Do small businesses matter for economic growth in Appalachia?

Heather Stephens
Mark Partridge
Agricultural, Environmental, and Development Economics, The Ohio State University,
2120 Fyffe Road, Columbus, OH 43210, email: stephens.177@osu.edu

Abstract

Despite progress in reducing poverty and increasing economic vitality in Appalachia, the region continues to lag economically behind the rest of the nation. With the decline of employment in the region's traditional industries, a number of initiatives to support entrepreneurial development have been launched with the presumption that small businesses and entrepreneurs can be sources of long-term economic growth. However, previous studies have found the strongest evidence of a link between entrepreneurs and growth in urban centers. We investigate whether the link between the small businesses and economic growth holds in the rural, Appalachian region. We find strong evidence that small businesses are positively associated with employment and per capita income growth in Appalachia.

Draft Working Paper presented to the 49th Southern Regional Science Association Meeting
March 26, 2010

Introduction

Despite progress in reducing poverty and increasing economic vitality in Appalachia, the region continues to lag economically behind the rest of the nation. With the decline of employment in the region's traditional industries, a number of initiatives to support entrepreneurial development have been launched with the presumption that small businesses and entrepreneurs can be sources of long-term economic growth.

Entrepreneurship has the advantage that it is endogenous and that small business formations can be influenced by policies. While previous research has found a link between rural economic growth and both proximity to urban areas (Partridge et al, 2008) and presence of natural amenities (Deller et al, 2001), counties can't create natural amenities or urban clusters. In addition, small businesses are more likely to purchase local inputs and less prone to relocation due to the individuals' ties to the region, thus increasing their positive impact on the region's economy. Support for local-based entrepreneurs also provides hope for breaking the region's dependence on export-based industries which have led to a segmented and imperfectly competitive labor market that is highly affected by downsizing (Weiler, 2001).

Previous empirical work by Shrestha and Goetz (2007) showed that proprietorship formation is linked to economic growth in the United States. However, their work found the strongest evidence of growth in metropolitan counties. Because most of the Appalachian region is rural, with less than one-third of the counties part of a metropolitan area, we explore whether proprietors can live up to their promise as drivers of economic growth in this region. Using data on counties in and around the Appalachian region, we find strong evidence that small businesses are positively associated with employment and per capita income growth.

The Appalachian Region

The Appalachian region of the United States follows the Appalachian Mountains from southern New York to northern Mississippi. Historically, many of the region's counties have been among the poorest in the nation. In 1965, Congress established the Appalachian Regional Commission (ARC) "to address the persistent poverty and growing economic despair of the Appalachian Region" (Appalachian Regional Commission). Today, the federally-designated ARC region consists of 420 counties including all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia.

The region's economy has historically been dependent on manufacturing and on the boom and bust cycles of the extraction of natural resources. Since 1965, while some parts of the region have become more economically diversified, others still require basic infrastructure such as roads and water and sewer systems (Appalachian Regional Commission).

In recent years, a number of initiatives have been launched to encourage entrepreneurship development in the region. In 1997, ARC launched the Entrepreneurship Initiative (EI), a "ten-year initiative to invest in projects designed to build entrepreneurial economies across the Region" (Appalachian Regional Commission). In 2000, the federal New Markets Initiative was enacted, promoting access to equity financing for entrepreneurship in underserved areas nationwide. One of the first venture capital firms created through this initiative, Adena Ventures, serves part of the

Appalachian region. In 2005, the Kellogg Foundation funded two projects that impacted the region through its Rural Entrepreneurship Development Systems grant program (W.K. Kellogg Foundation). The presumption of all these programs is that by encouraging entrepreneurship development, we can increase the economic vitality of the region.

Theoretical framework and Previous Empirical Analysis

Classical regional development theory focuses on the need for regional exports as a source of regional economic growth. This theoretical basis led many communities to focus on recruiting new export-oriented businesses as a means of creating economic growth. However, recent work by Kilkenny and Partridge (2009), found that for rural areas, export employment is "neither necessary nor sufficient for rural development." Their results show that in many rural areas export-based employment (such as mining, manufacturing, or agriculture) was associated with lower levels of growth. This is consistent with persistent low levels of growth in the Appalachian region and with the findings of Weiler (2001) that regional specialization in export-based industries has led to chronic high levels of unemployment in West Virginia due to its highly-segmented and non-market clearing labor markets.

Acs and Kallas (2008) also point out that traditional supply-side theories of economic development view a region as having a "competitive pool of inputs" to attract new investment and do not explain how poor regions with a poorly-educated workforce, like Appalachia, would begin to develop in the first place.

Since Appalachia is predominantly rural and historically poor, these traditional models will not be useful in explaining economic growth in the region. We thus turn to research related to the effect of entrepreneurship and small business creation on economic growth. Unlike possible barriers to growth in the region, such as remoteness or lack of amenities, the formation of small businesses has the advantage of being endogenous to communities and can be influenced by policies.

Theoretical work by Fritsch and Mueller (2004) explored the effects of small business creation – the direct effect of creating jobs; the displacement effect, where small businesses take jobs away from existing businesses; and the induced or indirect effects, where small businesses contribute to the economic growth of a region. If the displacement effects are high, small businesses could take jobs from existing firms, negating any direct effects and possibly resulting in net job loss. Whether small businesses contribute to the overall economic growth of the region may also depend on the type of small businesses. Additionally, small businesses may purchase more inputs locally and they may be less prone than multinational corporations to leave for greener pastures, thus increasing their impact on the economic growth of the region.

