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The Competitiveness of Rural County Manufacturing During a Period of Dollar Appreciation

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Dan M. Bechter
Federal Reserve Bank of Richmond

Christine Chmura
Federal Reserve Bank of Richmond

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THE COMPETITIVENESS OF RURAL COUNTY MANUFACTURING DURING A PERIOD OF DOLLAR APPRECIATION

Dan M. Bechter
and
Christine Chmura

Federal Reserve Bank of Richmond

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Some observers contend that manufacturing activity in rural areas has been more adversely affected than in urban areas by foreign competition. For example, in 1988 Steven A. Waldhorn testified that

> A...growing rural-urban split seems to be taking place. The source of this divergence is twofold. First, rural areas tend to be at a competitive disadvantage because of their industry mix and structure. They also tend to be dependent on just a few industries; these industries also happen to be the ones most affected by increasing foreign competition. Lower-cost foreign locations are attracting some basic U.S. manufacturing operations...at the expense of rural economies.[1]

Others have made specific reference to the concentrations of such manufacturing in the Southeast:

> Rural manufacturing has been especially subject to foreign competition in recent years...For example, the textile industry in...the rural Southeast has seen a rise in textile imports from Pacific Basin countries that has replaced a significant share of domestic production.[2]

Moreover, the press has supported the notion that rural areas have been especially hard hit by overseas competition:

> The story that unfolded last week in this rural Virginia community of 10,000 was depressingly familiar: An aging textile mill, hit hard by foreign competition and

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[1]"New Perspectives on Rural Development," Hearings To Identify Prospects for Economic Development in Rural America, before The Subcommittee on Rural Economy and Family Farming of the Committee on Small Business, United States Senate (Washington, D.C.: Government Printing Office, 1988), pp. 58, 62-63.

[2]Mark Henry, Mark Drabenstott, and Lynn Gibson, "A Changing Rural Economy," in Mark Drabenstott and Lynn Gibson (Eds.) Rural America in Transition, The Federal Reserve Bank of Kansas City, 1988.

> environmental problems, closed its doors, throwing hundreds out of work and plunging the town into turmoil.[3]

It is true, of course, that the economies of some rural areas have been devastated by closings of key manufacturing plants. Even if plant closings were distributed randomly among rural and urban areas, however, some rural areas (as well as some urban areas) would suffer greatly because of their "company town" character. But commentators on hardships in rural manufacturing seem to be saying that reductions in manufacturing activity have been more common in rural than urban areas, either because of the types of manufacturers found in rural areas or because of changes in the relative attractiveness of rural and urban areas to manufacturers.

We found little empirical support in the literature for the claim that rural areas on average suffered disproportionately from foreign competition. But we did find two studies indicating that manufacturing employment in non-metropolitan areas had fared as well or better than in metropolitan areas. In their study that covered the period from 1979-85 in the Tennessee Valley, Robert W. Gilmer and Allan G. Pulsipher concluded:

> The data show a strong recovery in manufacturing by all of the Valley compared to the United States and, surprisingly, a stronger performance by the region's nonmetro areas than metro areas.[4]

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[3]Malcolm Gladness, "Shenandoah Valley's Quiet Business Boom May Cushion Impact of Avtex Closing," Washington Post, November 7, 1988.

[4]"Cyclical and Structural Change in Southern Manufacturing: Recent Evidence from the Tennessee Valley: Note," Growth and Change, October 1986, p. 64.

Similarly, in their paper that covered the period 1980-85 in five southern states, William H. Branson and James P. Love concluded:

> Changes in manufacturing employment attributable to increases in the foreign exchange value of the dollar were not significantly different between metropolitan and non-metropolitan areas...[5]

Non-metropolitan areas are not necessarily rural, however, so these findings leave open the question of whether manufacturing in rural areas was harder hit than in urban areas by foreign competition. Using data for all 50 states, Branson and Love did find some evidence that rural areas may have been hurt more: "...the more rural the state, the more sensitive manufacturing employment in the state is to foreign trade."[6]

Here, we report our findings on whether manufacturing employment in rural counties, generally, and in southeastern rural counties, in particular, was more adversely affected than manufacturing employment in urban counties by foreign competition. Our approach is indirect: our analysis covers the period 1980-85, during which time foreign competition intensified at least partly because of the rising foreign exchange value of the dollar. Other factors, of course, also affected manufacturing activity over this period, and we try to account for their influence.

Our principal findings can be summarized as follows: (1) in the Southeast as well as in the rest of the country, the greatest percentage losses in manufacturing employment over this period did <u>not</u> occur in the

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[5]"The Real Exchange Rate and Employment in U.S. Manufacturing: State and Regional Results," Cambridge, Massachusetts: National Bureau of Economic Research, Inc., Working Paper No. 2435, 1987, p. 16.

[6]Ibid.

most rural counties, but in counties central to large metropolitan areas; (2) in the Southeast, manufacturing in counties with urban populations of less than 20,000--which can be considered rural--also suffered relatively high average percentage losses in employment, while the hardest hit elsewhere in the United States tended to be counties with urban populations between 20,000 and 50,000; (3) in the Southeast, suburban counties along the Baltimore-Washington-Richmond-Norfolk corridor posted especially rapid growth from 1980-85; (4) in the Southeast as well as the U.S., the rural vs. urban differences in industrial mix did not likely contribute much on average to differences in their manufacturing employment experiences; and (5) simulated responses of manufacturing employment to dollar appreciation from 1980-85 did not differ appreciably from rural to urban counties, which indicates that there was no reason to expect that the rising dollar during that period should have caused manufacturing employment to decline more in rural than in urban areas.

I. County Data

We use manufacturing employment data, in total and by industry for each U.S. county, as compiled by the U.S. Department of Commerce for the years 1980, 1982, and 1985. To define the rural or urban character of counties, we choose a classification system created by the Economic Research Service of the U.S. Department of Agriculture. This system classifies counties into 10 categories, or "Beale codes," based on population density and proximity to metropolitan areas. Table 1 gives the definitions of these Beale codes along with their shares of all U.S. counties and U.S. manufacturing employment. The higher the integer value of the Beale code, also called the "Rural-Urban Continuum Code,"

the more rural the county. Following the precedent of a General Accounting Office Study, we define Beale code counties 6, 7, 8, and 9 as rural areas (see footnote to Table 1).

Table 1: Rural-Urban Continuum (Beale Code) County Classification System

Beale Code, Population and County Metropolitan Area (MA) Location	Percent of Counties	Percent of Mfg. Employment
0 Central to MAs of over 1 million	2.0	30.0
1 Fringe of MAs of over 1 million	6.3	15.7
2 In MAs of 250 thousand to 1 million	10.4	24.1
3 In MAs of less than 250 thousand	7.1	8.7
4 Urban 20 thousand or more, adjacent to MA	5.1	5.1
5 Urban 20 thousand or more, not adjacent to MA	5.1	2.9
*6 Urban less than 20 thousand, adjacent to MA	18.7	5.9
*7 Urban less than 20 thousand, not adjacent to MA	25.4	6.0
*8 Completely rural, adjacent to a MA	6.5	0.6
*9 Completely rural, not adjacent to a MA	13.5	1.0

Addenda: Total number of U.S. counties represented in 1985 = 2,691
Total manufacturing employment represented in 1985 = 19,174,317

Notes: Metropolitan status was determined by the U.S. Office of Management and Budget, June 1983, based on the results of the 1980 census. Metropolitan areas must have either (1) a city of at least 50,000 population, or (2) an urbanized area of at least 50,000 with a total metropolitan population of at least 100,000. This criterion further defines Beale codes 3, 4, and 5. A completely rural (Beale codes 8 and 9) county has no town in it with over 5,000 population. A county adjacent to a metropolitan area must have an adjacent physical boundary and at least 2 percent of its employed labor force must commute to metropolitan central counties.

