# Agricultural and Rural Finance Markets in Transition

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# Rural Growth and the Rural Capital Account

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**Abstract:** This technical report contributes to NC 1014's efforts to understand and improve the contribution of rural financial markets for rural growth. We investigate the 'export-led growth' hypothesis about rural development, with particular emphasis on the implications of regional current account surpluses/capital account deficits, and deposits in commercial banks. We find that in just one case, subsequent rural deposits depend positively on prior rural export sector activity. But these deposits do not appear to support local investment: both subsequent rural employment and rural income growth are significantly negatively correlated with initial export intensity.

## Introduction

It is widely believed that "the basic sector, which trades outside its boundaries, produces dollar flows into the local economy, which provides impetus for consequent economic development." (Harris, Shonkwiler and Ebai, 1999; page 115). This statement summarizes the 'export base theory' idea that the key to rural development is to have large agricultural, mining, or manufacturing sectors that sell to urban or foreign markets. In that model of regional development there is no explicit role for a local service sector like banking.

An alternative tradition in regional science holds a contrasting opinion about regional development, in which capital flows are key:

"If a region's earnings from exports exceed its outlays for imports, on net there is an exodus of productive resources from the region (as embodied in goods and services traded). In this sense the region is loaning its resources to other areas, the region is a net investor, or exporter of capital. By the same token, if imports exceed exports, the region is receiving a net inflow of capital from outside. *It is patently absurd to argue that the way to make a region grow is to invest the regions savings somewhere else, and that an influx of investment from outside is inimical to growth.* If anything, it would seem more plausible to infer that a regions growth is enhanced if its capital stock is augmented by investment from outside which means that the regions *imports should exceed its exports*. **(Hoover and Giarratani**, 1984; emphasis in original; http://www.rri.wvu.edu/WebBook/Giarratani/chaptereleven.htm)

In this paper we will empirically investigate hypotheses about rural development, export sector activity like farming, and banking. We look at the dependence of current deposits in local banks on prior export sector activity. And we investigate at the relationship between initial rural export orientation at the county level and growth in total employment or income over the subsequent decade.

First, we briefly formalize alternative hypotheses about the contributions of export sector activity to growth. Next we formalize hypotheses about the banking sector's process of multiple deposit creation, to growth. We then describe the data and explain the econometric modeling approach. Finally, we present and interpret our findings, referring to other theories of rural income (the spatial factor distribution of income, the positive effects of competition on productivity, etc.) and rural economic activity (the Product Cycle; amenity-driven migration, etc.) as warranted.

## The Hypotheses

By 'rural growth' we mean increases in real income per capita by place of rural residence, or increases in factor employment, all else equal. One way to focus on the role of financial intermediation in rural growth is to consider what constrains rural productivity or labor force growth. With respect to labor force growth, research confirms that people migrate away from places that are unpleasant or that offer uncertain future employment opportunities (Clark and Hunter, 1992; Deller, et al., 2001). Productivity growth is constrained by, among other things, new investment. New investment is constrained by available funds, which can come from retained earnings, external financing, or donations/subsidies. In the simplest terms, when people obtain funds today to bring more land, labor, or equipment into production, their locality grows tomorrow. Thus in this paper we look at what supports increased investment in rural areas.

*Model 1: Exports cause Growth*

Where do funds for investment come from? The Mercantilists of the $16^{th}$ – $18^{th}$ centuries, an era before paper money/fiat currencies, believed that a country's assets were increased only by sustaining a positive balance of trade, paid for in gold bullion. To mercantilists trade was a zero-sum game where the winners accumulated gold (and the losers got the goods --go figure!). Economists since Adam Smith have

rejected the mercantilist model, basically because we realize that trade, in which goods are sold from where they are relatively abundant and cheap to where they are relatively rare and expensive, benefits both parties; and that the benefits are that all trading regions enjoy a wider mix and larger amount of goods with free trade than under autarky.

The "export-base theory" of rural growth is a neo-mercantilist notion (Shaffer, 2000). To derive the model, start with a canonical GDP (gross domestic product) identity equation:

1) $$Y \equiv C + I + G + X - M$$

Where Y is the gross product/income/ or expenditure of all agents in the region; C is private consumption, I is private investment, G is government spending, X is exports, and M is imports; all in value terms. A Keynesian version of this model embeds the behavioral assumptions that consumption and imports are increasing functions of income: $C = cY$ and $M = mY$, and that government spending equals current tax revenues: $G = tY$. Exports and investment are assumed to be exogenous. The 'reduced form' GDP identity equation is thus:

2) $$Y = [1/(1 - c - t + m)](X + I).$$

The derivatives of Y with respect to I and X are known as *investment* and *economic-base multipliers*:

3) $$\partial Y/\partial I = \partial Y/\partial X = 1/(1 - c - t + m) > 0 \qquad \forall\, c,m,t \;\ni\; t < 1 - c + m.$$

Note that according to this model, an *investment multiplier* is just as potent as an *export multiplier*. Furthermore, if we also formalize that there is an exogenous/subsistence/autonomous level of consumption A that occurs no matter what Y is, so that $C = A + cY$, the multipliers are:

4) $$\partial Y/\partial I = \partial Y/\partial X = \partial A/\partial X = 1/(1 - c - t + m) > 0 \qquad \forall\, c,m,t \;\ni\; t < 1 - c + m,$$

which suggests that increases in autonomous local consumption, investment, and exports should all have the same positive "effect" on gross product or income.

On the other hand, equation (4) also suggests that if all local production is for export, so that all local consumption is imports (C = M and thus $c = m$), the multiplier is 1; abstracting from the public sector: G, $t = 0$. The implication is that in rural counties where all the households either farm, mine, or work in factories, and from which everyone drives to the city for groceries and entertainment, one more dollar earned nets just one more dollar earned.

The export base multiplier model does not actually imply that having a large export sector is any better than having a large autonomous service sector or enjoying more investment from outside. Indeed, the model suggests that in the limit, the larger is the share of export activity in total local activity, and thus the more locals rely on imports for what they consume (or invest locally, for that matter), the lower is the multiplier.

