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Rural Economic Performance and U.S. Federal Credit Programs

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Abstract

Several theories of externalities and asymmetric information suggest a potential role for government programs to assist credit markets. We examine empirical associations between funding by several U.S. government programs and six measures of subsequent economic outcomes, for nonmetropolitan U.S. counties during the 1990s. Significant differences emerge across programs and performance measures. The results suggest a need to compare policy objectives with acceptable costs in some cases. Overall, the results are consistent with theoretical predictions and with several standard policy objectives.

Keywords: federal credit programs; growth; volatility; employment; rural economic performance

1.0 Introduction

National governments often assist or subsidize private-sector borrowing, sometimes in large amounts.[1] However, measurable benefits from these programs have been mixed (Gale, 1991; Sala-i-Martin, 1997; Calomiris & Himmelberg, 1999; Craig et al., 2007, 2008; Shaffer & Collender, 2009), suggesting a need for additional study. This paper analyzes the economic performance of U.S. nonmetropolitan areas as affected by selected U.S. federal credit programs during the 1990s.[2]

We find that several measures of economic outcomes vary significantly with federal funding levels. The effects differ by program, and some tradeoffs emerge with apparent benefits in one dimension of economic performance offsetting costs in another dimension. Though the data and methods cannot prove causality, the empirical patterns accord with several theoretical predictions and policy objectives. Differences between nonmetropolitan and previously analyzed metropolitan regions suggest that rural areas may benefit from somewhat different policies than urban areas.

[1] Such assistance has been estimated to range as high as one-third of the total amount borrowed for U.S. data (Gale, 1991).
[2] Shaffer and Collender (2009) report a similar study for U.S. metropolitan areas, but economic theory suggests that the relevant mechanisms should vary between urban and rural settings, requiring separate empirical analysis.

In the remainder of this paper, 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 and suggests some issues for future study.

2.0 Prior Studies and Related Concepts

Prior literature has identified reasons why government credit programs could alternately help or hinder the efficient allocation of credit and associated economic performance (see review in Shaffer & Collender, 2009). In one view, government programs may mitigate market failures due to informational constraints or externalities. By contrast, limitations in the policy-making process or implementation might introduce distortions, undermining the efficiency of credit allocation and outcomes. Given these opposing considerations, the net impact of such programs is an empirical question.

Measured benefits of government credit programs have been mixed. Gale (1991) estimates 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) concludes that directed credit programs in the U.S., often aimed at equity, have had a limited impact on growth. Sala-i-Martin (1997) reports no significant association between government spending (including investment) and economic growth in cross-country analysis, while Odedokun (1996) finds lower incremental output-capital ratios in developing countries with more directed credit through development bank lending. By contrast, Calomiris and Himmelberg (1999) document several dimensions of economic benefit from Japanese programs of directed credit in the machine tool industry; and Craig et al. (2007) estimate a small but statistically significant positive association between loan guarantees by the U.S. Small Business Administration (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) find that more generous loan guarantees under SBA programs are associated with higher loan default rates, but Hancock and Wilcox (1998) find 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. Apart from Craig et al. (2007), these studies generally do not distinguish between urban and rural settings, leaving nonmetropolitan effects an important open question.

Shaffer and Collender (2009) review mechanisms proposed in previous studies by which government programs to assist credit markets could potentially confer net benefits, and estimate empirical effects of selected federal credit programs on U.S. metropolitan areas. Theory predicts different patterns in nonmetropolitan areas: Informational asymmetries that hinder private capital markets may be more severe in complex metropolitan markets than in small, homogeneous nonmetropolitan communities; adverse borrower selection is worse in markets with more lenders (Broecker, 1990; Riordan, 1993; Shaffer, 1998); and free rider problems and investment-distorting externalities may be more severe in larger markets. Such reasoning might suggest more limited scope for government financing programs to mitigate informational market failures in nonmetropolitan areas than in metropolitan areas; policies that promote growth in urban centers may have weaker effects in rural areas.

Another potential benefit of federal credit programs is stabilization, smoothing out the cyclicality of available credit and reducing volatility of per capita income levels, employment levels, and growth rates. 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 (1999), and Almeida and Ferreira (2002) implies that economic performance should be more variable where government credit programs are more active.[3] The importance of volatility in income levels follows Haider (2001), Moffitt and Gottschalk (2002), and Shin and Solon (2008). Similarly, the importance of volatility in growth rates is supported by Obstfeld (1994), and Martin (2008). Ramey and Ramey (1995) find that countries with higher volatility in growth rates— both in general and as specifically induced by government spending— exhibit slower average growth. Other studies advocate studying levels of economic aggregates (Klenow & Rodríguez-Clare, 1997; Hall & Jones, 1999; Bils & Klenow, 2000; Craig et al., 2008).