*Counties in these four classes are considered rural by the U.S. General Accounting Office in their study Rural Development, January 1989.

As with most data on the private sector, these county data are not made available to the public when fewer than three firms are represented at any level of aggregation (in order to protect the confidentiality of information on individual businesses). For individual manufacturing industries, such as textiles and electrical machinery, incomplete reports for counties are a problem. Omitted data are common for all classes of counties, but especially for the completely rural counties

which, as Table 1 shows, do not account for a large share of manufacturing employment. We address this question of nondisclosure bias in Appendix B. Fortunately, total manufacturing employment is reported for all but a few counties.

II. Methods and Findings

This section presents a summary of our empirical inquiry. Our first step was to see if rough calculations with the data supported a priori assertions that rural counties generally, and southeastern rural counties in particular, suffered greater losses in manufacturing employment than did urban counties during the first half of the 1980s. Finding some evidence in support of this contention, we proceeded by successive refinements to try to isolate the effects of industry mix and the exchange rate on manufacturing employment by type of county.

Percent Changes in Total Manufacturing Employment by County Type

We began by calculating the percentage changes in total manufacturing employment by Beale code over the period 1980-85. We divided this period into two subperiods, 1980-82 and 1982-85, to account for reversals in direction in oil prices and the business cycle.

Table 2a shows that, contrary to the hypothesis of greater losses in rural manufacturing employment, the two completely rural county classes (Beale codes 8 and 9) experienced <u>increased</u> manufacturing employment from 1980-85. Also, total manufacturing employment declined only slightly over this period in rural counties with urban populations of less than 20,000 (Beale codes 6 and 7). The county classes that experienced the largest losses in manufacturing jobs were those central to large metropolitan areas (Beale code 0), and those with urban

populations between 20,000 and 50,000 that were not adjacent to metropolitan areas (Beale code 5).

Changes in manufacturing employment over the two subperiods provide an expected contrast. During the 1980-82 subperiod, when energy prices rose and the economy suffered two recessions, manufacturing employment declined in all county classes. During the 1982-85 subperiod, however, when energy prices fell and the economy expanded, manufacturing employment rose in all county classes except one, despite continued dollar appreciation.

To summarize, data on total manufacturing employment by type of county do not support the hypothesis that more manufacturing jobs were lost in rural counties than in urban counties during the 1980-85 period of rapid dollar appreciation. The four most rural county classes did sustain slightly greater losses in jobs during the 1980-82 subperiod. But this loss was evidently due to the greater sensitivity of rural county manufacturing to the business cycle or to oil prices, as is evidenced in the more rapid rates of job growth in these counties during the 1982-85 subperiod. The two classes of counties that appear from Table 2a to have been at a relative disadvantage from 1980-85 were the counties represented by Beale codes 0 and 5.[7]

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[7]These figures do not, of course, negate the argument that in particular industries, the more rural counties may have sustained greater relative losses in employment than did the more urban counties. If this argument is true, however, the figures on total manufacturing employment indicate that the rural counties gained relatively more employment in other industries than did the urban counties (changes in manufacturing employment due to the entry and exit of industries are included in these calculations).

Table 2a: Percentage Change in Total Manufacturing Employment, by Urban/Rural Character (Beale Code) of Counties

Beale Code	1980-82	1982-85	1980-85
0	-8.0	-1.3	-9.2
1	-6.1	+6.4	-0.0
2	-7.2	+2.2	-5.2
3	-7.6	+2.1	-5.7
4	-7.8	+2.5	-5.5
5	-9.6	+1.8	-8.0
6	-7.9	+6.5	-1.9
7	-7.7	+6.9	-1.3
8	-7.8	+9.5	+1.0
9	-6.9	+10.3	+2.7
United States	-7.5	+2.4	-5.3

Southeastern states. We also compared the manufacturing employment experience of counties in a group of southeastern states[8] with counties in all other states. The figures in columns 1 and 2 of Table 2b confirm that, even in the Southeast where manufacturing in rural areas is relatively more common than in the rest of the country, the greatest concentration of manufacturing jobs is in metropolitan areas (Beale codes 0-3).

The changes in total employment from 1980-85 reveal some particularly strong differences among southeastern counties. In the Southeast even more so than in the rest of the country, the counties central to large metropolitan areas experienced the greatest percentage losses in jobs.[9] Counties in the class represented by Beale code 5 had

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[8]The southeastern states used in this study are those that comprise the Fifth Federal Reserve District: Maryland, North Carolina, South Carolina, Virginia, West Virginia, and the District of Columbia.

[9]Considered central to the three large metropolitan areas (Beale code 0) in the Fifth District are: Baltimore (city); Norfolk, Chesapeake, and Portsmouth; and the District of Columbia. The large

(Footnote Continued)

the next-to-the-greatest losses, and again the percentage loss was greater in the Southeast. The greatest gain, however, was registered by the fringe counties within the large southeastern metropolitan areas. These fringe counties are all located within the Baltimore-Norfolk corridor, or "crescent," that has grown rapidly in the last decade. As is clear from Table 2b, these southeastern crescent counties are not representative of the average county in this category in the rest of the country.

Table 2b: Percentage Change in Total Manufacturing Employment, Counties in Southeastern (S.E.) States and Other States (O.S.), by Beale Code

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Percent of Mfg.		Percent Change in Manufacturing Employment					
Beale	Jobs in 1985		1980-82		1982-85		1980-85	
Code	S.E.	O.S.	S.E.	O.S.	S.E.	O.S.	S.E.	O.S.
0	4.6	32.8	-12.9	-7.9	-4.2	-1.3	-16.5	-9.1
1	10.5	16.3	-1.0	-6.4	+12.1	+6.0	11.0	-0.8
2	32.3	23.2	-4.7	-7.6	+2.5	+2.2	-2.3	-5.6
3	14.3	8.1	-8.0	-7.5	+1.6	+2.2	-6.5	-5.5
4	7.5	4.9	-6.3	-8.0	+5.2	+2.1	-1.4	-6.1
5	5.0	2.7	-8.2	-10.0	-1.5	+2.6	-9.5	-7.7
6	13.7	5.0	-8.6	-7.6	+3.2	+7.6	-5.7	-0.6
7	8.5	5.7	-7.1	-7.8	+3.8	+7.4	-3.5	-0.9
8	1.2	0.6	-7.2	-7.9	+10.1	+9.3	+2.1	+0.7
9	2.4	0.8	-7.4	-6.7	+4.9	+12.2	-2.8	+4.7
All	100.0	100.0	-6.4	-7.6	+3.3	+2.3	-3.3	-5.5

(Footnote Continued)
1980-85 decline in manufacturing employment in this combined group of five jurisdictions was primarily due to the loss of 15,000 manufacturing jobs in Baltimore--a decline of 23 percent from 70,000 manufacturing workers in 1980 (Norfolk and Washington experienced smaller percentage losses from much smaller numbers of manufacturing workers). An analysis of changes in industry mix showed that the Baltimore industries that retrenched the most over this period were some of the heavy industries found to be among those industries most adversely affected by the high foreign exchange value of the dollar (see Appendix A).

A comparison of the numbers in columns 7 and 8 in Table 2b lends some support to the argument that manufacturing employment in rural southeastern counties suffered greater declines than in other rural U.S. counties during this period. Individually, only one of four rural county classes (Beale codes 6-9) in the Southeast outperformed its counterpart in the rest of the country. As a group, the southeastern rural counties lost 4.4 percent of their manufacturing jobs from 1980-85. This percentage loss was larger than the 0.4 percent loss experienced by rural counties in the rest of the country, and larger also than the 2.9 percent lost by southeastern urban counties. It was smaller, however, than the 6.2 percent loss of manufacturing jobs in urban areas in the rest of the country.