In any case, a very unsatisfactory aspect of the 'export base' approach to modeling growth is that it is a static identity equation masquerading as a dynamic causal process. Furthermore, as Leven (2000) has shown, the *ceteris paribus* assumption about employment or income in non-export sectors is often untenable. An increase in the derived demand for employment in export sectors can simply draw resources away from other activities, with 'multipliers' of their own. It is possible for the multiplier to be less than 1or even negative (see also McVittie and Swales (1999), McGregor, et al (2000), or Goodman (2003)). In the empirical section of this paper, we will assert temporal priority in exports, and control for many other sources of change over time, to estimate the empirical validity of the claim that $\partial Y_t/\partial X_{t-j} > 0$.

*Model 2: Exports undermine Investment and Growth*

Many respectable development economists who believe that exports cause growth also assume that export earnings are the only private source of funds (the public source is government transfers/subsidy). Retained earnings are the single largest source of funds for new investment. It is reasonable to expect that rural businesses that export have larger sales than rural businesses that do not export. If more sales support more retained earnings, this explains a belief that investment depends positively on exporting.

On the other hand, with respect to external sources of funds such as loans from commercial banks, the more a region's exports exceed imports, the less loanable funds come into to the region. Then investment and exports are negatively related. This implication follows directly from both the GDP and the balance of payments identity equations:

5) $$I \equiv Y - C - G - X + M \;\rightarrow\; \partial I/\partial X < 0$$

Thus identity equation (5) implies that a region which exports more than it imports has <u>less</u> to invest.

And, because $\partial Y/\partial I > 0$ by both equations (3) and (4), we have that $\partial Y/\partial X = \partial Y/\partial I \bullet \partial I/\partial X < 0$; being a net exporting region undermines investment and thus does not support growth. Of course, this is also just a static identity equation masquerading as a dynamic causal model. Taking temporal priority into account, it gives us the mirror-image hypothesis that $\partial Y_t/\partial X_{t-j} < 0$.

Hoover's perspective can also be formalized starting from the balance-of-payments identity. To be a net exporting region requires lending local savings to one's trade partners ($S_x$, to indicate the export of savings) to finance their net trade deficits. By the same token, a region borrows from its trade partners ($S_M$) to finance importing more than it exports and/or to sell claims on its assets or future earnings in order to finance its own growth. Inflows and outflows of cash due to the sales of exports, purchases of imports, sales of local assets to outsiders, or 'purchases' of I.O.U.'s from outsiders, accounts for all nominal flows. Therefore the balance of payments identity is:

6) $$S_X - S_M \equiv X - M.$$

There is a net outflow of savings when the value of exports from a region exceeds the value of imports, and an inflow of loanable funds into net importing regions.

*Model 3: Employment 'multipliers'*

The 'export base' model can also be formalized in terms of employment. Start with an identity equation that categorizes total employment (T) in sectors that produce for export (E) or local consumption (L):

7) $$T \equiv E + L.$$

While the demand for export sector employees derives from demand from outside the region, local sector employment can be modeled as having an autonomous part (A) and a part that rises with total regional employment ($\beta$T). The autonomous or indigenous part (A) represents the number of persons who are needed locally to provide shelter, security, health care, education, and the like, regardless of the level of employment in export activity. In addition, the more people there are in a region, the more local sector employment, at a rate of $\beta$ ($0<\beta<1$). With $L = A + \beta T$, the 'reduced form' of the total employment identity equation is:

8) $$T = [1/(1-\beta)] \bullet (E + A);$$

and the *employment multiplier* is [1/(1- β)]. Note that β can be calculated as 1 - (E/T) – (A/T). In rural counties where the share of total employment in export sectors, E/T, is about 32%, assuming autonomous employment is low (say 10% of total), a plausible $\beta$ is about 0.4. This suggests that the total change in employment due to either a change "Δ" in exports or a change Δ in autonomous service sector employment is 2.5•Δ. Readers familiar with input-output or economic impact simulations of the effect an new plant opening, for example, will recognize this magnitude.

In a county where 90% of the labor force works in farming, mining, or manufacturing, and residents shop and recreate elsewhere, $\beta$ may be nil. In that case also, the 'multiplier effect' of an expansion in export sector employment would be unitary: one more job is just one more job.

*Model 4: Local Bank Money Multiplier*

The use of fiat currencies as media of exchange and for storing value dramatically altered the Mercantilists' world. Real wealth, and real gains from trade are now measured in terms of real things. Pieces of paper called *money* just help us move things from places and times where they are in surplus to places or times where are scarce. The financial system in a place plays a critical role by moving money from savers who have more than they want to spend to investors who can put that money to use to expand local productive capacity. Commercial banks play a critical role in the money supply process.

Three types of players determine the supply of money in a place. First is a central bank, which stands ready to buy (or sell) government securities in exchange for fiat currency to increase (or decrease) the amount of cash circulating in the system. The second key players are commercial banks, which buy (or sell) those government securities to earn a return that is shared with depositor/savers. The third are private citizens in businesses or households who deposit cash with and obtain loans from banks.

Because the cash in a bank provides for loans, and because the balance of loans are held as deposits in the lending bank, which can then lend more and accept more deposits, and so on, the commercial banking system *multiplies* money. The magnitude of the *money multiplier* (*m*) is easily calculated given the definitions of the money supply (M1) and the monetary base (MB):

$$M1 \equiv m \bullet MB$$
$$M1 \equiv C + D$$
$$MB \equiv C + R \equiv C + r_D \bullet D + ER$$

*9)* $$m \equiv (C+D)/(C + r_D \bullet D + ER)$$

where C denotes currency in circulation, D denotes deposits in banks, R denotes the required reserves held by banks ("fed funds") at the rate $r_D$, and ER are excess reserves (that is, deposits that are neither required reserves nor lent out). In the United States today, the *money multiplier* is between 2 and 3 (Mishkin, 2007). An increase of Δ in deposits in a place can raise local liquidity by about 2.5•Δ.

The process of money multiplication is a local event because banking market areas are local. Bank market areas are local in order to contain the asymmetric information problems faced by banks and savers. The asymmetric information problem known as adverse selection is the possibility that potential borrowers who are willing to pay high interest rates may also be the most likely to default (Stiglitz and Weiss, 1981). The asymmetric information problem known as moral hazard is the problem that once a borrower has a loan, the borrower may not use it for the stated purposes, and may default.