These diverse considerations motivate the importance of continued empirical research on the linkages between government credit programs and multiple dimensions of economic performance, particularly in under-studied rural counties. We concur with the perspective of Calomiris and Himmel (1995), 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.

3.0 Sample and Data

We assembled a unique dataset from four sources: local lending through federal direct and guaranteed loan programs from the Consolidated Federal Funds Reports (CFFR; http.//www.census.gov/govs/www/cffr.html), 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.[4] Table 1 lists the variables and summary statistics; as a preliminary step, it is instructive to compare the means and variances against those reported in Shaffer and Collender (2009) for corresponding variables across the same programs in a metropolitan sample. Major differences from the metropolitan sample include higher means and variances for the standard deviation of income growth and employment growth (YgthSD and EgthSD), total funds from listed business programs (TB), and funds from listed USDA programs and each of their subcomponents. Lower means and variances are seen, compared to the metropolitan sample, for funds from listed housing programs (TH), funds from listed non-USDA programs (NU), and HUD housing credit guarantees.

[3] However, the cross-sectional test proposed by Alemeida 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.

[4] Our dataset is complementary to that used by Shaffer and Collender (2009) and, except for the CFFR data, similar to that used by Collender and Shaffer (2003). We refer readers to those studies for more detailed discussion of the data. Craig et al. (2007, 2008) provide further details of the SBA's programs and associated data.

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.

Our unit of analysis is individual counties.[5] 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. Because employment statistics are reported by place of employment, whereas income statistics are reported by place of residence, these latter two measures may provide complementary perspectives on economic performance to the extent that workers commute across county lines. This aspect is common to all empirical county-level studies.

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, following Shaffer and Collender (2009). This specification is consistent with cross-country studies that measured education by secondary school enrollment (Levine & Renelt, 1992; Bekaert et al., 2006) and with findings that high school education is more important in U.S. nonmetropolitan areas (Jensen et al., 1999; Porterfield, 2001).

3.1 Program Characteristics

We explore the impact of federal lending on local economic well-being, focusing 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. We note that the USDA's commodity loan programs are primarily intended as short run floor prices for agricultural commodities, and have other unique features.

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 includes a portion of these loan programs—those with credible local information on their lending activities and that were funded throughout 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

[5] 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.

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.[6] Table 2 lists the programs included in our study; these are the same categories of programs analyzed in Shaffer and Collender (2009) for metropolitan markets, where it is explained (Shaffer & Collender, 2009, footnote to their Table 2) that many agricultural and similar loans are also made within U.S. metropolitan areas, not just rural counties.

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

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 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 wider, multicounty area.

4.0 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 subsequent years. 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

[6] USDA guaranteed housing loans and direct housing loans were reported as a single aggregated variable, preventing measurement of the direct and guaranteed components separately.

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 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 consideration is that the likely mechanisms relating 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 & Levine, 1993; Levine, 1998; Levine & Zervos, 1998; Collender & 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.[7] 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 prove causality, measuring the statistical associations with a multi-year lag reduces the likelihood that changes in economic outcomes are driving changes in funding.[8]

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 short-run benefits. Overall, therefore, non-overlapping five-year periods represent a reasonable compromise in balancing these

[7] 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.

[8] 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 the mitigation afforded by using consecutive five-year periods is useful.

two effects of business credit.[9] 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.

Previous studies typically maintain an implicit perspective that funding levels are exogenous to any one program or region, and are adjusted independently across programs and regions. In a macroeconomic general equilibrium framework, it may happen that funding in a particular program or region comes at least partially at the expense of funding in other programs or regions. Such interactions can also occur in outcomes as, for example, the USDA Rural Development programs are designed to attract businesses to the funded areas, potentially reducing such entry to un-funded areas.[10] The aggregate effect of these interregional interactions will be reflected in the regression intercept terms. Measuring or controlling for such effects in more detail, besides being difficult to achieve, would address a somewhat different research question than the direct local economic effects of program funding explored here. While acknowledging this broader question as useful for future research, we follow the approach of previous studies in abstracting from such interregional interactions in our empirical specification.