Data for the two subperiods (Table 2b, columns 4-7) indicate that southeastern rural manufacturers were somewhat less sensitive than their rest-of-country counterparts to swings in the business cycle. The percentage in declines in manufacturing employment in rural counties during the 1980-82 recession period were similar in the Southeast to those in the rest of the country, but in the 1982-85 expansion period, three of four county classes in the Southeast posted smaller percentage increases than their counterparts elsewhere in the country. It does not appear, however, that manufacturing employment in southeastern rural counties was held back disproportionately by the rising dollar during the second subperiod. Total manufacturing employment in rural southeastern counties rose faster than the national average from 1982-85.

Distributions of Percentage Changes in Manufacturing Employment by County Type

Totals can hide a great deal of internal variation. Thus, although total manufacturing employment in rural counties fared as well or better than in metropolitan counties during the the first half of the 1980s, the average rural county may still have suffered greater relative losses. To check this possibility, we calculated measures of central tendency and dispersion for the distributions of percentage changes in manufacturing employment by class of county for 1980-82, 1982-85, and 1980-85.

In Table 3a, we report the mean, median, and standard deviation of percentage changes in manufacturing employment by Beale code. The average changes are in many ways similar to the changes in the totals reported in Table 2a. From 1980-85, for example, county classes represented by Beale codes 0 and 5 had the greatest mean and median losses in manufacturing employment, just as was the case for total employment. But there are some differences, too.

The mean and median percentage changes (Table 3a) differ from the changes in the totals (Table 2a) in ways that paint a somewhat rosier picture for the counties in metropolitan areas when compared with those outside.[10] For example, although total manufacturing employment in the fringe counties of large metropolitan areas did not change from 1980-85, the mean and median percentage increases for these counties were 4.5 and 4.0 percent, respectively. In contrast, for rural county class 9, the

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[10]See Appendix tables C-3a for the results of the tests of differences in means and variances.

gain of 2.7 percent in total manufacturing employment compares to an average loss of about -1.8 percent; similar differences in the same direction characterize rural county classes 6 and 7. Even with this somewhat different picture, however, Table 3a does not provide support for the hypothesis that the more rural counties experienced greater dislocations in manufacturing from 1980-85.

Table 3a: Means, Medians, and Standard Deviations in Percent Changes in Manufacturing Employment Among Counties

Beale	1980-82			1982-85			1980-85		
Code	Mean	Median	S.D.	Mean	Median	S.D.	Mean	Median	S.D.
0	-8.0	-8.2	8.0	+0.2	-0.2	12.0	-7.7	-9.7	18.0
1	-3.9	-5.3	18.9	+8.4	+7.9	22.1	+4.5	+4.0	31.1
2	-7.4	-5.9	12.6	+3.4	+3.7	17.2	-4.0	-3.3	22.8
3	-6.2	-6.4	11.9	+0.9	+3.3	18.5	-5.3	-3.9	24.4
4	-7.3	-8.8	16.5	+1.4	+1.9	17.3	-6.0	-6.6	23.6
5	-10.1	-10.4	11.7	+1.5	+1.0	18.5	-8.6	-7.5	18.8
6	-9.1	-8.6	17.2	+5.2	+5.7	25.3	-3.9	-4.2	29.1
7	-8.4	-7.8	23.4	+2.6	+4.2	27.5	-5.8	-2.9	35.3
8	-6.1	-6.9	29.6	+8.4	+7.3	34.9	+2.3	+0.0	39.1
9	-9.0	-8.2	30.0	+7.2	+7.5	42.6	-1.8	-1.6	48.1

A look at Figures 1 and 2 is instructive. These frequency distributions indicate that the completely rural counties were more likely to experience large changes. This greater frequency in the tails of the distribution was expected even before calculating the standard deviations reported in Table 3a, where the 48.1 percentage point figure for Beale code 9 contrasts sharply with the significantly smaller ones for the other Beale codes. Moreover, the second and third most rural county classes (Beale codes 7 and 8), along with counties central to large metropolitan areas, also had wider distributions in their percentage changes in manufacturing employment. The larger incidence of big decreases in employment in rural counties may explain (but not necessarily justify, because there were some big increases too) why some

Figure 1

Distribution of Percentage Changes in Manufacturing Employment for Beale Codes 0, 1, 2, 8, and 9 1980-85

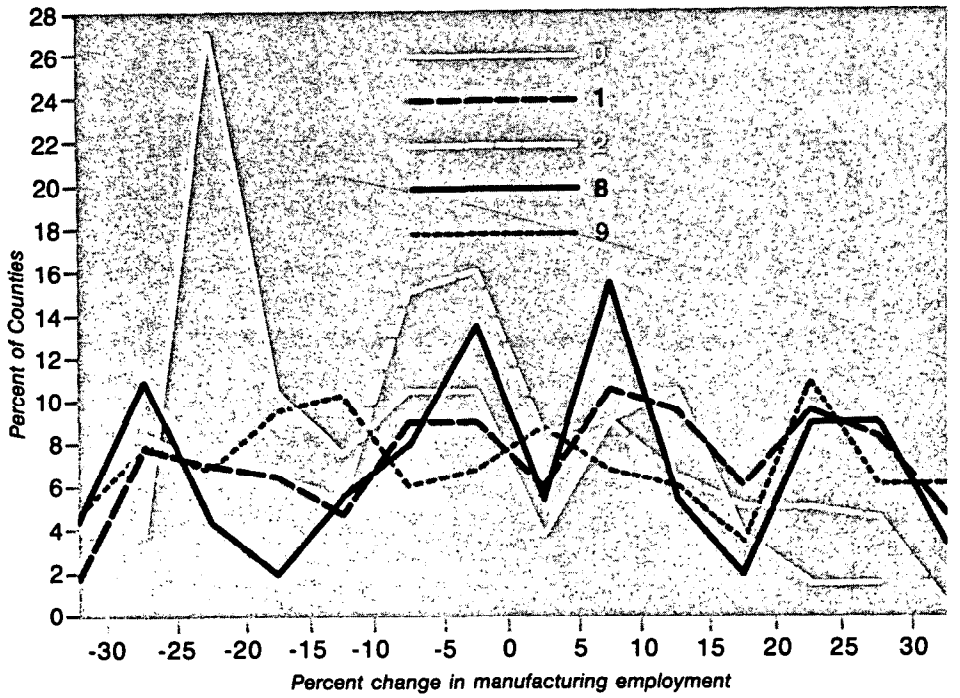
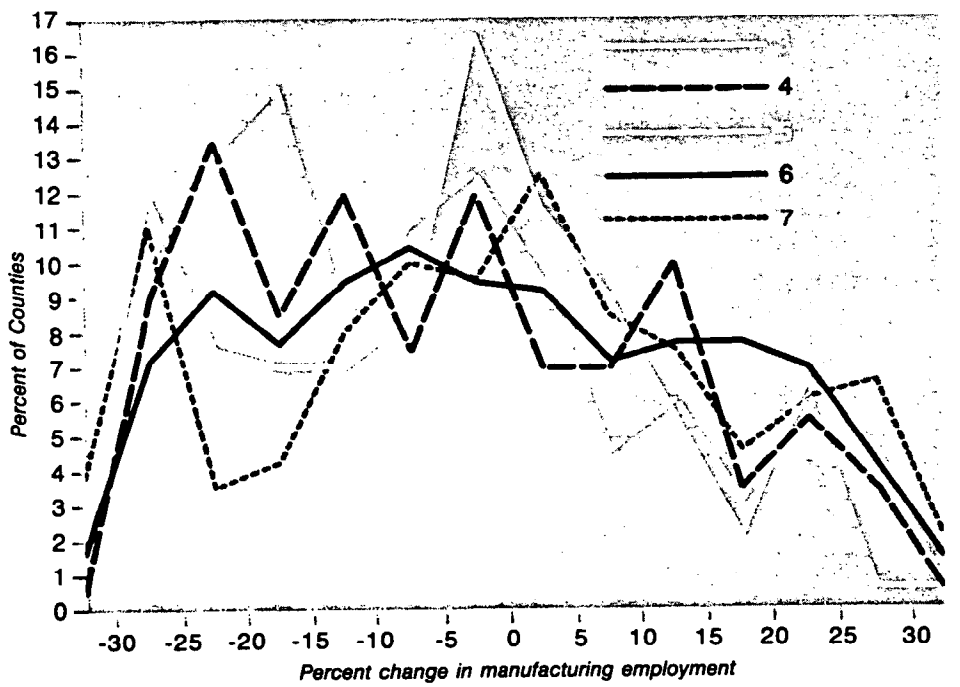


