	12.36*	1.75	2.82*	6.84*	6, 2207
Funds, USDA or not, vs. by program	12.90*	2.39**	10.12*	1.45	3.11*	5.60*	6, 2207
Scalar funds vs. business / housing	2.46	3.46	1.88	0.07	2.37	8.61*	1, 2214
Scalar funds vs. USDA or not	0.50	0.19	15.04*	1.85	0.62	15.99*	1, 2214

F-tests, significant at the *0.01 level or **0.05 level. Variable names are defined in Table 1.

Table 6: LAD Regression Coefficients on Funding Variables

Performance measure:	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl
TF	0.0357 (37.65)*	-0.0012 (-2.25)**	0.2060 (6.94)*	0.0006 (0.92)	0.2010 (16.28)*	-0.0020 (-2.96)*
TB	0.0402 (41.98)*	-0.0014 (-2.49)**	0.2198 (7.28)*	0.0006 (0.98)	0.2065 (16.44)*	-0.0025 (-3.68)*
TH	0.0001 (0.01)	0.0113 (3.28)*	-0.1834 (-0.99)	0.0033 (0.84)	-0.1811 (-1.05)	0.0111 (2.65)*
TU	0.0402 (41.75)*	-0.0013 (-2.24)**	0.1919 (6.33)*	0.0002 (0.35)	0.2053 (16.27)*	-0.0028 (-4.07)*
NU	0.0082 (1.57)	0.0011 (0.35)	0.3587 (2.19)**	0.0045 (1.33)	0.1033 (1.52)	0.0111 (3.00)*
UBDL	0.0240 (22.76)*	-0.1415 (-2.25)**	0.3320 (9.95)*	0.0013 (1.83)***	0.1539 (10.96)*	-0.0008 (-1.05)
UBGL	0.1157 (18.56)*	-0.0043 (-1.16)	-1.395 (-7.07)*	-0.0052 (-1.25)	0.6375 (7.68)*	-0.0246 (-5.51)*
SBDL	-0.0004 (-0.01)	-0.0191 (-1.24)	4.0311 (4.94)*	0.0352 (2.04)**	0.9038 (2.63)*	-0.0053 (-0.28)
SBGL	0.0015 (0.11)	-0.0340 (-4.26)*	3.6933 (8.72)*	0.0091 (1.01)	0.0357 (0.20)	0.0582 (6.07)*
UHL	-0.1083 (-3.60)*	0.0230 (1.28)	3.6684 (3.85)*	0.0283 (1.41)	-0.4207 (-1.05)	0.1226 (5.68)*
HHDL	-0.0944 (-0.52)	-0.1693 (-1.56)	0.1593 (0.03)	0.0120 (0.10)	-2.807 (-1.16)	-0.2391 (-1.84)***
HHGL	0.0132 (1.89)***	0.0032 (1.96)**	-0.5757 (-2.59)*	0.0072 (1.53)	-0.2483 (-2.66)*	0.0017 (0.33)
DHGL	-0.0185 (-1.15)	0.0122 (1.27)	-0.4713 (-0.92)	-0.0038 (-0.35)	0.8889 (4.13)*	0.0113 (0.98)

Parentheses contain the LAD equivalent of t-statistics, computed by TSP under the assumption that regression errors take the Laplace distribution: significant at the *0.01, **0.05, or ***0.10 level. Each regression includes the control vector shown in Table A1. The last eight rows are from a single regression per column; TF was run in a separate regression; the other four funding variables were included in complementary pairs in separate regressions (TB and TH; TU and NU). This partitioning of funding variables ensures that each program in Table 1 is represented without double counting in each regression. Variable names are defined in Table 1.

Appendix 1: **County Types**

The county economic and policy typology codes used in this research are described in Peggy J. Cook and Karen L. Mizer, The Revised ERS County Typology: An Overview, RDRR 89, U.S. Department of Agriculture, Economic Research Service, Dec. 1994.