Rather than focusing on outcomes in 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 note that, while the policy goal of business funding is to stimulate production, income, employment, and other traditional measures of economic growth, housing credit follows a different policy goal: facilitating home ownership by a larger segment of the population. It is possible that housing loans could fully meet their policy objectives without yielding 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.[11] A similar question may

[9] 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 except to the extent that funding levels are correlated over time. Positively correlated funding levels over time, by contrast, would induce the estimated coefficients to exaggerate the impacts of the investments, regardless of the sign of impact.
[10] The authors are grateful to an anonymous referee for noting this possibility.
[11] One mechanism by which broader home ownership might be expected to result in higher subsequent levels of income and employment is suggested by McAndrews and Nakamura (1991). In addition, lenders often view home ownership as linked with job stability and creditworthiness.

apply to the USDA's commodity loan programs, which have alternate goals as noted above.

For each measure of economic performance described above, the basic regression equation to be estimated is:

$$y = \alpha + x\beta + z\gamma + \varepsilon$$

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 described below, α is the intercept parameter to be estimated, β and γ are estimated parameter vectors, and ε is a stochastic error term. Table 1 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.

Our first control variable is the logarithm of county population, 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. It is important to note that prior studies have tended to focus on metropolitan markets (e.g., Glaeser et al., 1995), or to aggregate urban and rural data together (e.g., Cetorelli & Gambera, 2001), so it is of independent interest whether similar linkages hold in rural markets.

Population density or employment has been found significantly related to several measures of economic performance, possibly due to scale effects or to superior matching between firms and workers in denser markets (Ciccone & Hall, 1996; Carlino et al., 2005; Strumsky et al., 2005; Andersson et al., 2007). While these studies have largely focused on metropolitan markets, their findings suggest at least a possibility that density could be positively associated with economic performance, and it is of independent interest to observe whether this pattern continues to hold in nonmetropolitan settings.

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. In our study, it is important to control for the local market structure of financial intermediation because 75 percent of all net credit advanced is channeled through financial intermediaries (Moran, 1985).[12] The three measures of bank structure and financial intermediation used here are broadly 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), predicting a negative association with subsequent economic performance. Both variables are similar to those used in other studies of economic

[12] Likewise, Craig et al. (2007) control for local deposit concentration and find a significant effect in their growth model with time fixed effects.

growth such as Glaeser et al. (1995), Rajan and Zingales (1998), Levine et al. (2000), Cetorelli and Gambera (2001), and Collender and Shaffer (2003). We also controlled for three county type indicators as defined by the USDA (Cook & Mizer, 1994), including retirement destination, federal lands, and transfer dependent.[13]

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.[14] Its inclusion 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.

As a preliminary step to motivate the subsequent regressions, Table 3 presents simple correlation coefficients between each funding variable and each measure of economic performance. 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 2 (TF), the business funding subset of those programs (TB), and total USDA programs included in Table 2 (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.[15]

5.0 Regression Estimates

Table 4 reports estimated regression coefficients on each funding variable versus each measure of economic performance. Each regression is structured to represent funding levels from all of the federal programs listed in Table 2, regardless of the level of aggregation or disaggregation. TF is the sole funding variable in one set of regressions, with a separate regression for each measure of economic performance; TB and TH are the two funding variables in a second set of regressions; TU and NU are the two funding variables in a third set of regressions; and the eight program-specific funding variables are included as a vector of funding variables in a fourth set of regressions.[16]

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[13] A county qualified as a retirement destination if its population aged 60+ years in 1990 increased by at least 15 percent during the prior decade. A county was designated as 'federal lands' if such lands comprised at least 30 percent of the county's land as of 1987. Counties were transfer dependent if at least 25 percent of total personal income came from transfer payments during 1987-89. We initially considered additional county type indicators, but ultimately omitted them due to statistical considerations such as high correlations with certain funding variables.

[14] 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.

[15] No strong collinearity exists among the other variables in the sample.

[16] 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.

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.

White (1980) 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 2 was represented without double counting in each regression. Variable names are defined in Table 1.

The results indicate that income growth is more stable (YgthSD is lower) where USDA housing lending is higher or where USDA business credit (UBDL, UBGL, or their associated aggregates TB and TU) is lower. Marginally significant contrasting effects appear for HUD direct and indirect housing credit; housing credit extended by the USDA is associated with lower volatility of income growth. The volatility of income levels (rpciSD) displays generally the same signs and significance levels as the volatility of income growth rates.

Employment growth, 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 associated with marginally more stable employment growth. No other funding variables are consistently associated with EgthSD.