Figure 2

Distribution of Percentage Changes in Manufacturing Employment for Beale Codes 3, 4, 5, 6, and 7 1980-85



observers have claimed that rural counties experienced greater relative losses in manufacturing employment over this period.

Southeastern counties. To assure an adequate sample size of southeastern counties in each rural or metropolitan class, we combined county classes to calculate mean percentage changes in manufacturing employment. Beale code pair 0 and 1 thus represents all counties in large (over 1 million population) metropolitan areas; 2 and 3, other metropolitan areas; 4 and 5, non-metropolitan counties with larger urban (over 20,000) populations; 6 and 7, rural counties with smaller (under 20,000) populations; and, 8 and 9, the completely rural counties.

The results, shown in Table 3b, are similar to those in Table 2b in that they provide some support for the view that rural southeastern counties suffered greater losses in manufacturing employment than metropolitan southeastern counties. From 1980-85, the median change drops from a strong +11.3 percent in large southeastern metropolitan

Table 3b: Median Percentage Changes in Manufacturing Employment Among Southeastern and Other Counties Classified by Beale Code Pairs

	1980-82		1982-85		1980-85	
Beale Codes	S.E.	O.S.	S.E.	O.S.	S.E.	O.S.
0 + 1	-4.9	-6.1	+5.6	+6.0	+11.3	-1.3
2 + 3	-5.6	-6.1	+2.7	+3.7	-3.7	-3.6
4 + 5	-6.4	-9.9	+2.6	+1.0	-4.4	-7.5
6 + 7	-8.9	-8.1	+2.7	+5.1	-8.5	-2.9
8 + 9	-7.1	-7.7	+8.2	+7.4	-1.4	-0.7

area counties to -3.7 percent in the smaller metropolitan counties, and further to -4.4 and -8.5 percent, respectively, in the southeastern non-metropolitan counties with larger and smaller urban populations. This association of "poorer performance the more rural the southeastern county" fails at the rural extreme, however, for the median loss in the completely rural southeastern counties was only 1.4 percent. It fails

also in the rest of the country, where from 1980-85 the greatest median loss (-7.5 percent) in manufacturing employment was sustained by the county classes (4 + 5) right in the middle of the rural/urban continuum.

Effects of Industry Mix

Up to this point, we have reported actual percentage changes in manufacturing employment by Beale code. Our findings give weak support to the view that rural manufacturing sustained greater losses in employment than urban manufacturing in the Southeast, and virtually no support for the same contention as regards the rest of the nation. Some observers, however, have claimed that rural counties experienced greater losses because rural counties have the kinds of manufacturing industries that are particularly sensitive to foreign competition. For example,

> Rural areas have relied on manufacturing to a greater degree than metropolitan areas. The typical manufacturing-dominant rural community has tended to be dependent on the traditional, mass production segments of industry that pay less, require fewer skills, and have fared poorly against foreign competition.[11]

In order to check how the differences in the mix of manufacturing industries may have affected changes in employment, we assumed that each county's employment in each two-digit manufacturing industry changed by the same percentage as that industry's employment changed in the nation as a whole. In those cases where part or all of a county's manufacturing employment was not disclosed at the two-digit SIC level, we assumed that the undistributed employment changed by the same

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[11]Winifred A. Pizzano, Hearings To Identify Prospects for Economic Development in Rural America, p. 33.

percentage as total manufacturing employment in the nation.[12] After calculating an expected employment change for each county, we then calculated, for each county class, the resultant distributions of hypothetical percentage changes in manufacturing employment by Beale code.[13] The means of these distributions are compared with actual changes in Table 4a.

Table 4a: Actual and Hypothetical* Mean Percentage Changes in Manufacturing Employment Among Counties Classified by Beale Code

Beale	1980-82			1982-85			1980-85		
Code	Act'l	Hyp'l	Diff.	Act'l	Hyp'l	Diff.	Act'l	Hyp'l	Diff.
0	-7.9	-7.8	-0.2	+0.2	+3.3	**-3.1**	-7.7	-4.7	**-3.2**
1	-3.9	-8.5	**+4.6**	+8.4	+3.7	**+4.7**	+4.5	-4.9	**+9.4**
2	-7.4	-8.7	+1.3	+3.4	+2.9	+0.5	-4.0	-5.8	+1.8
3	-6.2	-8.5	+2.3	+0.9	+3.2	-2.3	-5.3	-5.3	0.0
4	-7.3	-7.6	+1.4	+1.4	+2.5	-1.1	-6.0	-6.3	+0.3
5	-10.1	-8.5	-1.6	+1.5	+3.9	-2.4	-8.6	-4.7	**-3.9**
6	-9.1	-8.7	-0.4	+5.2	+4.3	+0.9	-3.9	-4.3	+0.5
7	-8.4	-8.6	+0.2	+2.6	+4.8	-2.2	-5.8	-3.8	-2.0
8	-6.1	-9.4	**+3.3**	+8.4	+6.2	+2.2	+2.3	-3.2	**+5.5**
9	-9.0	-9.1	+0.1	+7.2	+6.1	+1.1	-1.8	-2.9	+1.1

*Hypothetical percentage changes were generated by assuming that a particular industry's manufacturing employment changed in each county by the same percentage as it did in the nation as a whole.

Considered by themselves, the hypothetical changes provide a rough measure of whether the relative performances by Beale code were influenced by industry mix.[14] Over the period 1980-85, for example, Table 4a

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[12]This assumption biases the results--especially for the rural counties--toward the national average percentage change in manufacturing employment.

[13]See Appendix tables C-4a for the results of the tests of differences in means and variances.

[14]The measure must be considered rough because each two-digit SIC code for the manufacturing industry includes a wide variation of

(Footnote Continued)

shows that, based on their mix of industries, the more rural counties in Beale codes 6 through 9 may have been expected to show smaller average losses in manufacturing employment than counties in other Beale classes. Counties in Beale code classes 2, 3, and 4 may have been expected to show larger losses because of their industry mixes. On the basis of these results, one would conclude that in the nation as a whole, the kinds of manufacturing industries located in rural areas did not on average put their home counties at a relative disadvantage to foreign competition.