COUNTY ECONOMIC TYPES (mutually exclusive, a county may fall into only one economic type):

- Farming-dependent--Farming contributed a weighted annual average of 20 percent or more of total labor and proprietor income over the 3 years from 1987 to 1989.

- Mining-dependent--Mining contributed a weighted annual average of 15 percent or more of total labor and proprietor income over the 3 years from 1987 to 1989.

- Manufacturing-dependent--manufacturing contributed a weighted annual average of 30 percent or more of total labor and proprietor income over the 3 years from 1987 to 1989.

- Government-dependent--federal, state, and local government activities contributed a weighted annual average of 25 percent or more of total labor and proprietor income over the 3 years from 1987 to 1989.

- Service-dependent--Service activities (private and personal services, agricultural services, wholesale and retail trade, finance and insurance, real estate, transportation, and public utilities) contributed a weighted annual average of 50 percent or more of total labor and proprietor income over the 3 years from 1987 to 1989.

- Nonspecialized--Counties not classified as a specialized economic type over the 3 years from 1987 to 1989.

The farming-dependent, mining-dependent, manufacturing-dependent, government-dependent, service-dependent, and nonspecialized counties are abbreviated, respectively, as FM, MI, MF, GV, TS, and NS. Each of these County Economic Types is represented by a dummy variable. For example, when a county is identified as farming-dependent then FM=1, and otherwise 0. The same holds for other economic types.

COUNTY POLICY TYPES (overlapping, a county may fall into any number of these types):

- Retirement-destination--The population aged 60 years and older in 1990 increased by 15 percent or more during 1980-90 through in-movement of people. Federal lands--federally owned lands made up 30 percent or more of a county's land in the year 1987.

- Commuting--workers aged 16 years and over commuting to jobs outside their county of residence were 40 percent or more of all the county's workers in 1990.

- Persistent poverty--persons with poverty-level income in the preceding year were 20 percent or more of total population in each of 4 years: 1960, 1970, 1980, and 1990.

- Transfer dependent--Income from transfer payments contributed a weighted annual average of 25 percent or more of total personal income over 3 years from 1987 to 1989.

The retirement-destination, federal-lands, commuting, persistent-poverty, and transfer-dependent counties are abbreviated, respectively, as RT, FL, CM, PV, and NS. Each of these County Policy Types is represented by a dummy variable. For example, if a county is identified as retirement-destination then RT=1, and otherwise 0. The same holds for other policy types.

Table A1: Data Correlations

Panel A: Funding levels

	UBDL	UBGL	SBDL	SBGL	UHL	HHDL	HHGL
UBGL	0.423						
SBDL	0.102	0.148					
SBGL	0.039	0.111	0.042				
UHL	-0.020	-0.073	-0.030	0.012			
HHDL	-0.030	-0.054	-0.017	0.000	0.012		
HHGL	-0.016	-0.060	-0.048	0.271	0.083	0.017	
DHGL	-0.071	-0.104	-0.041	0.014	0.041	0.002	0.229

Panel B: Control variables

	lpop	dens	NB	HHI	rdeppc	mrpci	HS90	stpci	RT	FL
dens	0.631									
NB	0.734	0.622								
HHI	-0.685	-0.354	-0.615							
rdeppc	-0.210	-0.137	0.034	-0.233						
mrpci	0.020	0.143	0.219	-0.155	0.432					
HS90	-0.017	-0.034	0.159	-0.115	0.261	0.568				
stpci	0.117	0.126	0.179	-0.119	0.082	0.368	0.327			
RT	0.084	0.015	0.036	0.017	-0.083	0.066	0.075	0.115		
FL	-0.073	-0.186	-0.106	0.170	-0.180	0.023	0.245	0.005	0.181	
TP	-0.041	-0.079	-0.155	0.146	-0.227	-.417	-.364	-0.174	0.073	0.009