Table 4: *Estimated Regression Coefficients on Funding Variables*

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

The explanatory power of the regressions on the average level of real per capita income (rpci) is very high, with adjusted R-squares approaching 0.9. Much of this 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 business credit programs (all except USDA business credit guarantees) as well as in the USDA's housing credit (UHL) or in the presence of lower levels of USDA business guarantees (UBGL). The aggregates TB, TU, and TF (all business; all USDA; and all funds studied) display significant coefficients of the same sign as their underlying

components, with NU (non-USDA) also significant due to business lending (direct and indirect) by the SBA. First-order income trends (Ygth), interestingly, are not significantly associated with any of the programs in our study.

Coefficients on the average growth rate of employment (Empl) exhibit a pattern of signs and significance as 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).

Summarizing these results by program category, we see that TF, TB, TU, and UBDL (total funds, total business funds, total USDA funds, and USDA business credit guarantees) are all significantly associated with five of our six measures of economic performance: higher average real per capita income (rpci), more volatile income growth (YgthSD) and income levels (rpciSD), lower volatility of employment growth (EgthSD), and slower employment growth (Empl). At the other extreme, housing credit guarantees are not robustly associated with any of our measures of economic performance, regardless of the sponsoring agency. Other programs exhibit mixed patterns of results.

Table 5 reports estimated OLS coefficients for the control vector in the disaggregated funding regressions, along with the adjusted R-squares for those regressions. As these coefficients do not relate to our central research question, we do not discuss them individually but simply note that – except for the county type indicators – a majority of these variables are significant in at least half of the regressions.

Turning to the magnitude of selected estimates, we find that an increase of one sample standard deviation in total funding across the programs is associated with statistically significant increases of 77 basis points (b.p.) in the standard deviation of annual income growth rates (21% of the sample mean), 4.2 percentage points in the standard deviation of the annual income level (7.0% 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 b.p. in the standard deviation of annual employment growth rates (3.1% of the sample mean) and 6.9 b.p. in the average annual rate of employment growth (6.0% of the sample mean). [17]

Similar patterns emerge for various program subcategories. 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 b.p. reduction in the volatility of employment growth (7.7% of the sample mean), a 5.6% higher volatility of real per capita income (9.3% of the sample mean), and a $330 gain in annual per capita income (2.9% of the sample mean). The largest impact on average annual employment growth rates was by SBA-guaranteed business loans: a one standard deviation increase was associated with a 15 b.p. increase (13% of the sample mean).

[17] 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.

Table 5: *Estimated Regression Coefficients on Control Variables*

Dependent Variable:	**YgthSD**	**EgthSD**	**rpci**	**Ygth**	**rpciSD**	**Empl**
Intercept	-0.0906	0.01531	2.5323	1.0046	-0.7605	0.9956
	(-6.61)*	(3.38)*	(9.19)*	(153.36)*	(-4.92)*	(213.82)*
lpop	-0.0295	-0.00466	0.2948	-0.00485	-0.1832	0.00144
	(-8.49)*	(-5.59)*	(4.72)*	(-2.92)*	(-4.17)*	(1.73)***
dens	0.41x10-6	0.90x10-5	0.002665	0.16x10-4	0.000238	0.24x10-4
	(0.02)	(1.15)	(4.94)*	(1.95)***	(0.99)	(2.25)**
NB	.001313	-0.40x10-4	-0.02210	0.0001415	0.004245	-0.000112
	(5.87)*	(-0.61)	(-4.52)*	(1.29)	(1.53)	(-1.55)
HHI	-0.0174	0.00529	-0.4874	-0.007379	-0.06779	0.004273
	(-3.22)*	(2.28)**	(-3.39)*	(-2.37)**	(-0.89)	(1.63)
rdeppc	-.001590	-0.00062	0.0283	-0.32x10-4	-0.008395	-0.00059
	(-2.36)**	(-3.66)*	(1.92)***	(-0.11)	(-1.10)	(-3.74)*
mrpci	0.002434	0.000684	0.9544	-0.000345	0.0731	-0.000156
	(3.32)*	(2.67)*	(25.99)*	(-0.74)	(5.62)*	(-0.63)
HS90	-.002885	-0.0297	0.4297	0.006686	0.1924	0.02946
	(-0.28)	(-7.50)*	(1.57)	(1.11)	(1.37)	(6.40)*
stpci	-0.52x10-4	0.000243	-0.01796	-0.000274	-0.02108	0.000220
	(-3.10)*	(1.13)	(-1.25)	(-1.19)	(-4.26)*	(0.88)
RT	-0.52x10-4	-0.00032	-0.09560	-0.000616	-0.00358	0.01342
	(-0.03)	(-0.32)	(-1.51)	(-0.64)	(-0.16)	(10.28)*
FL	-0.01085	0.00080	0.1023	-0.00353	-0.04130	-0.00161
	(-4.91)*	(0.72)	(1.44)	(-2.83)*	(-1.70)***	(-1.22)
TP	-0.00405	0.00043	-0.02190	-0.00207	-0.01871	0.00088
	(-2.62)*	(0.41)	(-0.46)	(-2.20)**	(-1.09)	(0.85)
Adj. R2	0.458	0.164	0.884	0.056	0.368	0.157