Numerous studies have documented the direct effects – the job creation ability of small businesses (including Robbins et al., 2000; Barth et al., 2008). According to a 2004 study by the Ewing Marion Kauffman foundation "over the last decade, small firms have provided 60–80 percent of the net new jobs in the economy," (U.S. Small Business Administration, 2004).

Additionally, Audretsch (2002) found that spillover effects can have positive impacts on both small business formation and economic growth. Spillovers arise when knowledge created by one business "spills over" into the immediate geographic region. Audretsch found that urban areas are best suited to benefit from these effects.

To determine whether the overall economic effects of small business creation are positive, Shrestha et al. (2007) examined the economic growth of U.S. regions in the five-year period after new proprietorships were formed. Their findings indicated that increases in the number of proprietors were positively associated with net job growth in a region. The strongest evidence of this effect was found in metropolitan counties which saw an additional 0.1 percent increase in jobs over rural areas (Shrestha et al, 2007). They also found clusters of high job growth rates in certain geographic areas of the country, further evidence of spillover effects.

Deller and McConnon (2009) looked at the effect of microenterprises on economic growth (population, employment, and per capita income) using state-level data on businesses with less than five employees. Their results show that microenterprises play a role in economic growth, with faster economic growth associated with a larger share of service-industry firms.

This suggests that the net effect of small businesses on economic growth in the Appalachian region depends on the type of small businesses. Acs (2006) found that small business creation due to individuals having no other options for work, or "necessity entrepreneurship," has no effect on economic growth. Given the decline of employment in the region's traditional industries, if small business creation in Appalachia can be contributed to the lack of prospects, we would expect to find no correlation between small businesses and economic growth. If, however, the region has high rates of "opportunity entrepreneurship," where individuals choose to take advantage of business opportunities, then, according to Acs (2006), small businesses should have a net positive effect on economic growth. However, given the rural nature of the region, we may be less likely to see spillover effects and additional positive growth related to clustering.

Since the theory and previous empirical evidence do not provide a clear answer about whether small businesses can be drivers of growth in a poor, rural region like Appalachia, we explore this question using an empirical model.

Proprietors, Entrepreneurs, and Small Businesses

As outlined in Goetz et al (2009) and Deller and McConnon (2009) the definitions of entrepreneurs and small businesses are not standardized. For this analysis we use non-farm proprietorships as a measure of entrepreneurs or small businesses, but like Goetz and Rupasingha (2009) we recognize that "the degree of risk acceptance and creativeness or innovativeness likely distinguishes true entrepreneurs from the self-employed, and so the analogy between the two types of individuals is not without problems." We also acknowledge that proprietors do not represent all small businesses and that there is value in using other measures of small businesses, such as data on businesses with less than five employees that is used by Deller and McConnon (2009) (which looked at data at the state level).

The Empirical Model and Data

To understand how small businesses affect economic growth in the region, we estimate the following model:

$$y_j = \beta_0 + \beta_1 * \text{SB}_j + \beta_2 * \text{State Dummies}_j + \beta_3 * \text{ARC}_j + \beta_4 * \text{Distance to Metro}_j + \beta_5 * \text{Natural Amenities}_j + \beta_6 * X_j + \varepsilon_j$$

We look at economic growth (y_j) for the 420 counties in the ARC region and for the 134 counties which share a geographic border with the region. We include the immediate surrounding counties in order to test whether the relationships between small businesses and growth is different in the ARC-designated counties than in the greater geographic region. The surrounding counties share some similarities (geography, culture, etc.) with those in the ARC region, but there are also historic differences in economic opportunities. Thus the non-ARC counties provide somewhat of a natural experiment of how the ARC designation affects outcomes. Henceforth, when we refer to ARC counties, we mean the 420 counties in the federally-designated ARC region; when we refer to other counties or non-ARC counties, we mean those that surround the region. A summary of the variables used in this analysis is available in Table 1.

Our analysis considers three potential measures of economic growth (y_j):

1) The percent change in county-level total employment from 1990 to 2006. This measure is based on data from the Bureau of Economic Analysis (BEA), U.S. Department of Commerce. Over the 16-year period, the average county-level job growth for the study region was 32 percent, compared to the national job growth of 27.6 percent over the same period. For the non-ARC counties, employment growth was approximately 33 percent over the 16-year period, about equal to the ARC counties.
2) The percent change in county-level per capita income from 1990 to 2006. This is also based on data from the BEA. Per capita income in the study region (both ARC and non-ARC counties) grew by 88 percent in the 16-year period. Nationally, per capita income rose by 89 percent.
3) The percent change in the county-level poverty rate from 1989 to 2006. This measure is constructed using poverty rate data from the U.S. Census Bureau. There are potential problems with this data since the 2006 poverty rate is only an estimate. However, we conducted sensitivity analysis on the results and found no qualitative differences if the upper or lower bounds of the estimates were used instead of the mean.