The Table 4a hypothetical changes for the periods 1980-82 and 1982-85 suggest, as did the actual changes reported earlier in this paper, that rural manufacturing was more sensitive than metropolitan manufacturing to the business cycle and to the swing in energy prices, and less sensitive to the foreign exchange value of the dollar, which appreciated throughout the period. Over the 1980-82 subperiod, the hypothetical mean percentage changes in manufacturing employment by county class indicate that the two completely rural county classes were somewhat disadvantaged by their industry mixes as compared to the most metropolitan of the county classes. During the 1982-85 subperiod, however, the industry mixes of the five more rural counties were--at least hypothetically--relatively advantageous compared to those of the more metropolitan counties.

(Footnote Continued)
specialized types of manufacturing. For example, textile mills making carpets and textile mills making cloth are likely to experience different effects from the business cycle, oil price shocks, and dollar appreciation.

The difference between the actual and hypothetical percentage change provides a rough estimate of the influence of factors other than industry mix on changes in manufacturing employment by Beale code. These differences, shown also in Table 4a, include some relatively large values, shown in boldface. For example, based on their industry mix, the fringe counties within large metropolitan areas (Beale code 1) might have been expected to suffer an average loss in manufacturing employment of 4.9 percent from 1980-85. Instead, they posted an average gain of 4.5 percent, a difference of 9.4 percent. One can infer that this large difference was probably due to factors other than the types of industries located in these counties. Similarly, the large positive difference for Beale code 8 counties and the large negative differences for Beale code 0 and 5 counties indicate that the actual performances of these county classes are well outside what would be expected based on industry mix alone.

Southeastern counties. In the Southeast, the hypothetical means in Table 4b show that for 1980-85, counties within large metropolitan areas (Beale codes 0 and 1) had industrial mixes which were, on average, least likely to suffer from the dollar, oil, and cyclical shocks of 1980-85. In second-best position, as far as industrial mix was concerned, were the completely rural counties (Beale codes 8 and 9). The distribution of industries among the other three county classes results in very little difference in the mean losses in manufacturing employment expected for them. Even in the Southeast, therefore, it would not appear that the type of industries found in rural areas were those that suffered, on average, greater losses in manufacturing employment from 1980-85.

Table 4b: Actual and Hypothetical* Mean Percentage Changes in Manufacturing Employment Among Counties Classified by Beale Code Pairs

Southeastern Counties

Beale Codes	1980-82 Act'l	1980-82 Hyp'l	1980-82 Diff.	1982-85 Act'l	1982-85 Hyp'l	1982-85 Diff.	1980-85 Act'l	1980-85 Hyp'l	1980-85 Diff.
0 + 1	-2.6	-7.2	**+4.6**	+13.0	+6.5	**+7.5**	+10.4	-2.1	**+12.1**
2 + 3	-7.3	-9.6	+2.3	-1.1	+3.2	**-4.3**	-8.3	-6.4	-1.9
4 + 5	-6.8	-8.9	+2.1	+0.7	+2.5	-1.8	-6.1	-6.5	+0.4
6 + 7	-10.5	-9.4	-1.1	-0.7	+3.3	**-4.0**	-11.1	-6.1	**-5.0**
8 + 9	-7.5	-9.1	+1.6	+9.5	+5.8	**+3.7**	+2.1	-3.3	**+5.4**

Other Counties

Beale Codes	1980-82 Act'l	1980-82 Hyp'l	1980-82 Diff.	1982-85 Act'l	1982-85 Hyp'l	1982-85 Diff.	1980-85 Act'l	1980-85 Hyp'l	1980-85 Diff.
0 + 1	-5.2	-8.5	**+3.3**	+5.4	+3.3	+2.1	+0.2	-5.3	**+5.5**
2 + 3	-6.8	-8.4	+1.6	+3.1	+3.0	+0.1	-3.8	-5.4	+1.6
4 + 5	-8.9	-9.3	+0.4	+1.5	+3.2	-1.7	-7.4	-5.3	-2.1
6 + 7	-8.5	-8.6	+0.1	+4.2	+4.8	-0.6	-4.3	-4.8	+0.5
8 + 9	-8.2	-8.3	+0.1	+7.3	+6.3	+1.0	-0.9	-2.9	+2.0

*See footnote to Table 4a.

The positive numbers in the difference column in Table 4b show that from 1980-85, the large urban and the completely rural counties in the Southeast did substantially better than expected on the basis of their industry mixes. The standout performance of the large southeastern metropolitan counties is especially noteworthy. The largest negative numbers in the difference column are associated with rural counties with small urban populations (Beale codes 6 and 7). These counties suffered the greatest mean percentage losses in manufacturing employment (-11.1 percent); about half of this percentage loss in employment appears attributable to industry mix.

Also of interest are comparisons of the industry-adjusted relative performances of southeastern counties to counties in the rest of the country. For 1980-85, one can infer from the hypothetical mean percentage changes of Table 4b that the only southeastern counties with a more favorable industry mix than their counterparts in the rest of the

country were the large metropolitan area counties. Yet the southeastern counties outperformed counties in the rest of the country in three of the five county-class pairs, including the pair composed of the completely rural counties. The decidedly poorer performance of small urban counties in the Southeast as compared to their counterparts in the rest of the country was apparently partly, but not mostly, a consequence of difference in industry mix.

Dollar-Induced Changes in Manufacturing Employment by Type of County

We have no clear evidence in support of the view that rural county manufacturing employment suffered more than that in metropolitan counties from the rise in the foreign exchange value of the dollar from 1980-85. We elected to see if this could be expected to be the case. To do so, we held everything constant except industry mix, and simulated changes in each county's manufacturing employment, given the county's industry mix, the dollar appreciation that occurred, and industry-specific measures of exchange rate elasticities. We made two sets of projections: one based on employment elasticities calculated from a single real exchange rate,[15] and the other based on production elasticities calculated from industry-specific real exchange rates.[16]

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[15]"Dollar Appreciation and Manufacturing Employment and Output," Cambridge, Massachusetts: National Bureau of Economic Research, Inc., Working Paper No. 1972, 1986, p. 16.

[16]W. Michael Cox and John K. Hill, "Effects of the Lower Dollar on U.S. Manufacturing: Industry and State Comparisons," Federal Reserve Bank of Dallas Economic Review, March 1988, pp. 2-9.

The results of the set of projections based on a single real exchange rate index are shown in Table 5a. These estimates indicate that an in-period simulation, in which everything is held constant except the dollar, yields simulated percentage losses in manufacturing employment that are smaller for the five most rural counties than for the five least rural counties. In other words, if in every county every industry is assumed to respond to dollar appreciation according

Table 5a: Simulated* Mean Percentage Changes in County Manufacturing Employment Due to Dollar Appreciation: U.S. Counties by Beale Code, 1980 to 1985 (Using Branson and Love Findings)

Beale Code	1980-82	1982-85	1980-85
0	-3.5	-3.2	-7.2
1	-3.7	-3.5	-7.6
2	-3.7	-3.5	-7.4
3	-3.3	-3.4	-7.1
4	-3.8	-3.6	-7.7
5	-3.5	-3.2	-6.6
6	-3.3	-3.2	-6.5
7	-3.3	-3.1	-6.3
8	-3.2	-3.1	-6.3
9	-3.2	-3.1	-6.2

*These simulations included only counties for which at least 80 percent of the manufacturing employment was disclosed (assigned to specific industries).

to the employment elasticity estimated for that industry nationally, then the industry mixes of rural counties were, during the period under review, on average slightly more insulated than metropolitan counties from changes in the real exchange rate.[17]

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[17]In the simulation, we included counties with 80 percent or more of their manufacturing employment assigned to specific industries (i.e., we excluded counties with over 20 percent of their manufacturing employment undisclosed to protect confidentiality). The non-inclusion of some counties has undoubtedly introduced some bias into the results,

(Footnote Continued)