To reduce the problems of asymmetric information, banks operate out of brick-and-mortar offices that are almost as ubiquitous as bars and cafés. Indeed, banks are found in the lowest-order places of the central place hierarchy described earlier. The crucial importance of face-to-face interaction with respect to banks is further attested to by the fact that the number of brick-and-mortar banks has continued to rise despite the emergence of e-finance, on-line credit scoring, and many other innovations that facilitate financial transactions between distant parties (Kilkenny and Jolly 2005).

It has been said that if a rural town loses its bank, it will disappear soon. Empirical research has shown that banking sector expansion leads local growth, and vice-versa (Barkley and Helander 1985; Collender and Shaffer 2003). A properly functioning local commercial banking institution appears to be critical for the vitality of a rural community.

In sum, we have briefly reviewed three models often used to explain rural growth, plus one other. The first three models are derived from contemporaneous GDP, BOP, or labor force/employment identity equations. The derivative of total income or employment with respect to exporting is interpreted as an *export base multiplier*. Using real-world magnitudes characteristic of rural USA, this derivative may be just 1, or even negative, but it is often calculated to be about 2.5. The fourth 'model' derives from the hypothesis that the supply of money is a local phenomenon. Because banks lend deposits to local borrowers, who deposit some of the loan with their local bank, who can then lend it out again, and so on, a place can finance its own growth without relying on an "external" money supply. The *money multiplier* in the USA also happens to be about 2.5.

**The Data**

*Stylized Facts*

Nationwide, less than 11 percent of the U.S. gross domestic product is earned in export sectors and 15 percent of U.S. domestic expenditure is on imports (Bureau of Economic Analysis, National Income and Product Accounts). The U.S. capital account surplus averages about 4 percent of GDP.

In rural America, 38 percent of earned income is earned in sectors likely producing goods or services sold elsewhere, Figure 1; but only 30 percent of household expenditures is on things that probably are 'imported' from another county or country; Figure 2 (Bureau of Labor Statistics and Bureau of Economic Analysis data, analyzed by the authors). This is intuitively reasonable: the smaller a place is, the narrower its resource base, the more it can gain from specialization and trade.

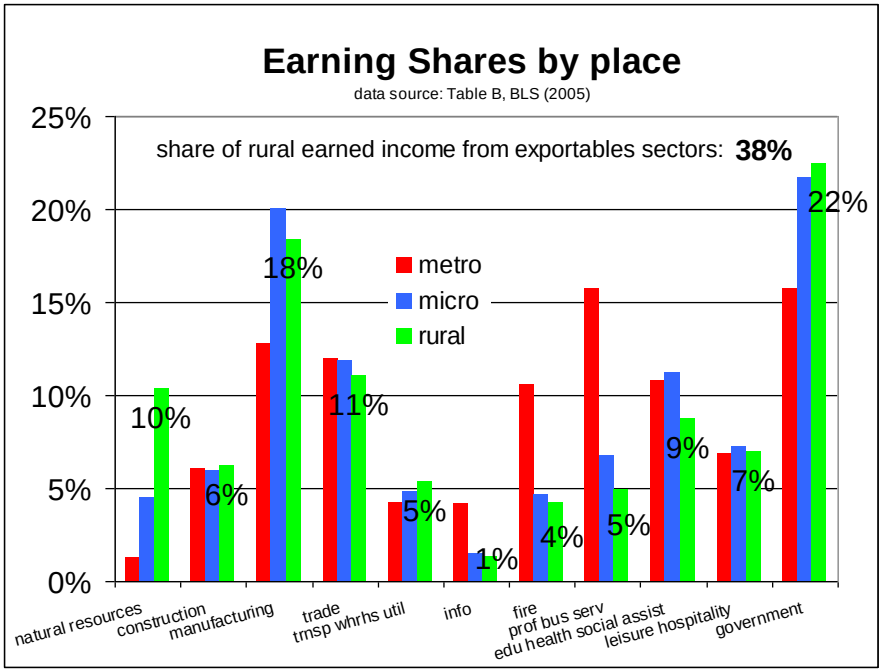


Figure 1. Share of Earned Income in Export Sectors by Type of place.
*Source*: *BLS 2005, table B; analysis by the authors.*

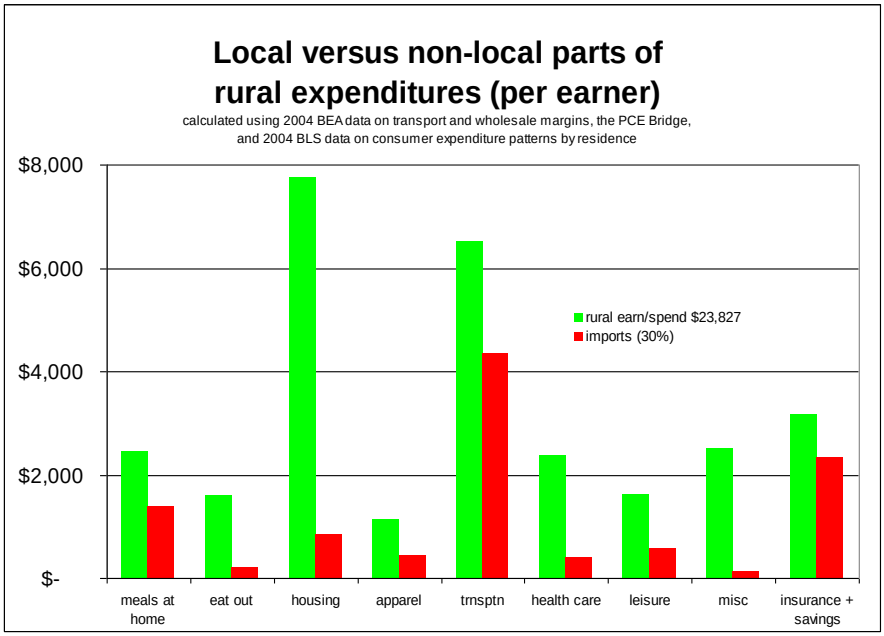


Figure 2. Share Local versus Non-local Rural Expenditures, per Earner, 2004
*Source: calculated by authors using2004 BLS data on consumer expenditure patterns by residence (US BLS, 2005), 2004 BEA data on transport and wholesale margins, and the PCE Bridge (US BEA).*

As we show in Figure 2, in 2004-5, average rural county expenditure per worker was $23,827 according to BEA and BLS data. Our calculations indicate that about thirty percent of that was spent on goods and services that are likely to be imported into rural counties. These are expenditures on manufactures (including food), higher education, most entertainment, etc. We estimate that import spending per rural worker was thus about $7,264/year.