As measures of the impact of entrepreneurs or small businesses in a county (SB_j), we use two different variables:

1) The share of non-farm proprietors in a county in 1990, based on BEA data.[1] Non-farm proprietors make up 17 percent of total employment in the ARC counties and 15 percent in the surrounding counties. By comparison, the average national share of non-farm proprietors is 14 percent.

[1] "The BEA local area estimates of nonfarm self-employment consist of the number of sole proprietorships and the number of individual business partners not assumed to be limited partners." Source: www.bea.gov/regional/definitions/nextpage.cfm?key=Proprietors%20employment. Accessed March 9, 2009

2) The change in non-farm proprietor employment from 1980 to 1990 using the BEA data from 1). Following the protocol established by Shrestha et al. (2007), we use the Labor Market (LM) approach which normalizes the growth in proprietorships by the total initial stock of workers (rather than the initial stock of businesses). This approach is preferred because otherwise the growth rate is inflated on a small initial stock of small businesses (Shrestha et al., 2007).

Because of unforeseeable changes to the economy of the United States between 1990 and 2006 as a result of government downsizing in the 1990s, the internet boom of the late 1990s and early 2000s, September 11th, and the wars in Iraq and Afghanistan, it is unlikely that an entrepreneur in 1990 could have accurately predicted economic growth from 1990 to 2006. By using this timeframe we hope to minimize any effect on the model from small businesses being formed in anticipation of economic growth. We also use explanatory variables from 1990 to further minimize endogeneity bias in the parameter estimates.

State dummy variables (State Dummies$_j$) for each of the thirteen states are included to control for state-specific fixed effects that might affect job growth. The Georgia dummy variable is left out of the models.

We also include a dummy variable that indicates whether or not a county is in the ARC region (ARC$_j$). In some models, we interact this dummy variable with the relevant measure of small businesses to see if small businesses make more or less of a difference in generating economic growth if a county is part of the ARC region. [2]

Previous studies (including Partridge et al., 2008) have shown that urban proximity is a determinant of rural firm location and economic prosperity. To account for urban influence (Distance to Metro$_j$), we use 1990 measures of the distance in kilometers from the population weighted center of the county to the population center of the nearest metropolitan statistical area (MSA) and three measures of incremental distance to a) an MSA of over 250,000 people, b) an MSA of over 500,000 people, and c) an MSA of over 1.5 million people. The average ARC county is 52.89 km from the nearest MSA, while the counties that surround the federally-designated region are only 39.84 km, on average, away from the nearest MSA. In addition, as shown in Table 1, the incremental distances to cities of over 250,000 and 500,000 people are higher for the ARC counties. In some models, we interact the distance to the nearest metro variable with the relevant measure of small businesses to see if small businesses make more or less of a difference in generating economic growth if a county is closer to an urban area.

[2] To test for opportunity versus necessity entrepreneurship in the ARC counties, we also look at a model which includes 1990 proprietor income per proprietor, using BEA data and interact it with the ARC dummy variable.

Natural amenities have been linked to economic growth in rural areas (Deller et al., 2001). We account for natural amenities (Natural Amenities$_i$) with each county's natural amenity score using the Natural Amenities Scale from the USDA Economic Research Service.[3] The ARC counties have a significantly higher natural amenity score (0.17) than the non-ARC counties (-0.42). [4]

Finally, we include a number of control variables (X_i) that capture other determinants of economic growth:

- Education. Two education variables, based on data from the 1990 Census, correspond to labor quality. The Share of College Graduates is the percentage of those age 25 and older with a college degree (bachelor's and above). The Share of High School Graduates is the percentage of individuals age 25 and older with a high school diploma (but no additional education).
- Industry Concentrations. 1990 shares of manufacturing, government, and farm employment (using data from the BEA) represent the concentrations of other industries.
- Average Age. From 1990 Census data, average age captures factors related to the outmigration of younger workers (which would increase the average age and potentially reduce economic growth).
- Population. We use the natural log (Ln) of the population from 1990 Census data.
- Topography Score. Because the region follows the Appalachian Mountains, its terrain can sometimes be steep and, historically, the topography of the region has been a barrier to development. Using the Topography Scale from the USDA Economic Research Service[5], we control for this historic effect. The ARC counties have an average score of 15.25, which indicates the terrain is "open high hills" and open low mountains." By contrast, the average score of the non-ARC counties is only 9.49 indicating terrain of "plains with hills."
- Change in Population, 1950 to 1960 (deviation from the mean). We use county-level population data from the U.S. Census for 1950 and 1960 to construct a measure of population change during that time period. Then, we calculate the mean change for the counties in our dataset and the deviation of each county's growth from that mean. This variable is used to control for historical conditions under which some counties were more economically robust than others. We find that the ARC counties, as expected, had population changes from 1950 to 1960 below the mean, while the surrounding counties had populations that were growing faster than the mean.

[3] "The natural amenities scale is a measure of the physical characteristics of a county area that enhance the location as a place to live. The scale was constructed by combining six measures of climate, typography, and water area that reflect environmental qualities most people prefer. These measures are warm winter, winter sun, temperate summer, low summer humidity, topographic variation, and water area." Source: www.ers.usda.gov/Data/NaturalAmenities/

[4] We also test the interaction between amenities and small business to see if small businesses in high amenity areas are more or less likely to contribute to growth.