Southeastern counties. Among counties in the five southeastern states, those in large metropolitan areas (Table 5b) produced the smallest mean simulated losses in manufacturing employment from 1980-82, 1982-85, and 1980-85.[18] The completely rural counties were a close second; the differences among Beale code pairs in the Southeast were

Table 5b: Simulated Mean Percentage Changes in Manufacturing Employment Due to Dollar Appreciation: Southeastern and Other Counties Classified by Beale Code Pairs (Using Branson and Love Findings)

	1980-82		1982-85		1980-85	
Beale Codes	S.E.	O.S.	S.E.	O.S.	S.E.	O.S.
0 + 1	-2.7	-3.8	-2.5	-3.6	-5.4	-7.8
2 + 3	-3.3	-3.7	-3.1	-3.5	-6.5	-7.5
4 + 5	-3.4	-3.6	-3.2	-3.4	-6.5	-7.2
6 + 7	-3.1	-3.3	-2.9	-3.1	-5.9	-6.4
8 + 9	-3.0	-3.3	-2.9	-3.1	-5.8	-6.3

small. The types of manufacturers and their sensitivities to a real exchange rate index produced mean simulated losses for counties in the Southeast that were smaller than in the rest of the country. In the case of counties in large metropolitan areas (Beale code pair 0 and 1), the simulated loss in the Southeast from 1980-85 (-5.4) is over two percentage points lower than in the rest of the country (-7.8). This result suggests that the stronger actual performance of these southeastern counties, reported in Table 3b, may have been at least partly due to their industry mix.

(Footnote Continued)
but for reasons given in Appendix B, we do not believe the bias is of any consequence.

[18]See Appendix tables C-5b for the results of the tests of differences in means and variances.

The results of our set of projections based on Cox and Hill findings are shown in Table 6a.[19] These simulations make use of both industry-specific real exchange rates as well as industry-specific elasticities.[20] Again as in the previous simulation, these estimates indicate that an in-period simulation holding everything constant except dollar appreciation yields mean percentage losses in manufacturing employment that are slightly smaller for rural than for metropolitan area counties.

Table 6a: Simulated Mean Percentage Changes in County Manufacturing Employment Due to Dollar Appreciation: U.S. Counties by Beale Code, 1980 to 1985 (Using Cox and Hill Findings)

Beale Code	1980-82	1982-85	1980-85
0	-2.9	-2.6	-5.4
1	-2.7	-2.4	-5.1
2	-2.7	-2.5	-5.2
3	-2.6	-2.3	-4.8
4	-2.5	-2.3	-4.7
5	-2.3	-2.3	-4.5
6	-2.5	-2.5	-4.9
7	-2.4	-2.4	-4.7
8	-2.4	-2.6	-4.9
9	-2.5	-2.6	-5.0

Southeastern counties. When counties are combined in Beale code pairs and separated to compare those in five southeastern states with those in the rest of the country, the simulations produce very small differences in expected response to dollar appreciation. In contrast to the previous simulation reported in Table 5b, this simulation, reported

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[19]See Appendix tables C-6a for the results of the tests of differences in means and variances.

[20]The Cox-Hill elasticities are output elasticities, so we are implicitly assuming a constant ratio of output to labor.

in Table 6b, generated much smaller differences in projected sensitivities to exchange rate movements. In particular, in this simulation as compared with the previous one, the counties in the large southeastern metropolitan areas are not shown in Table 6b to have as much an advantage in industry mix over their counterparts in the rest of the country. Again, as in the previous simulation, the projected performances of manufacturing employment in rural counties is not notably different from that in metropolitan counties.

Table 6b: Simulated Mean Percentage Changes in Manufacturing Employment Due to Dollar Appreciation: Southeastern and Other Counties Classified by Beale Code Pairs (Using Cox and Hill Findings)

	1980-82		1982-85		1980-85	
Beale Codes	S.E.	O.S.	S.E.	O.S.	S.E.	O.S.
0 + 1	-2.5	-2.8	-2.2	-2.5	-4.6	-5.2
2 + 3	-2.5	-2.7	-2.5	-2.5	-4.9	-5.1
4 + 5	-2.5	-2.4	-2.5	-2.3	-4.9	-4.6
6 + 7	-2.4	-2.4	-2.5	-2.4	-4.8	-4.8
8 + 9	-2.4	-2.5	-2.6	-2.6	-4.9	-5.0

III. Summary

Some observers have argued that employment in rural areas was more adversely affected than employment in urban areas by the rapid appreciation of the foreign exchange value of the dollar between 1980 and 1985. Changes in total manufacturing employment, however, provide no evidence that, in the nation as a whole, rural areas suffered greater employment losses than urban areas during this period. In the Southeast, however, rural counties lost more employment than urban counties during this period.

Observers have also claimed that some rural counties were more adversely affected by the 1980-85 increase in the dollar because labor intensive industries are more common in rural areas, and those

industries are more susceptible to foreign competition. To the contrary, however, we found that when industry experience is used to project employment growth, the rural areas performed better on average than the urban areas. Finally, simulations based on alternative estimates of real exchange rates and industry-specific exchange rate elasticities did not support the view that the more rural counties, because of the exchange rate effect on their types of industries, should have suffered greater losses in manufacturing employment when the dollar was rising from 1980-85.

This study provides a preliminary analysis of the relationship between the rural character of a county and the effect of a rapid dollar appreciation on the employment in that county. Additional studies are necessary to provide more conclusive evidence on the effect of exchange rate changes on rural vs. urban counties. An area of further study we intend to pursue is whether the differences in employment changes between rural areas in the Southeast and the rest of the country are caused by differences in the mix of manufacturing industries.

Appendix A

Branson and Love used a quarterly time series on four independent variables--a real exchange rate, a measure of energy prices, the unemployment rate, and a time (trend) variable--to estimate elasticities of U.S. employment by industry. We used their estimates of these industry exchange rate elasticities along with their real exchange rate to project percentage changes in manufacturing employment by county type. The Branson and Love real exchange rate index and their estimates of industry elasticities are summarized in Table A-1.

Table A-1: Branson and Love Exchange Rate Statistics

Real Exchange Rate Index			Employment Elasticities by Industry (All Mfg. = -0.164)				
1980	1982	1985	SIC Elas.	SIC Elas.	SIC Elas.	SIC Elas.	SIC Elas.
100	125	155	20 -.095	21 -.114	22 -.150	23 -.099	24 -.081
			25 .044	26 -.044	27 .113	28 -.167	29 -.293
			30 -.133	31 -.211	32 -.235	33 -.629	34 -.311
			35 -.433	36 .032	37 -.262	38 -.208	39 -.301

The elasticity estimates of Branson and Love led them to conclude:

> The exchange rate has its greatest impact on primary metal industries [SIC 33], non-electrical machinery [35], fabricated metal industries [34], and miscellaneous manufacturing [35], with somewhat smaller, but important, effects on textiles and apparel [22,23], petroleum and coal products [29], leather and leather goods [31], stone, clay, and glass products [32], transportation equipment [37], and instruments and related products [38].

Cox and Hill used industry-specific real exchange rates, measures of domestic and foreign trade exposure, estimates of elasticities of substitution from the Michigan Model of World Production and Trade, and the assumption of unitary price elasticities to derive their estimates of the sensitivities of the output of U.S. industries to exchange rate movements. We used their estimates of these industry exchange rate elasticities along with their real exchange rates by industry to project

percentage changes in manufacturing employment by county type. The Cox and Hill figures that we used are summarized in the tables below.