On the earnings side (Figure 1), using BEA data we calculated that an average of $9,133 was earned per rural worker in export industries such as farming, mining, and manufacturing. Rural America appears to be a net exporting region. The aggregate rural data on households and workers suggests that on average, rural America has a current account surplus/capital account deficit. If so, capital is flowing out of rural areas. No wonder rural labor, especially in the farm belt, is also out-migrating (Figures 3 and 4).

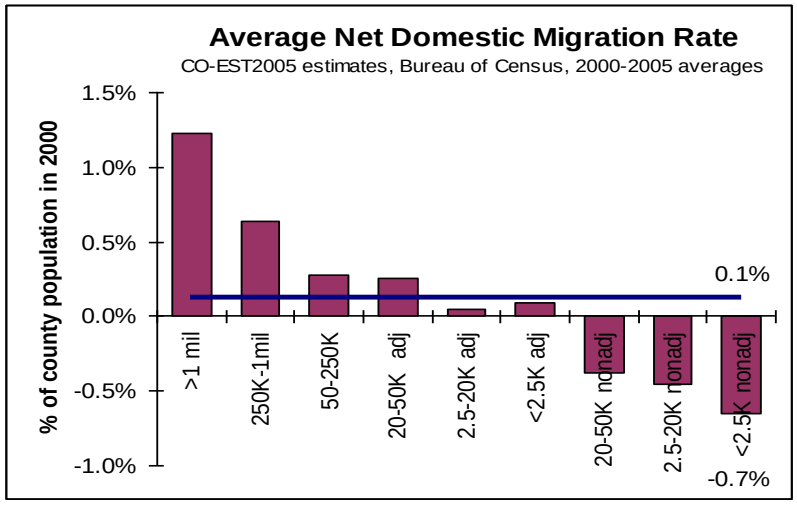


**Figure 3. Net Domestic Migration rates by County Type**
Note: the horizontal line at 0.1% indicates the nationwide average net in-migration rate.
*Source: CO-EST2000-1-2-3-4-5 population estimates, U.S. Bureau of the Census; analysis by the authors.*

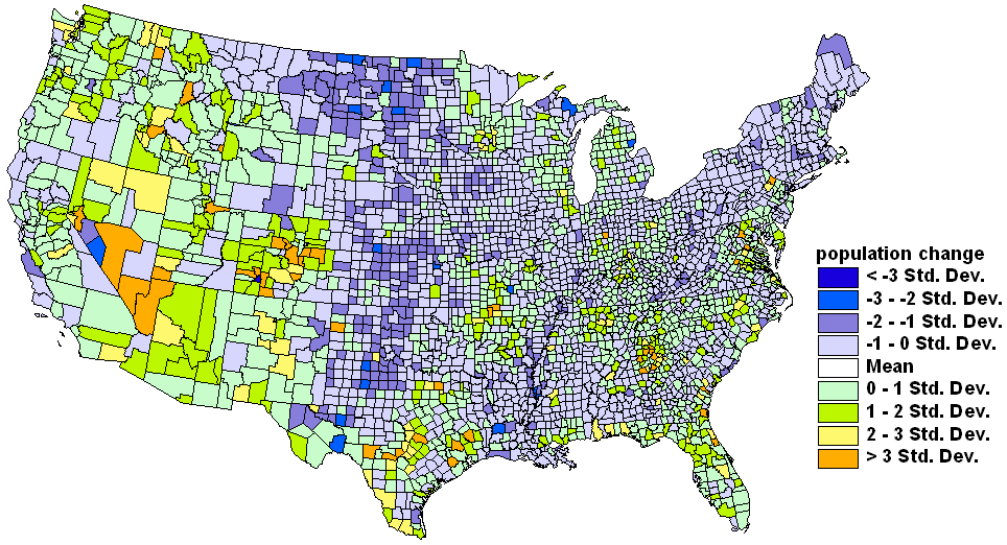


**Figure 4.** Population Change Across U.S. Counties, 2000-1990
*Data Source: U.S. Bureau of the Census; mapped by the authors.*
The historical data shows that the non-farm rural population has remained stable (around 22%) over the past centuries despite dramatic changes in the share of the rural population that farmed. It also shows that "β" is not a constant, but has ranged from a low of 0.23 in 1820 when farmers were 72% of the population (77% of the rural population), to a high of 0.92, now that farmers are less than 2% of the total population. Therefore the farm sector "multiplier" was rising, from 1.3 to 12.5. But the dramatic shrinkage in the number of farmers did not lead *multiplied* reductions in the non-farm rural population.

That's the good news. The rural non-farm share of the US population has not declined with the share that has farmed. By the same token, if history repeats itself, export sectors like farming should not be expected to lead growth either. Indeed, they have not (Goetz and Debertin, 1995;Drabenstott, 2005.)