[5] The topography scale is from The National Atlas of the United States of America, U.S. Department of Interior, U.S. Geological Survey, Washington, DC., 1970.

Despite our attempts to control for the factors that determine economic growth, we suspect potential endogeneity of our SB_j variable. Thus, we create three possible instrumental variables that can be used to control for this endogeneity.

1) The share of non-farm proprietors in a county in 1969 based on BEA data.
2) The change in non-farm proprietor employment from 1969 to 1979 using the BEA data from 1). Like our original variable for change in proprietor employment, we use the Labor Market (LM) approach.
3) The share of manufacturing employment in a county in 1960, using data from the 1962 County Data Book from the U.S. Census Bureau. Higher shares of manufacturing, which tend to be large establishments, are hypothesized to be negatively associated with future small business establishments.

Estimation and Results

For each measure of economic growth, we estimated several different models. Tables 2, 3, and 4 contain the results. Overall, we find that both the share of proprietors in 1990 and the change in the share of proprietors from 1980 to 1990 were significantly associated with employment growth and per capita income growth in the counties in our sample. The poverty results were mixed and do not show a strong statistical correlation between self-employment and poverty reduction.

Initially, we used instrumental variable estimation because we suspected that our small business variables were endogenous. We conducted weak instrument tests, and as shown in Tables 2, 3, and 4, found we had strong instruments with F-statistics between 79 and 390. We next used the Hausman test for endogeneity. With the Hausman test, under the null there is no statistical evidence of endogeneity and Ordinary Least Squares (OLS) should be used to estimate the model. For Model 1, we found some evidence of endogeneity. However, the results from instrumental variable estimation (not shown) were identical to those from OLS. As soon as we included the distance variables in the model, the Hausman test found no statistical evidence of endogeneity. We suspect that distance to metro areas may be controlling for the potential endogeneity since other studies have shown a strong correlation between metro influence and economic growth in rural areas (Partridge et al, 2008). Due to the results of the Hausman test, we used OLS to estimate economic growth in the region.

In **Table 2**, we find a strong relationship between self-employment and employment growth. Model 1 is a parsimonious model that includes only state fixed effects and the ARC dummy variable. Model 2 adds the distance variables. Model 3 is our core model that includes the natural amenity variable and the other control variables. In all cases, we find that our results our robust to the inclusion of additional variables and that a one percent increase in the share of proprietors is associated with a more than four percent increase in employment growth in the sample area. As expected, distance to a metro area has a negative effect on employment growth, while natural amenities have a positive effect. And, as suggested by the recent study by Kilkenny and Partridge (2009), the presence of manufacturing has a negative effect on the employment growth of this region. The topography score is also negatively associated with employment growth, suggesting that steeper places are harder to develop. This is consistent with the history of development in the Appalachian region, which until recently was restricted to the less steep places.

In Models 4 and 5, we add the interaction variables between proprietor share and 1) the ARC dummy variable and 2) the distance to the closest metro area. In both cases, the F-test for joint significance of the proprietor variable and the interaction variable are significant. However, on their own, the interaction variables are not significant. Thus there is weak evidence that small businesses have a larger positive effect in the ARC region and but that remote areas are less prone to benefit from small businesses.

To better understand how small businesses affect economic growth in the region, we conduct some preliminary analyses using alternative specifications of the model. When we interact the share of proprietors with the natural amenity score the resulting parameter estimates for the share of proprietors (4.43) and the interaction variable (1.29) are statistically significant, indicating that small businesses may be more important to employment growth in high amenity areas (results not included in table).

We also estimate two models in which we used 1990 county-level data on proprietor income per proprietor as a measure of the value of proprietor wages to try to tease out whether the region is experiencing entrepreneurship of necessity or opportunity. If there is a high incidence of necessity entrepreneurship we would expect to see a negative correlation between income per proprietor and employment growth. Instead, we find that higher per proprietor income is significantly positively correlated with employment growth, suggesting opportunity entrepreneurship. We also interact this variable with the ARC variable to determine if there is any difference in the type of proprietors in the ARC region versus those in the control counties. We find statistically significant correlation between the interaction variable and employment growth suggesting that the ARC region is experiencing higher rates of opportunity entrepreneurship.

In Models 6, 7, and 8 of Table 2, we test an alternative specification using Labor Market (LM) Change in Share of Proprietors as the measure of small businesses. Again, we find strong evidence that small businesses are associated with employment growth. But this time we find weak evidence that the change in the share of proprietors may have a smaller positive effect on employment growth in the ARC region.

In **Table 3**, our results point to a strong positive relationship between proprietor share and per capita income growth. From our base model (Model 9) we see that a one percent increase in the share of small businesses is associated with a 0.65 percent increase in per capita income growth. However, all else equal, the ARC region had lower per capita income growth. This is consistent with data that shows that in 2006, the ARC region continued to have a per capita income of 69 percent of the national average.

Model 10, which introduces the interaction variable between proprietor share and the ARC dummy, provides weak evidence that small businesses have a smaller positive effect in the ARC region and that remote areas are less prone to benefit from small businesses. Since this result could point to necessity entrepreneurs in the ARC region and away from urban areas, we further explore whether this is the case. We look at a variation of this model that includes the 1990 proprietor income per proprietor variable and its interaction with the ARC dummy and find virtually no relationship between those variables and per capita income growth. Thus, more research may be needed to understand what types of small businesses are being created in the region.