Table A-2: Cox and Hill Exchange Rate Statistics

	Index of Real Exchange Rate (1980 = 100)				Index of Real Exchange Rate (1980 = 100)		
SIC	1982	1985	Elasticity	SIC	1982	1985	Elasticity
20	116.6	138.6	-.062	30	116.0	132.0	-.163
21	128.0	151.7	-.079	31	113.3	138.9	-.365
22	120.0	142.5	-.070	32	118.9	135.9	-.127
23	116.1	141.4	-.328	33	115.5	137.9	-.144
24	108.2	122.7	-.134	34	114.9	129.5	-.155
25	115.2	131.3	-.167	35	120.1	138.2	-.190
26	110.5	123.9	-.109	36	117.6	129.7	-.254
27	114.5	132.0	-.041	37	115.4	127.3	-.357
28	120.7	143.3	-.216	38	121.7	138.6	-.258
29	111.3	134.5	-.101	39	116.6	134.8	-.403

The Cox and Hill estimates show real exchange rate appreciation for individual industries over the 1980-85 period ranged from a low of just over 20 percent for lumber and wood products [SIC 24] to a high of about 42 percent for tobacco manufactures, while the absolute values of their estimates of the sensitivities (elasticities) of industries to exchange rate movements varied from a low of 0.041 for printing and publishing [27] to a high of 0.403 for miscellaneous manufacturing [39]. The total effect of dollar appreciation is given by the product of the amount of appreciation and the estimated elasticity.

Cox and Hill concluded:

> The industries found to be the most sensitive to exchange rate movements are miscellaneous manufacturing (including jewelry, toys, and sporting equipment), leather and leather products, transportation equipment, and apparel. These industries are highly exposed to trade, either through exports or imports, and their products are highly substitutable for foreign products within the same product group. Industries such as printing and publishing, food processing, textiles, and tobacco manufacturing are considered relatively insensitive to the exchange rate movements, primarily because of low trade exposure.

The table below shows some clear differences between the findings of Cox and Hill and those of Branson and Love. In particular, Branson and Love estimated that in the U.S. the primary metals industries were the hardest hit by dollar appreciation, while Cox and Hill found primary metals industries suffered relatively less than many other manufacturing sectors. Cox and Hill, on the other hand, estimated that U.S. apparel industries were among the hardest hit and textile industries among the least hard hit, while Branson and Love found apparel industries less sensitive than textile industries to the exchange rate, and both significantly less than several other industries.

Table A-3: The Impact of the High Foreign Exchange Value of the Dollar on U.S. Manufacturing Industries, 1980-85 (Industries Listed in Descending Order of Estimated Damage)

Cox and Hill	Branson and Love
Miscellaneous manufacturing	Primary metals
Leather goods	
Apparel	
	Non-electrical machinery
Transportation equipment	Fabricated metal products
Instruments	Miscellaneous manufacturing
Chemicals	
	Petroleum and coal products
Electrical equipment	
Non-electrical machinery	Transportation equipment
	Stone, clay, and glass
Primary metals	Leather goods
Furniture and fixtures	Instruments
Rubber and plastics	
Fabricated metals	Chemicals
Stone, clay, and glass	Textile products
	Rubber and plastics
Tobacco products	Tobacco products
Petroleum and coal products	Apparel
Lumber and wood products	Food and kindred products
	Lumber and wood products
Textile products	Paper products
Paper products	
Food and kindred products	
Printing and publishing	Electrical equipment
	Furniture and fixtures
	Printing and publishing

Appendix B

Two sources of bias are introduced when data are not available. The first source is the bias associated with excluding observations from the sample when data on these observations are not known. The second source is associated with using proxies for unavailable data for observations included in the sample.

Both sources of bias are present in our calculations. We chose to exclude from our sample any county that did not disclose employing industries for at least 80 percent of its manufacturing employment. For counties that we included in the sample, we assumed the undisclosed percent of manufacturing employment behaved in accordance with the national average for manufacturing.

As one would expect, the 80 percent disclosure rule results in omitting more rural than metropolitan counties from the simulations. It could be argued, therefore, that the omitted rural counties, because of their lack of diversity, were the ones that suffered the most economic shock during the 1980-85 period. If this is so, the mean percentage losses in manufacturing employment reported here for rural counties understate the true means. But there is reason to believe that it is not so: one must also take into account the kinds of industries in the omitted counties. If, as is commonly believed, the industries more common to rural areas are generally the lighter industries that weathered the shocks of the early 1980s well, omitting these counties from the simulations does not unduly bias the findings.

The second source of bias arises from assuming that the undisclosed portion of an included county's manufacturing employment behaves as the national average for manufacturing. This bias pushes the mean simulated

change in manufacturing employment toward the national average. As in the case of bias due to omitted counties, this bias probably works to underestimate the simulated percentage losses in employment in metropolitan area counties, and to overstate them in rural counties.

An indication of the direction of bias due to excluding counties can be gleaned from economic statistics disclosed by both included and excluded counties. For example, if excluded counties experienced larger changes in manufacturing employment, these changes should show up in larger changes in total employment, personal income, etc. Table B-1 provides comparisons of mean percentage changes in per capita personal income. None of the differences between included and excluded non-metropolitan counties are large enough to justify worry about bias in county classes 4 through 9. Although the differences are fairly large for metropolitan area counties, the implied amount of bias is small because so few of these counties were excluded from the calculations.

Table B-1: Percentage Change in Per Capita Personal Income, 1981-84
Counties Included in Sample vs. Counties Excluded
from Sample by Beale Code

Beale Code	In	Out	Diff.
0	18.0	none	n.a.
1	25.6	27.5	-1.9
2	20.8	26.3	-5.5
3	18.0	21.0	-3.0
4	18.9	18.1	+0.8
5	16.4	17.1	-0.7
6	21.0	20.8	+0.2
7	18.6	19.0	-0.4
8	24.0	23.4	+0.6
9	21.8	21.1	+0.7