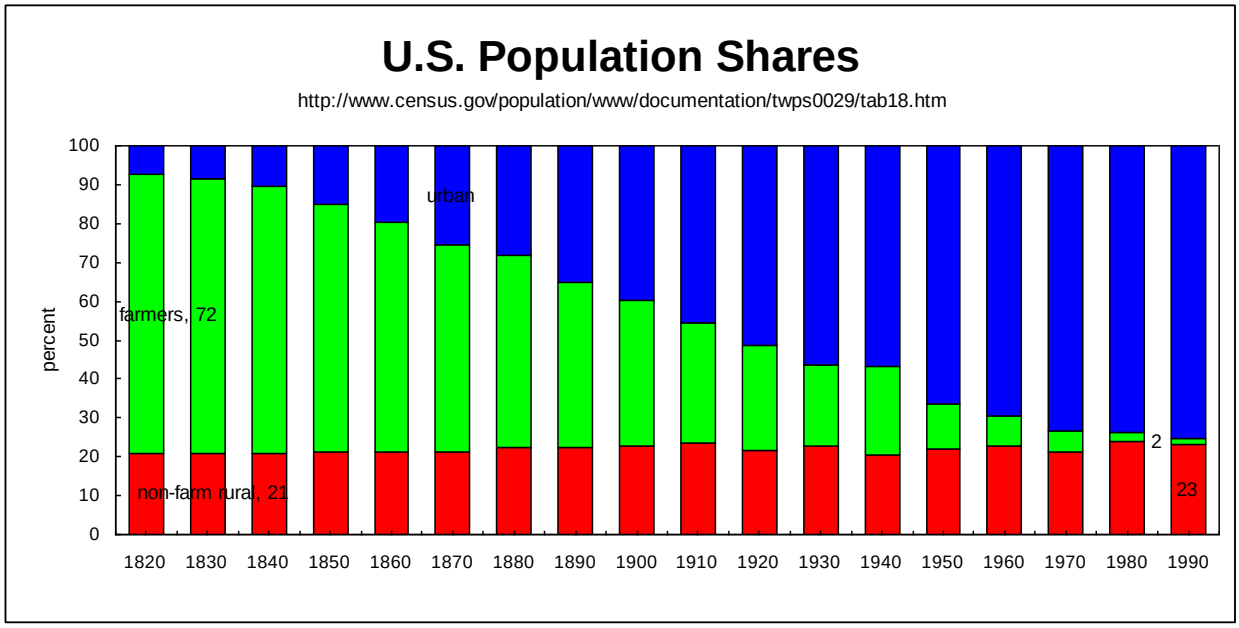


**Figure 5.** Urban, Farm, and Rural Non-farm Shares of the U.S. Population, 1820–1990
*Source: http://www.census.gov/population/www/documentation/twps0029/tab18.htm, analyzed by the authors.*

*Estimated models*

Any activity that brings previously unemployed resources into a locality or into production will increase the GDP of that locality (if the resources are locally-owned). The question is, which allocation of resources supports more local savings lent locally or increases the funds for investment and growth? Should export industries be favored, or can businesses that serve local demand grow a rural economy?

To empirically investigate the dependence of rural growth on export activity or the rural capital account, we collected a county-level data base for the years 1985, 1990, 1995, and 2000 measuring per capita income, employment (total and by sector), and population. For each county, we also collected the level of deposits in banks in 1994, and 1990 data on the distance of the county to the nearest metro area, climate, typography, and the amenity score of the county, plus the shares of county population by age category and by level of education. See Table 1 (Appendix) for the summary statistics.

We measure the export orientation in a county by the share of total employment in each of the three 'export' sectors of farming, mining, and manufacturing. This is known as the "assignment method." It is one of many plausible ways to deduce export-orientation. It is the easiest to use, and has been shown to perform as well as some of the more data-intensive and complicated measures in some counties (Harris, Shonkwiler, and Ebai, 1999).

To investigate if a place has more money in the bank if it exports more, we regressed deposits per capita in 1994 on the shares of employment in export sectors, controlling for county characteristics, demographics, human capital, and state dummies to control for statewide fixed effects. The t-statistics are adjusted for potential spatial error correlation within MSAs by using the STATA 'cluster' command. The results for the core rural counties in the U.S. are shown in Table 2.

Table 2. Deposits per Capita in 1994

| | Coef. | SD | P>\|t\| | signif[a] |
|---|---|---|---|---|
| chexpor~8590 | 1.625 | 2.999 | 0.589 | |
| rfarmsh90 | -0.324 | 2.325 | 0.889 | |
| **rminsh90** | 6.106 | 2.551 | 0.018 | ** |
| rmansh90 | 0.549 | 1.414 | 0.698 | |
| nmetrop90 | 0.000 | 0.000 | 0.810 | |
| nearmsakm | 0.015 | 0.003 | 0.000 | *** |
| incmetgt250k | 0.005 | 0.002 | 0.004 | *** |
| incmetgt500k | -0.002 | 0.002 | 0.305 | |
| incmet~1500k | 0.002 | 0.002 | 0.179 | |
| lnpop90 | 0.965 | 0.297 | 0.001 | *** |
| jantemp | -0.042 | 0.049 | 0.387 | |
| amenrank | -0.484 | 0.278 | 0.084 | * |
| typography | -0.041 | 0.039 | 0.301 | |
| pcthsgr90 | 0.169 | 0.033 | 0.000 | *** |
| pctsmcol90 | 0.031 | 0.057 | 0.588 | |
| pctasso90 | 0.224 | 0.095 | 0.019 | ** |
| pctcolgr90 | 0.404 | 0.066 | 0.000 | *** |
| pctageu690 | 0.096 | 0.164 | 0.560 | |
| pctage71790 | -0.214 | 0.091 | 0.020 | ** |
| pctage65o90 | 0.434 | 0.064 | 0.000 | *** |
| pctage555990 | -0.384 | 0.253 | 0.130 | |
| pctage606490 | -0.110 | 0.201 | 0.584 | |
| all other controls omitted for ease of exposition | | | | |
| [a] t-statistics adjusted for spatial error correlation *** for $\alpha \leq 0.01$, ** $\alpha \leq 0.05$, * for $\alpha \leq 0.10$ | | | | |
| number of observations | 1294 | | | |
| $R^2$ | 0.50 | | | |
| Prob > F | 0.000 | | | |

For only the core rural counties specializing in mining, the evidence is consistent with the first part of the claim that "the basic sector, which trades outside its boundaries, produces dollar flows into the local economy, …" (Harris, Shonkwiler and Ebai, 1999; page 115). But there is no statistically significant evidence that farming or manufacturing sector activity *per se* supports higher levels of subsequent rural liquidity. The good news is that there is no statistically significant evidence that export sector activity leads to outflows of loanable funds (as measured by lagged deposits per capita) either.

Next we estimated the dependence of total employment growth between 1990 and 2000 on initial export orientation as measured by the shares of employment in farming, mining, or manufacturing; controlling for county characteristics. Table 3 shows the unhappy results. The larger is the share of export sectors in a rural county's total employment, the less total employment grew over the subsequent decade. This finding is surprisingly robust, and has been identified by many other analysts. There is a statistically significant negative relationship between rural growth and the relative size of the rural farm, mining, or manufacturing sectors. (In contrast, metro counties with large farm employment shares grew faster.)