The results also show that per capita income growth is positively associated with the share of government employment but negatively associated with the share of manufacturing employment and share of high school graduates. Interestingly, per capita income appears to be negatively correlated with the share of college graduates, which is contrary to what we would have originally predicted.

In Models 12, 13, and 14, we again test the alternative specification using the LM Change in Share of Proprietors variable and get virtually identical results.

In **Table 4**, we present the results for predicting county-level poverty rate change. Overall, the results suggest that small businesses have little to no statistical effect on poverty reduction. In our base model (Model 15), however, we find a negative association between being in the ARC region and the poverty rate. This suggests success by the Appalachian Regional Commission in meeting one of its core goals of poverty reduction. Consistent with this, our results also show that counties with lower population growth rates than the average from 1950 to 1960 have lower poverty rate growth. The only other significant factor associated with lower poverty rates was the share of college graduates in a county, which is as would be predicted. The distance to a metro area is statistically uncorrelated with poverty rates.

When the interaction variable between proprietor and ARC is added to the model (Model 16), the ARC variable, the interaction variable and the proprietor share variable are all insignificant. Similarly, we get insignificant results when we add the interaction with the distance to metro variable in Model 17.

In Models 18, 19, and 20, we look at the change in poverty rate versus the alternative specification for small business, the LM Change in Share of Proprietors. We find weak evidence of a positive relationship between the growth in the number of proprietors between 1980 and 1990 and the poverty rate. However, the results still suggest that being in an ARC county is negatively associated with the poverty rate. Overall, Table 4 does not point to a clear relationship between the number of small businesses or self-employed and the poverty rate. However, further work is needed to understand better what is occurring.

Conclusion

Theoretical models do not provide us with guidance on whether increasing the number of small businesses will have a positive impact on economic growth in poor, rural regions like Appalachia. If small business creation is due to individuals having no other options for work, or "necessity entrepreneurship," it will have no effect on economic growth (Acs, 2006). If, however, the region has high rates of "opportunity entrepreneurship," then small businesses should have a net positive effect on economic growth (Acs, 2006). Prior work has found that the effects of small businesses on economic growth are stronger in metropolitan areas and that they are enhanced by spillover effects.

Building on the previous literature, we find strong evidence that small businesses contribute to net economic growth in the Appalachian region. We find no statistical difference between the contribution of the self-employed to employment and per capita income growth in the ARC counties versus their neighbors. While the ARC region continues to lag behind its neighbors in per capita income growth, proprietors do not appear to be responsible for this difference. In addition, preliminary analysis using a measure of income per proprietor interacted with the ARC indicator

variable provides statistical evidence that income per proprietor has a larger effect on employment growth in the ARC region and suggests a stronger presence of opportunity entrepreneurs in the ARC counties. Unlike the presence of natural amenities and proximity to urban areas which are factors that a county cannot control, small business formations are endogenous and can be influenced by policies. Thus these results validate the importance of supporting entrepreneurship and small business development as a means for generating economic growth in the region.

This study does not fully address what types of entrepreneurship policies would be best for the region. Goetz and Rupasingha (2009) found that despite efforts in the 1990s to induce more self-employment in Appalachia, the region continued to lag behind the nation in proprietor formations. However, the region has fewer business deaths and higher rates of startup survivals than the national average (Acs and Kallas, 2008) which has contributed to the relatively higher levels of non-farm proprietors in the region. Further research is needed to understand how best to support opportunity entrepreneurs and economic growth in the region.

Table 1: Descriptive Statistics

	ARC Counties				Non-ARC Counties			
Variables	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Explanatory Variables								
Share of Proprietors, 1990[1]	0.17	0.05	0.07	0.38	0.15	0.04	0.07	0.28
Labor Market (LM) Change in Share of Proprietors, 1980 to 1990	0.06	0.06	-0.08	0.42	0.05	0.05	-0.06	0.24
Distance to nearest Metro (km)	52.89	31.69	0.00	163.09	39.84	29.62	0.00	148.51
Incremental distance to a metro > 250,000 pop.	22.73	30.88	0.00	124.05	16.86	30.07	0.00	154.70
Incremental distance to a metro > 500,000 pop.	38.40	50.63	0.00	208.20	23.06	41.05	0.00	186.19
Incremental distance to a metro > 1,500,000 pop.	97.96	98.14	0.00	394.25	144.26	125.73	0.00	394.33
Natural Amenity Score	0.17	1.19	-3.72	3.55	-0.42	1.16	-3.22	1.78
Share of College Graduates, 1990	0.10	0.05	0.04	0.42	0.14	0.07	0.05	0.37
Share of High School Graduates, 1990	0.35	0.07	0.19	0.53	0.33	0.05	0.20	0.45
Share of Farm Employment, 1990	0.08	0.08	0.00	0.56	0.07	0.07	0.00	0.35
Share of Government Employment, 1990	0.15	0.05	0.08	0.41	0.15	0.06	0.06	0.47
Share of Manufacturing Employment, 1990	0.21	0.11	0.01	0.54	0.22	0.09	0.05	0.46
Average Age, 1990	36.31	1.96	30.27	43.08	35.34	1.76	30.64	38.55
Natural Log of 1990 Population	10.31	0.96	7.66	14.11	10.88	1.20	8.69	14.09
Topography Score	15.25	5.05	2.00	20.00	9.49	5.44	1.00	20.00
Change in Population, 1950 to 1960, deviation from the mean	-0.03	0.14	-0.30	0.90	0.09	0.24	-0.29	1.41
Growth Variables								
% Change in County-Level Total Employment, 1990 to 2006	0.32	0.89	-0.73	15.55	0.33	0.51	-0.16	4.60
% Change in County-Level Per-Capita Income, 1990 to 2006	0.88	0.16	0.37	1.51	0.88	0.18	0.54	1.50
% Change in County-Level Poverty Rate, 1989 to 2006	-0.03	0.18	-0.56	0.72	0.03	0.22	-0.39	0.62
Available Instruments								
Share of Proprietors, 1969	0.13	0.04	0.06	0.33	0.12	0.03	0.04	0.21
Labor Market (LM) Change in Share of Proprietors, 1969 to 1979	0.04	0.05	-0.07	0.51	0.04	0.04	-0.02	0.26
Share of Manufacturing Employment, 1960	0.28	0.13	0.03	0.61	0.28	0.12	0.04	0.54
Total Number of Counties:	554							
Total Number of ARC Counties:	420							