White (1980) heteroskedasticity-consistent t-statistics in parentheses, significant at the *0.01, **0.05, or ***0.10 level. Variable names are defined in Table 1.

Three programs (USDA housing lending, SBA business credit guarantees, and HUD direct housing lending) exhibited several economic benefits without any detrimental consequences observed, while two (USDA direct business guarantees and HUD housing credit guarantees) exhibited no benefits and at least one adverse association. Other programs exhibited a mix of positive and negative associations, suggesting that some economic benefits come at a cost. Such findings warn against focusing narrowly on any single measure of outcomes, and indicate that policymakers need to think carefully about program objectives and acceptable costs.

Applying the multiplier argument developed in Shaffer and Collender (2009), we note that three programs exhibit coefficients significantly greater than unity in the rpci regressions: SBA business credit – both direct and guaranteed – and the USDA's housing funding. Their point estimates range between 3.7 and 5.1 with 95 percent confidence intervals spanning 4.06 to 6.15 for SBA direct business lending (SBDL), 2.86 to 4.62 for SBA business credit guarantees (SBGL), and 2.27 to 5.29 for USDA housing lending (UHL). We conclude that the apparent income benefit of these programs, at least, cannot be fully attributed to a simple transfer from external sources into the local economy.[18]

Overall, these estimates indicate that much targeted federal funding is not neutral with respect to nonmetropolitan economic performance, but in some 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 some local economic consequences of government credit policy.

Finally, metropolitan results reported in Shaffer and Collender (2009) contrast with the nonmetropolitan results here in several ways. Housing credit by the USDA (UHL) exhibits the opposite sign of association with real per capita income (rpci), possibly reflecting different program objectives. Total credit funding likewise exhibited the opposite sign of association with subsequent employment growth in the two samples. Federal credit funding appears to have more measurable effects in nonmetropolitan than metropolitan areas, based on the relative numbers of statistically significant associations.

6.0 Summary and Conclusion

This paper has explored 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. Comparing these results against those of Shaffer and Collender (2009) reveals some contrasts between metropolitan and nonmetropolitan effects.

Total aggregate federal funding across the included programs is 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 appears for total business funding, total funding by the USDA, and direct business lending by the USDA. Housing lending by the USDA is associated with higher average real per capita income levels. Total federal credit funding is associated with slower employment growth.

[18] The authors are grateful to Charles Calomiris for suggesting this test. We note that unity, while not the only possible threshold for addressing this question, is a natural benchmark to bracket the interpretation of results, and in any case need not be deemed a precise value here because it is so dramatically exceeded by our empirical estimates.

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 economic performance measures point to the dangers of focusing exclusively on any single measure of 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 economic benefits in five of the six performance measures without significant adverse effects.

Other issues could be usefully explored by future research. Spatial autocorrelation tests, not possible in our dataset, could be explored to refine the conclusions offered here. Moreover, 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 outcomes such as local homeownership rates or local housing quality. A similar recommendation could apply to the USDA's commodity loan programs and their particular goals.

A separate direction of inquiry could explore the interaction among heterogeneous forms of agriculture across counties, the control variables used here, and economic performance. Within the U.S., rural counties differ not only in their level of dependence on agriculture (versus tourism, mining, and other activities) but also on the types and structure of their agriculture.

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 guaranteed credit programs may promote better efficiency than direct 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.[19]

Future research could also 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 question the optimality of the government funding

[19] Newer data are disaggregated into direct housing loans and guaranteed housing loans, so this question could be addressed in the future using a later sample.

programs to the extent that they divert funds away from more productive uses. On the other hand, even for programs with no measurable benefit, it might be difficult to interpret such 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.

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