Table 3. Growth in Total Employment, 1990-2000

| | Coef. | SD | P>\|t\| | signif[a] |
|---|---|---|---|---|
| rfarmsh90 | -33.026 | 9.716 | 0.001 | *** |

| | | | | |
|---|---|---|---|---|
| rminsh90 | -121.942 | 11.103 | 0.000 | *** |
| rmansh90 | -31.405 | 7.344 | 0.000 | *** |
| nearmsakm | -0.053 | 0.013 | 0.000 | *** |
| incmetgt250k | -0.021 | 0.009 | 0.015 | ** |
| incmetgt500k | -0.020 | 0.010 | 0.042 | ** |
| incmet~1500k | -0.011 | 0.007 | 0.120 | |
| nmetrop90 | 0.000 | 0.000 | 0.897 | |
| lnpop90 | 0.639 | 1.125 | 0.571 | |
| jantemp | -0.147 | 0.165 | 0.374 | |
| amenrank | 2.263 | 0.921 | 0.015 | ** |
| typography | 0.475 | 0.117 | 0.000 | *** |
| all other controls omitted for ease of exposition | | | | |
| [a] t-statistics adjusted for spatial error correlation, *** for $\alpha \leq 0.01$, ** $\alpha \leq 0.05$, * for $\alpha \leq 0.10$ | | | | |
| number of observations | 1294 | | | |
| $R^2$ | 0.33 | | | |
| Prob > F | 0.000 | | | |

*Alternative Hypothesis: The Product Cycle Model*

The 'product cycle' hypothesis is the most likely explanation of the estimates in Table 3. This theory argues that where a product is produced is a function of what stage the product is in its life cycle. Growth rates are high in the beginning, falling as an industry reaches maturity, then negative.

The Product Cycle model is based on the theory of Comparative Advantage. The concept was first coined by spatial economist Hoover (1948); elaborated by Vernon (1966), and applied to gain insights about industrial policy by Norton (1986). It has recently been reformalized in spatial general equilibrium by Puga & Duranton (2001).

Fundamental to the Product Cycle model is the definition of a *product* as a thing with unique or distinguishing characteristics (e.g. a Tommy Hilfinger Sweater; a Napa Valley Cabernet Sauvingnon), as opposed to *commodities* that share common characteristics (e.g., rubber boots, Number 1 Yellow Corn). Define the *cycle* of a product like a "life cycle" or the stages a product goes through over time: conception, birth, maturation, senescence and death.

The location of production will, as predicted by *comparative advantage*, occur where the factor used intensively is relatively abundant (Kim, 1999). Thus, we expect products to be *conceived* in first-world cities where there are relative abundances of creative and highly-skilled labor as well as loanable funds (venture capital.) Cities are also the places where products are born, because of the same relative factor abundances. If the product survives in the domestic market, its industrial production is initiated in U.S. suburbs, where there is a relative abundance of engineers, and the factory is not too far from the market (U.S. cities) to keep communication and transport costs low. Through these stages, the price premium that may be commanded by the innovators is falling, as competitor products start to appear in the domestic market. Export demand, especially from less developed economies (LDCs) with incomes too low to be effectively demanding 'new-new' things, is effectively nil.

But when growth in export demand warrants expanding production, the industrial activity relocates from suburban or non-metro USA to rural USA, which is relatively abundant in unskilled labor and factory floor space. By the standardized/mass production stage in the product cycle, the returns to factors of production have been bid down to their opportunity costs.

Finally (sooner or later), the product becomes redundant in the U.S. market. Demand for it may still be rising in foreign markets. That provides the push and pull incentives for the firm to shut down US production and open production in the LDCs where demand for the item is growing. The incentives are to avoid the costs of transport to markets and to capitalize on the relative abundance of low skilled labor.

The Product Cycle model therefore provides a hypothesis that rural places with higher proportions of employment in export sectors are places on the verge of decline. Our finding that places with larger shares of employment in manufacturing declined subsequently are consistent with the Product Cycle model.

Further evidence consistent with the Product Cycle model is the significantly positive 47% partial correlation between the percentage of the local population that has graduated from college, and the magnitude of the local share of employment in growing industries. When we estimated the dependence of total employment growth between 1990 and 2000 on initial export orientation and county characteristics, controlling for rural human capital and population demographics, we find little evidence of missing (human capital) variable bias. Table 4 shows that model.

Table 4. Growth in Total Employment, 1990-2000, controlling for human capital

| | Coef. | SD | P>\|t\| | signif[a] |
|---|---|---|---|---|
| rfarmsh90 | -20.521 | 9.330 | 0.029 | ** |
| rminsh90 | -122.337 | 10.435 | 0.000 | *** |
| rmansh90 | -27.657 | 7.055 | 0.000 | *** |
| nearmsakm \| | 0.061 | 0.121 | 0.000 | *** |
| incmetgt250k | -0.024 | 0.009 | 0.011 | ** |
| incmetgt500k | -0.022 | 0.010 | 0.021 | ** |
| incmet~1500k | -0.013 | 0.007 | 0.067 | * |
| nmetrop90 | 0.000 | 0.000 | 0.809 | |
| lnpop90 | 0.581 | 1.012 | 0.566 | |
| jantemp | -0.035 | 0.168 | 0.833 | |
| amenrank | 1.038 | 0.884 | 0.242 | |
| typography | 0.493 | 0.112 | 0.000 | *** |
| pcthsgr90 | -0.075 | 0.115 | 0.514 | |
| pctsmcol90 | 0.533 | 0.209 | 0.012 | ** |
| pctasso90 | 0.174 | 0.303 | 0.567 | |
| pctcolgr90 | 0.249 | 0.181 | 0.169 | |
| pctage71790 | -0.466 | 0.336 | 0.168 | |
| pctage65o90 | -1.182 | 0.276 | 0.000 | *** |
| pctage555990 | 0.956 | 0.698 | 0.173 | |
| pctage606490 | 2.518 | 0.753 | 0.001 | *** |
| all other controls omitted for ease of exposition | | | | |
| [a] t-statistics adjusted for spatial error correlation, *** for $\alpha \leq 0.01$, ** $\alpha \leq 0.05$, * for $\alpha \leq 0.10$ | | | | |
| number of observations | 1294 | | | |
| $R^2$ | 0.37 | | | |
| Prob > F | 0.000 | | | |

Even though the employment in export sectors may decline as export industries mature, and thus overall employment growth may also decline, export employment may still support non-basic employment growth. Table 5 shows that this does not happen either. The larger are the shares of a county's employment in farming, mining, or manufacturing, the lower is the rate of growth in employment in non-export sectors.