[1]All proprietor variables include non-farm proprietors only.

Table 2:
Parameter Values for Predicting County-Level Employment Growth, 1990 to 2006

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Explanatory Variables								
Share of Proprietors, 1990[1]	*4.675	*4.908	*4.650	2.708	**9.135			
	3.28	*3.08*	*2.42*	*1.43*	*1.70*			
Labor Market (LM) Change in Share of Proprietors, 1980 to 1990						*2.909	*3.068	*4.342
						3.65	*2.24*	*2.96*
Proprietors * ARC				2.402			-0.187	
				1.23			*-0.15*	
Proprietors * Distance to nearest Metro					-0.094			-0.031
					-1.24			*-1.63*
ARC	-0.062	0.028	0.146	-0.215	0.150	0.151	0.160	0.147
	-1.03	*0.38*	*1.14*	*-0.82*	*1.17*	*1.09*	*1.02*	*1.07*
Distance to nearest Metro (km)		*-0.005	*-0.005	*-0.005	0.009	*-0.005	*-0.005	-0.004
		-2.85	*-2.15*	*-2.16*	*0.91*	*-1.99*	*-1.99*	*-1.49*
Incremental distance to a metro > 250,000 pop.		*-0.003	*-0.003	*-0.002	*-0.003	*-0.003	-0.003	*-0.003
		-3.07	*-2.46*	*-2.46*	*-2.52*	*-2.85*	*-2.86*	*-2.85*
Incremental distance to a metro > 500,000 pop.		-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
		-1.23	*-1.23*	*-1.3*	*-1.53*	*-1.61*	*-1.56*	*-1.58*
Incremental distance to a metro > 1,500,000 pop.		0.000	0.001	0.001	0.001	0.001	0.001	0.001
		0.56	*0.73*	*0.72*	*0.7*	*0.75*	*0.75*	*0.71*
Natural Amenity Score			*0.129	*0.126	*0.100	*0.111	*0.111	*0.108
			3.22	*3.27*	*3.05*	*2.78*	*2.81*	*2.68*
Share of College Graduates, 1990			0.255	0.275	0.319	-0.197	-0.210	-0.257
			0.37	*0.4*	*0.44*	*-0.32*	*-0.35*	*-0.42*
Share of High School Graduates, 1990			-1.719	-1.707	-2.163	-1.445	-1.442	-1.486
			-1.28	*-1.28*	*-1.34*	*-1.25*	*-1.25*	*-1.28*
Share of Farm Employment, 1990			-2.101	-2.140	-2.005	-2.151	-2.148	-2.125
			-1.55	*-1.56*	*-1.61*	*-1.6*	*-1.6*	*-1.59*
Share of Government Employment, 1990			0.414	0.269	0.738	0.398	0.406	0.464
			0.37	*0.25*	*0.56*	*0.41*	*0.41*	*0.47*
Share of Manufacturing Employment, 1990			*-0.995	*-0.987	*-0.935	*-1.454	*-1.454	*-1.434
			-2.5	*-2.52*	*-2.33*	*-2.69*	*-2.69*	*-2.65*
Average Age, 1990			0.024	0.023	0.040	0.046	0.046	0.051
			0.34	*0.33*	*0.5*	*0.65*	*0.65*	*0.71*
Natural Log of 1990 Population			**-0.204	**-0.208	**-0.177	**-0.272	**-0.272	**-0.268
			-1.76	*-1.77*	*-1.78*	*-1.8*	*-1.8*	*-1.78*
Topography Score			*-0.048	*-0.047	*-0.042	**-0.045	**-0.045	*-0.044
			-2.01	*-2.01*	*-2.17*	*-1.94*	*-1.94*	*-1.92*
Change in Population, 1950 to 1960, (diff. from the mean)			0.265	0.270	0.278	0.307	0.308	0.304
			0.95	*0.95*	*0.97*	*0.94*	*0.94*	*0.93*
State Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.134	0.151	0.220	0.221	0.237	0.203	0.202	0.204
Joint F-test for Proprietors & Proprietors * ARC				*14.31			*7.69	
Joint F-test for Proprietors & Proprietors * Distance to nearest Metro					*20.25			*8.44
Instruments Used for 2SLS:								
Share of Proprietors, 1969	√	√	√	√	√			
Labor Market (LM) Change in Share of Proprietors, 1969 to 1979						√	√	√
Share of Manufacturing Employment, 1960				√	√		√	√
First Stage F-test of Instruments	388.81	372.13	195.91	123.39	122.39	79.03	152.75	155.15
Hausman Test of OLS vs IV	23.99	19.89	16.73	11.43	4.51	2.99	2.83	2.20
Probability > Chi-Square Statistic	0.07	0.40	0.96	0.99	1.00	1.00	1.00	1.00