Panel C: Funding vs. control variables

	lpop	dens	NB	HHI	rdeppc	mrpci	HS90	stpci	RT	FL	TP
UBDL	-.223	-.168	-.096	-.002	0.267	0.144	0.084	-.034	-.084	-.114	-.081
UBGL	-.422	-.285	-.224	0.129	0.335	0.137	0.082	-.085	-.146	-.101	-.102
SBDL	-.101	-.074	-.066	-.000	0.088	0.018	-.018	0.055	-.005	-.059	-.038
SBGL	-.133	-.163	-.076	0.050	0.146	0.201	0.316	0.117	0.084	-.073	-.041
UHL	0.167	0.081	0.071	-.084	-.079	-.006	-.036	0.126	0.015	-.186	-.079
HHDL	0.084	0.119	0.092	-.043	-.040	0.015	0.159	0.179	0.036	-.106	-.155
HHGL	0.120	-.006	0.077	-.054	-.053	0.240	-.115	-.119	0.017	0.170	0.146
DHGL	0.134	0.099	0.076	-.031	-.101	0.054	0.261	0.083	-.083	-.180	-.227

Variable names are defined in Table 1.

Table A2: Coefficients of Control Variables in OLS Regressions with Funding by Program

Dependent Variable:	YgthSD	EgthSD	rpci	Ygth	rpciSD	Empl
Intercept	-0.0906 (-6.61)*	0.01531 (3.38)*	2.5323 (9.19)*	1.0046 (153.36)*	-0.7605 (-4.92)*	0.9956 (213.82)*
lpop	-0.0295 (-8.49)*	-0.00466 (-5.59)*	0.2948 (4.72)*	-0.00485 (-2.92)*	-0.1832 (-4.17)*	0.00144 (1.73)***
dens	0.41×10^{-6} (0.02)	0.90×10^{-5} (1.15)	0.002665 (4.94)*	0.16×10^{-4} (1.95)***	0.000238 (0.99)	0.24×10^{-4} (2.25)**
NB	.001313 (5.87)*	-0.40×10^{-4} (-0.61)	-0.02210 (-4.52)*	0.0001415 (1.29)	0.004245 (1.53)	-0.000112 (-1.55)
HHI	-0.0174 (-3.22)*	0.00529 (2.28)**	-0.4874 (-3.39)*	-0.007379 (-2.37)**	-0.06779 (-0.89)	0.004273 (1.63)
rdeppc	-.001590 (-2.36)**	-0.00062 (-3.66)*	0.0283 (1.92)***	-0.32×10^{-4} (-0.11)	-0.008395 (-1.10)	-0.00059 (-3.74)*
mrpci	0.002434 (3.32)*	0.000684 (2.67)*	0.9544 (25.99)*	-0.000345 (-0.74)	0.0731 (5.62)*	-0.000156 (-0.63)
HS90	-.002885 (-0.28)	-0.0297 (-7.50)*	0.4297 (1.57)	0.006686 (1.11)	0.1924 (1.37)	0.02946 (6.40)*
stpci	-0.52×10^{-4} (-3.10)*	0.000243 (1.13)	-0.01796 (-1.25)	-0.000274 (-1.19)	-0.02108 (-4.26)*	0.000220 (0.88)
RT	-0.52×10^{-4} (-0.03)	-0.00032 (-0.32)	-0.09560 (-1.51)	-0.000616 (-0.64)	-0.00358 (-0.16)	0.01342 (10.28)*
FL	-0.01085 (-4.91)*	0.00080 (0.72)	0.1023 (1.44)	-0.00353 (-2.83)*	-0.04130 (-1.70)***	-0.00161 (-1.22)
TP	-0.00405 (-2.62)*	0.00043 (0.41)	-0.02190 (-0.46)	-0.00207 (-2.20)**	-0.01871 (-1.09)	0.00088 (0.85)
Adj. R^2	0.458	0.164	0.884	0.056	0.368	0.157

White heteroscedasticity-consistent t-statistics in parentheses, significant at the *0.01, **0.05, or ***0.10 level. Variable names are defined in Table 1.

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