Table 5. Growth in rural non-basic employment, 1990-2000

| | Coef. | SD | P>\|t\| | signif[a] |
|---|---|---|---|---|
| rfarmsh90 | -20.664 | 10.844 | 0.058 | * |
| rminsh90 | -120.956 | 12.757 | 0.000 | *** |
| rmansh90 | -18.664 | 8.852 | 0.037 | ** |
| chexpor~9000 | -165.195 | 17.528 | 0.000 | *** |
| nearmsakm | -0.054 | 0.013 | 0.000 | *** |
| incmetgt250k | -0.021 | 0.009 | 0.020 | ** |
| incmetgt500k | -0.020 | 0.012 | 0.083 | * |
| incmet~1500k | -0.013 | 0.008 | 0.086 | * |
| nmetrop90 | 0.000 | 0.000 | 0.845 | |
| lnpop90 | 0.678 | 1.211 | 0.576 | |
| jantemp | -0.168 | 0.186 | 0.368 | |
| amenrank | 2.371 | 0.992 | 0.018 | ** |
| typography | 0.552 | 0.131 | 0.000 | *** |

all other controls omitted for ease of exposition

[a] t-statistics adjusted for spatial error correlation, *** for $\alpha \leq 0.01$, ** $\alpha \leq 0.05$, * for $\alpha \leq 0.10$

| | |
|---|---|
| number of observations | 1294 |
| $R^2$ | 0.37 |
| Prob > F | 0.000 |

*Exporting and Rural Income*

As we said in the beginning, rural development means growth in either employment or income. It is also possible that although employment may not grow much in places that specialize in export activities, income may be higher. Indeed, because of the competitive pressure, productivity is expected to be higher in export sectors than in sectors insulated from competition by high costs of transport (Syverson, 2004). Higher productivity should be rewarded in the market by higher factor returns. We now look for evidence of the claim that export sector activity supports higher rural household income.

Table 6 shows an estimated model of the change in the log of rural per capita income, from 1990 to 2000, as explained by initial export orientation and county characteristics, controlling for rural human capital and population demographics. All the export sector employment share coefficients are negative, and significant for both farming and mining. The manufacturing share is insignificant. Again, the Product Cycle model provides a plausible explanation. The returns to rural factors of production are at their opportunity cost. Even if rural labor in export sectors is highly productive, rural households do not appear to be capturing a return above their opportunity cost in the labor market.

Table 6. Growth in *ln*(Income/cap), 1990-2000, controlling for human capital

| | Coef. | SD | P>\|t\| | signif[a] |
|---|---|---|---|---|
| rfarmsh90 | -0.1655 | 0.0869 | 0.059 | * |
| rminsh90 | -0.2044 | 0.0970 | 0.037 | ** |
| rmansh90 | -0.0430 | 0.0419 | 0.306 | |
| nearmsakm | -0.0002 | 0.0001 | 0.164 | |
| incmetgt250k | -0.0001 | 0.0001 | 0.483 | |
| incmetgt500k | -0.0001 | 0.0001 | 0.270 | |
| incmet~1500k | 0.0000 | 0.0000 | 0.696 | |
| nmetrop90 | 0.0000 | 0.0000 | 0.793 | |
| lnpop90 | 0.0207 | 0.0070 | 0.004 | *** |
| jantemp | -0.0013 | 0.0011 | 0.251 | |
| amenrank | 0.0062 | 0.0058 | 0.291 | |
| typography | 0.0012 | 0.0007 | 0.124 | |
| pcthsgr90 | -0.0020 | 0.0010 | 0.049 | ** |
| pctsmcol90 | -0.0036 | 0.0016 | 0.024 | ** |
| pctasso90 | -0.0064 | 0.0024 | 0.009 | *** |
| pctcolgr90 | -0.0004 | 0.0016 | 0.814 | |
| pctageu690 | -0.0042 | 0.0036 | 0.242 | |
| pctage71790 | -0.0037 | 0.0025 | 0.151 | |
| pctage65o90 | -0.0025 | 0.0018 | 0.162 | |
| pctage555990 | -0.0014 | 0.0061 | 0.812 | |
| pctage606490 | 0.0013 | 0.0043 | 0.757 | |

all other controls omitted for ease of exposition

[a] t-statistics adjusted for spatial error correlation, *** for $\alpha \leq 0.01$, ** $\alpha \leq 0.05$, * for $\alpha \leq 0.10$

| | |
|---|---|
| number of observations | 1294 |
| $R^2$ | 0.37 |
| Prob > F | 0.000 |

*Comparisons and alternatives*

The 'assignment method' is not the best way to classify activity as for export or local consumption. And we do not like to interpret expressions derived from static identity equations as if they formalized dynamic causal relationships. Just because one uses time series or panel data over time does not mean that one is estimating a model of dynamic causality.

For example, Harris, Shonkwiler and Ebai (1999) estimated the parameters of the co-integrating vector relating nonbasic employment, L, per period to basic employment, E, per period. That time series econometric procedure provides estimates of a coefficient which is 1/(1-β)-1. The coefficient in their co-integration equation, if stable over time, measures the ratio between the two variables, nonbasic:basic employment. They found that it was stable over the years 1970 through 1989. They called it the 'long run multiplier.' It implied a "base multiplier" of 1.5 to 2.5.

Then they estimated the dependence of month-over-month changes in nonbasic employment on lagged changes in basic (export) and nonbasic employment for five rural Nevada counties over 19 years. Their findings coincide with ours. Export sector employment growth did not lead local employment growth in any of the five counties. Indeed, the estimated dependence was statistically significantly negative in three counties (and insignificantly negative in the other two). Nonbasic sector employment growth was

found to lead subsequent growth in two of the five counties, but also it was found to be negative in three counties.