[1]All proprietor variables include non-farm proprietors only.

* Indicates significance at the 95% level

** Indicates significance at the 90% level

Hausman Test null hypothesis is that there is no statistical evidence that endongenity is biasing the coefficients.

Values in *italics* are the heteroskedasticity-adjusted t-statistics.

Table 3:
Parameter Values for Predicting County-Level Per Capita Income Growth, 1990 to 2006

	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14
Explanatory Variables						
Share of Proprietors, 1990[1]	*0.635	*1.028	*0.907			
	3.27	*2.57*	*2.7*			
Labor Market (LM) Change in Share of Proprietors, 1980 to 1990				*1.292	*0.738	**0.580
				2.39	*2.22*	*1.93*
Proprietors * ARC		-0.486			-0.418	
		-1.18			*-1.21*	
Proprietors * Distance to nearest Metro			-0.006			-0.004
			-1			*-0.71*
ARC	*-0.053	0.020	*-0.053	*-0.052	-0.032	*-0.053
	-3.08	*0.31*	*-3.07*	*-3.02*	*-1.42*	*-3.05*
Distance to nearest Metro (km)	**0.001	**0.001	0.001	**0.000	**0.000	**0.001
	1.87	*1.93*	*1.55*	*1.69*	*1.72*	*1.76*
Incremental distance to a metro > 250,000 pop.	0.000	0.000	0.000	0.000	0.000	0.000
	0.16	*0.12*	*0.12*	*-0.12*	*-0.13*	*-0.12*
Incremental distance to a metro > 500,000 pop.	0.000	0.000	0.000	0.000	0.000	0.000
	-0.9	*-0.86*	*-0.96*	*-0.97*	*-0.86*	*-0.96*
Incremental distance to a metro > 1,500,000 pop.	0.000	0.000	0.000	0.000	0.000	0.000
	-0.97	*-0.96*	*-1*	*-0.97*	*-0.9*	*-1*
Natural Amenity Score	0.008	0.009	0.007	0.006	0.007	0.006
	0.96	*1.02*	*0.76*	*0.68*	*0.75*	*0.63*
Share of College Graduates, 1990	**-0.296	*-0.300	**-0.292	*-0.357	*-0.386	*-0.365
	-1.93	*-1.99*	*-1.94*	*-2.3*	*-2.48*	*-2.35*
Share of High School Graduates, 1990	*-0.533	*-0.535	*-0.559	*-0.492	*-0.486	*-0.498
	-2.59	*-2.61*	*-2.68*	*-2.42*	*-2.39*	*-2.43*
Share of Farm Employment, 1990	-0.084	-0.076	-0.078	-0.089	-0.083	-0.086
	-0.66	*-0.6*	*-0.61*	*-0.69*	*-0.64*	*-0.66*
Share of Government Employment, 1990	*0.406	*0.435	*0.425	*0.400	*0.417	*0.409
	2.59	*2.72*	*2.72*	*2.57*	*2.65*	*2.62*
Share of Manufacturing Employment, 1990	*-0.227	*-0.229	*-0.223	*-0.292	*-0.293	*-0.290
	-2.52	*-2.53*	*-2.47*	*-3.4*	*-3.41*	*-3.35*
Average Age, 1990	-0.004	-0.004	-0.003	-0.001	-0.001	0.000
	-0.85	*-0.81*	*-0.61*	*-0.2*	*-0.13*	*-0.04*
Natural Log of 1990 Population	-0.009	-0.009	-0.008	-0.019	-0.018	-0.018
	-0.68	*-0.63*	*-0.56*	*-1.42*	*-1.39*	*-1.38*
Topography Score	-0.001	-0.001	-0.001	0.000	-0.001	0.000
	-0.46	*-0.55*	*-0.28*	*-0.24*	*-0.33*	*-0.19*
Change in Population, 1950 to 1960, (diff. from the mean)	-0.067	-0.068	-0.066	-0.060	-0.059	-0.061
	-1.2	*-1.23*	*-1.19*	*-1.06*	*-1.06*	*-1.07*
State Fixed Effects	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.241	0.243	0.241	0.241	0.234	0.232
Joint F-test for Proprietors & Proprietors * ARC		*7.30			*4.34	
Joint F-test for Proprietors & Proprietors * Distance to nearest Metro			*6.93			*3.76
Instruments Used for 2SLS:						
Share of Proprietors, 1969	√	√	√			
Labor Market (LM) Change in Share of Proprietors, 1969 to 1979				√	√	√
Share of Manufacturing Employment, 1960		√	√		√	√
First Stage F-test of Instruments	195.91	123.39	122.39	79.03	152.75	155.150
Hausman Test of OLS vs IV	1.05	1.32	0.13	1.05	1.03	0.750
Probability > Chi-Square Statistic	1.00	1.00	1.00	1.00	1.00	1.000

[1]All proprietor variables include non-farm proprietors only.

* Indicates significance at the 95% level

** Indicates significance at the 90% level

Hausman Test null hypothesis is that there is no statistical evidence that endongenity is biasing the coefficients.

Values in *italics* are the heteroskedasticity-adjusted t-statistics.

Table 4:
Parameter Values for Predicting County-Level Poverty Rate Change, 1989 to 2006

	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
Explanatory Variables						
Share of Proprietors, 1990[1]	0.119	0.069	0.023			
	0.52	*0.18*	*0.07*			
Labor Market (LM) Change in Share of Proprietors, 1980 to 1990				*0.408	0.212	0.326
				2.75	*0.68*	*1.26*
Proprietors * ARC		0.061			0.230	
		0.15			*0.72*	
Proprietors * Distance to nearest Metro			0.002			0.002
			0.35			*0.36*
ARC	*-0.041	-0.051	*-0.041	*-0.044	*-0.055	*-0.043
	-2.08	*-0.78*	*-2.09*	*-2.23*	*-2.27*	*-2.21*
Distance to nearest Metro (km)	0.000	0.000	0.000	0.000	0.000	0.000
	0.29	*0.29*	*-0.24*	*0.59*	*0.58*	*0.32*
Incremental distance to a metro > 250,000 pop.	0.000	0.000	0.000	0.000	0.000	0.000
	0.38	*0.39*	*0.40*	*0.69*	*0.69*	*0.69*
Incremental distance to a metro > 500,000 pop.	0.000	0.000	0.000	0.000	0.000	0.000
	0.99	*0.98*	*1.01*	*1.36*	*1.29*	*1.35*
Incremental distance to a metro > 1,500,000 pop.	0.000	0.000	0.000	0.000	0.000	**0.000
	1.51	*1.51*	*1.53*	*1.63*	*1.60*	*1.65*
Natural Amenity Score	0.006	0.006	0.007	0.004	0.003	0.004
	0.70	*0.69*	*0.74*	*0.44*	*0.39*	*0.46*
Share of College Graduates, 1990	*-0.365	*-0.364	*-0.366	*-0.402	*-0.386	*-0.399
	-2.36	*-2.35*	*-2.37*	*-2.58*	*-2.41*	*-2.54*
Share of High School Graduates, 1990	-0.173	-0.173	-0.163	-0.226	-0.229	-0.223
	-0.90	*-0.89*	*-0.84*	*-1.15*	*-1.17*	*-1.14*
Share of Farm Employment, 1990	0.045	0.044	0.043	0.019	0.015	0.017
	0.38	*0.37*	*0.36*	*0.16*	*0.13*	*0.14*
Share of Government Employment, 1990	0.244	0.241	0.238	**0.316	**0.306	**0.312
	1.50	*1.45*	*1.44*	*1.95*	*1.87*	*1.92*
Share of Manufacturing Employment, 1990	**0.186	**0.186	**0.184	*0.228	*0.228	*0.227
	1.82	*1.82*	*1.81*	*2.41*	*2.42*	*2.40*
Average Age, 1990	**0.009	**0.009	**0.009	*0.013	*0.013	*0.013
	1.76	*1.76*	*1.66*	*2.51*	*2.46*	*2.42*
Natural Log of 1990 Population	*0.046	*0.046	*0.046	*0.051	*0.051	*0.051
	2.87	*2.86*	*2.83*	*3.54*	*3.52*	*3.53*
Topography Score	0.000	0.000	0.000	0.000	0.000	0.000
	0.07	*0.08*	*0.01*	*0.02*	*0.07*	*0.00*
Change in Population, 1950 to 1960, (diff. from the mean)	*0.133	*0.133	*0.133	*0.120	*0.120	*0.120
	2.13	*2.13*	*2.13*	*1.97*	*1.97*	*1.97*
State Fixed Effects	Y	Y	Y	Y	Y	Y
Adjusted R^2	0.290	0.289	0.289	0.298	0.297	0.297
Joint F-test for Proprietors & Proprietors * ARC		0.19			*3.35	
Joint F-test for Proprietors & Proprietors * Distance to nearest Metro			0.23			*3.17
Instruments Used for 2SLS:						
Share of Proprietors, 1969	√	√	√			
Labor Market (LM) Change in Share of Proprietors, 1969 to 1979				√	√	√
Share of Manufacturing Employment, 1960		√	√		√	√
First Stage F-test of Instruments	195.91	123.39	122.39	79.03	152.75	155.15
Hausman Test of OLS vs IV	0.13	0.83	0.1	2.88	1.61	1.00
Probability > Chi-Square Statistic	1.00	1.00	1.00	1.00	1.00	1.00

[1]All proprietor variables include non-farm proprietors only.

* Indicates significance at the 95% level

** Indicates significance at the 90% level

Hausman Test null hypothesis is that there is no statistical evidence that endongenity is biasing the coefficients.

Values in *italics* are the heteroskedasticity-adjusted t-statistics.

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