Finally, they conducted Granger causality tests of the dependence of a subsequent change in nonbasic sector employment on past changes in basic and non-basic sector employment. They reported only the F-tests of the null that all estimated coefficients are zero. The null was rejected for four of the five counties, indicating that the model based on changes in past non-basic and basic sector employment provides a better predictor of subsequent non-basic sector employment change than a random walk. (The F-test of the models of export sector employment indicated that export employment is exogenous and not predictable from past employment changes.) It is not obvious from the estimates presented why they concluded that increased basic employment Granger-causes increased nonbasic employment. They did not present the estimated coefficients. Their data may also have shown that positive changes in basic employment cause subsequent negative changes in non-basic employment, and/or that non-basic employment caused itself (displayed hysteresis or inversion).

James Davis and J. Vernon Henderson (2003) have also identified the positive contribution of non-basic activity, such as investments in inter-regional infrastructure or fiscal decentralization, to urban deconcentration (rural development). Analysts controlling for proximity in France have also found that urban nonbasic growth 'spreads' to rural communities (Schmitt, Henry, Piguet, and Hilal, 2006).

*Conclusions*

In sum, we have found no evidence that export-oriented rural counties grow faster than others. Indeed, the evidence suggests that the larger is rural employment in "basic" industries, the lower is the rate of growth, or the faster is the rate of rural decline. Rural counties with larger shares of employment in "nonbasic" service sectors have been growing (see also Barkely, 1995).

We have argued that the key to being able to grow without earning funds by selling outside is the local money multiplier process provided by rural banks. The *multipliers* have the same magnitudes! We investigated the (in)dependence of a place's money supply, proxied by deposits, on export activity. And we did find that there were more subsequent deposits per capita in rural counties that specialized in mining in 1990. But we found no evidence that mining counties grew faster. Indeed, like rural farm and manufacturing counties, rural mining counties also declined between 1990-2000.

That finding does not necessarily contradict our hypothesis that local liquidity, as proxied by deposits in banks, is key. As equation (9) makes clear, all deposits are not necessarily multiplied. In particular, required and excess reserves are not multiplied. The higher are excess reserves, the lower is the *money multiplier*. Banks in mining counties are likely to hold excess reserves. Why? We suggest that investment is low in mining counties because of the high risk. Mining county employment and population can vary 1000% from year to year. One would have to have a very high willingness to accept risk, or very deep pockets, to rationalize making an investment in such a locale.

We also found no evidence that income per capita is higher or grows faster in export-oriented rural counties. *Au contraire*, the evidence is that the larger is export sector employment, the lower is the rate of growth in per capita income. Rural counties where more employment is in service sectors have higher rates of per capita income growth. As Hoover (op.cit.) wrote, "countries *can* get rich taking in their own washing."

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Table 1. The data

| label | variable; data source | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| tempgr9000 | Percentage change in total employment over 1990-2000; Census | 16.52 | 17.21 | -35.80 | 129.97 |
| chlnper~9000 | ln (Y/cap)2000 – ln(Y/cap)1990 | 0.39 | 0.12 | -0.51 | 0.82 |
| dep94percap | 1994 county deposits/county popltn; FDIC | 11.29 | 4.96 | 0 | 61.17 |
| rfarmsh90 | 1990 Percent employed in agriculture; Census | 0.16 | 0.10 | 0 | 0.59 |
| rminsh90 | 1990 Percent employed in mining; Census | 0.03 | 0.05 | 0 | 0.43 |
| rmansh90 | 1990 Percent employed in manufctg; Census | 0.13 | 0.11 | 0 | 0.54 |
| nonbasicsh90 | 1990 Percent not in farm, min, or mnf | 67.97 | 10.06 | 36.01 | 97.93 |
| nonbas~r9000 | percentage change in nonbasic employment 2000-1990 | 25.17 | 19.93 | -41.54 | 163.15 |
| indmixgr9000 | 'shift/share": the national rate of employment growth 2000-1990 (shift) times the county industry employment shares in each one-digit sector, summed across all sectors. | 0.15 | 0.03 | 0.02 | 0.28 |
| nearmsakm | Distance (in km) between centroid of a rural county and population weighted centroid of the nearest urban center | 103.48 | 61.49 | 24.37 | 408.19 |
| incmetgt250k | Incremental distance to the nearest/actual metropolitan area in kms | 76.22 | 115.34 | 0 | 621.43 |
| incmetgt500k | Incremental distance to the nearest/actual metro area with at least 250,000 pop, 1990 | 45.44 | 69.04 | 0 | 398.59 |
| incmet~1500k | Incremental distance to the nearest/actual metro area with at least 500,000 pop, 1990 | 83.43 | 106.03 | 0 | 557.70 |
| nmetrop90 | Incremental distance to the nearest/actual metro area with at least 1,500,000 pop, 1990 | 141275 | 101039 | 40443 | 1481102 |
| lnpop90 | ln (1990 population) | 9.25 | 0.78 | 6.15 | 11.37 |
| jantemp | Mean January temperature (degree F) | 30.85 | 12.37 | 1.10 | 62.70 |
| amenrank | Natural amenity rank; 1 to 7 (7 = best); | 3.42 | 0.98 | 1 | 7 |
| typography | Typography score 1 to 24, where 24 is the most mountainous terrain; ERS/USDA | 9.20 | 6.62 | 1 | 21 |
| pcthsgr90 | Percent of 1990 population 25 years and over that are high school graduates; Census | 35.26 | 5.83 | 13.54 | 52.56 |
| pctsmcol90 | Percent of 1990 population 25 years and over that have some college; Census | 15.28 | 4.31 | 5.24 | 31.54 |
| pctasso90 | Percent of 1990 population 25 years and over that have an associate degree; Census | 5.01 | 2.26 | 0.61 | 14.06 |
| pctcolgr90 | Percent of 1990 population 25 years and over that are 4-year college graduates; | 10.97 | 4.11 | 3.69 | 49.84 |
| pctageu690 | Percent of 1990 population under 6 years | 9.89 | 1.56 | 5.39 | 22.66 |
| pctage71790 | Percent of 1990 population 7-17 years | 17.23 | 2.33 | 9.37 | 33.98 |
| pctage65o90 | Percent of 1990 population 18-24 years | 17.22 | 4.16 | 4.33 | 33.96 |
| pctage555990 | Percent of 1990 population 55-59 years | 4.83 | 0.75 | 2.04 | 8.10 |
| pctage606490 | Percent of 1990 population 60-64 years | 5.11 | 0.96 | 1.69 | 9.97 |