Appendix Table C-3a
PERCENT CHANGE IN EMPLOYMENT, 1980-82

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.079	0		-2.25**	-0.37	-1.28	-0.32	1.50	0.95	0.38	-0.72	0.59
179	-0.039	1			2.21**	1.37	1.74+	3.60*	3.28*	2.73*	0.86	2.44
294	-0.074	2				-1.11	-0.05	2.12**	1.65+	0.89	-0.56	0.93
200	-0.062	3					0.73	3.03*	2.65*	1.87+	-0.01	1.62
145	-0.073	4						1.62	1.13	0.67	-0.47	0.81
145	-0.101	5							-0.75	-1.26	-1.64	-0.58
531	-0.091	6								-0.63	-1.30	-0.09
719	-0.084	7									-0.97	0.33
184	-0.061	8										1.07
383	-0.090	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.080	0		5.53*	2.46*	2.20*	4.24*	2.11*	4.60*	8.46*	13.57*	14.03*
0.189	1			2.25*	2.51*	1.30+	2.62*	1.20	1.53*	2.45*	2.54*
0.126	2				1.12	1.73*	1.16	1.87*	3.44*	5.52*	5.71*
0.119	3					1.93	1.04	2.09*	3.84*	6.16*	6.37*
0.165	4						2.01*	1.08	1.99*	3.20*	3.31*
0.117	5							2.17*	4.00*	6.42*	6.63*
0.172	6								1.84*	2.95*	3.05*
0.234	7									1.60*	1.66*
0.296	8										1.03
0.301	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-3a
PERCENT CHANGE IN EMPLOYMENT, 1982-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	0.002	0		-3.53*	-1.69+	-0.34	-0.54	-0.57	-2.58**	-1.28	-2.71*	-2.59**
179	0.084	1			2.55**	3.53*	3.18*	3.05*	1.57	2.93*	-0.03	0.42
294	0.034	2				1.55	1.16	1.06	-1.22	0.54	-1.82+	-1.58
200	0.009	3					-0.24	-0.28	-2.54**	-1.05	-2.61*	-2.49**
145	0.014	4						-0.04	-2.13**	-0.72	-2.39**	-2.24**
145	0.015	5							-1.99**	-0.64	-2.32**	-2.16**
531	0.052	6								1.72+	-1.14	-0.81
719	0.026	7									-2.09**	-1.90+
184	0.084	8										0.36
383	0.072	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.120	0		3.38*	2.04*	2.35*	2.08*	2.36*	4.43*	5.23*	8.39*	12.51*
0.221	1			1.65*	1.43**	1.63*	1.43**	1.31**	1.55*	2.49*	3.71*
0.172	2				1.15	1.02	1.15	2.17*	2.56*	4.11*	6.12*
0.185	3					1.13	1.00	1.88*	2.22*	3.56*	5.32*
0.173	4						1.14	2.13*	2.52*	4.04*	6.02*
0.185	5							1.88*	2.22*	3.56*	5.30*
0.253	6								1.18**	1.89*	2.83*
0.275	7									1.60*	2.39*
0.349	8										1.49*
0.426	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-3a
PERCENT CHANGE IN EMPLOYMENT, 1980-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.077	0		-3.64*	-1.35	-0.83	-0.56	0.31	-1.39	-0.70	-2.66*	-1.72+
179	0.045	1			3.16*	3.35*	3.43*	4.66*	3.16*	3.83*	0.58	1.85+
294	-0.040	2				0.58	0.83	2.24**	-0.05	0.95	-1.98**	-0.79
200	-0.053	3					0.27	1.44	-0.63	0.24	-2.24**	-1.15
145	-0.060	4						1.05	-0.88	-0.08	-2.37**	-1.33
145	-0.086	5							-2.33**	-1.38	-3.32*	-2.34**
531	-0.039	6								1.02	-1.97**	-0.77
719	-0.058	7									-2.54**	-1.43
184	0.023	8										1.08
383	-0.018	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.180	0		2.99*	1.61**	1.84*	1.72**	1.09	2.62*	3.85*	4.74*	7.16*
0.311	1			1.86*	1.62*	1.73*	2.74*	1.14	1.29**	1.59*	2.40*
0.228	2				1.15	1.07	1.47*	1.63*	2.40*	2.95*	4.46*
0.244	3					1.07	1.69*	1.42*	2.09*	2.57*	3.88*
0.236	4						1.58*	1.52*	2.23*	2.75*	4.15*
0.188	5							2.40*	3.53*	4.35*	6.56*
0.291	6								1.47*	1.81*	2.73*
0.353	7									1.23**	1.86*
0.391	8										1.51*
0.481	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-4a
EXPECTED CHANGE IN EMPLOYMENT, 1980-82

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.002	0		-2.72*	-1.18	-1.80+	-0.92	0.97	0.16	-0.29	-1.41	-0.12
179	0.046	1			2.10**	1.45	1.62	3.69*	3.17*	2.69*	0.54	2.21**
294	0.014	2				-0.86	-0.05	2.48**	1.69*	1.01	-0.83	0.77
200	0.023	3					0.53	3.07*	2.40**	1.72+	-1.42	1.28
145	0.014	4						1.81+	-0.07	0.74	-0.71	0.67
145	-0.016	5							-0.99	-1.41	-2.03**	-0.90
531	-0.004	6								-0.53	-1.58	-0.25
719	0.002	7									-1.29	0.10
184	0.033	8										1.20
383	0.001	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.081	0		5.25*	2.20*	2.04*	4.11	1.95*	4.45*	8.07*	13.17*	13.55*
0.189	1			2.39*	2.57*	1.28	2.69*	1.18	1.54*	2.51*	2.58*
0.121	2				1.08	1.87*	1.13	2.02*	3.67*	5.99*	6.16*
0.117	3					2.01*	1.05	2.18*	3.95*	6.45*	6.63*
0.165	4						2.11*	1.62*	1.96*	3.20*	3.30*
0.114	5							2.28*	4.14*	6.75*	6.95*
0.172	6								1.81*	2.96*	3.05*
0.231	7									1.63*	1.68*
0.295	8										1.03
0.300	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-4a
EXPECTED CHANGE IN EMPLOYMENT, 1982-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.031	0		-3.59*	-0.99**	-0.43	-0.99	-0.36	-2.15**	-0.50	-1.79+	-1.58
179	0.047	1			2.26**	3.43*	2.71*	3.24*	1.97**	3.65*	0.84	1.36
294	0.005	2				1.71+	0.88	1.60	-0.28	1.86+	-0.63	-0.25
200	-0.023	3					-0.63	0.04	-1.88+	-0.03	-1.57	-1.33
145	-0.011	4						0.62	-1.08	0.65	-1.12	-0.82
145	-0.024	5							-1.75+	-0.08	-1.54	-1.30
531	0.009	6								2.05**	-0.47	-0.07
719	-0.022	7									-1.60	-1.36
184	0.022	8										0.34
383	0.011	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.111	0		3.70*	2.37*	2.57*	2.38*	2.58*	5.23*	6.14*	9.71*	14.58*
0.214	1			1.56*	1.44**	1.56*	1.43**	1.41*	1.66*	2.62*	3.94*
0.171	2				1.09	1.01	1.09	2.21*	2.59*	4.10*	6.16*
0.178	3					1.08	1.00	2.04*	2.39*	3.78*	5.67*
0.172	4						1.09	2.20*	2.58*	4.08*	6.13*
0.179	5							2.03*	2.38*	3.76*	5.65*
0.255	6								1.17+	1.86*	2.79*
0.276	7									1.58*	2.38*
0.347	8										1.50*
0.425	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-4a
EXPECTED CHANGE IN EMPLOYMENT, 1980-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.032	0		-3.92*	-1.89**	-1.12	-1.18	0.26	-1.40	-0.46	-2.34**	-1.27
179	0.094	1			2.95*	3.41*	3.09*	4.92*	3.51*	4.40*	1.09	2.51**
294	0.018	2				0.89	0.65	2.85*	0.73	2.06**	-1.16	0.26
200	0.000	3					-0.14	1.73+	-0.24	-0.93	-1.65+	-0.37
145	0.003	4						1.73+	-0.07	0.99	-1.48	-0.24
145	-0.039	5							-2.21**	-0.96	-2.87*	-1.72+
531	0.005	6								1.35	-1.58	-0.21
719	-0.020	7									-2.35**	-1.10
184	0.055	8										1.16
383	0.011	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.173	0		2.97*	1.62**	1.79**	1.77**	1.15	2.86*	4.15*	5.09*	7.68*
0.299	1			1.83*	1.66*	1.68*	2.59*	1.04	1.40*	1.71*	2.58*
0.221	2				1.10	1.09	1.41**	1.76*	2.56*	3.14*	4.73*
0.232	3					1.01	1.56*	1.60*	2.32*	2.85*	4.29*
0.231	4						1.54*	1.62*	2.35*	2.88*	4.34*
0.186	5							2.49*	3.61*	4.43*	6.69*
0.293	6								1.45*	1.78*	2.68*
0.353	7									1.23+	1.85*
0.391	8										1.51*
0.481	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-6a
PERCENT CHANGE IN EMPLOYMENT AFTER TAKING INTO ACCOUNT
THE EXCHANGE RATE CHANGES, 1980-82

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.029	0		-2.95*	-3.19*	-5.16*	-5.61*	-8.02*	-7.18*	-8.84*	-6.74*	-6.93*
179	-0.027	1			0.04	-2.72*	-3.88*	-6.32*	-5.20*	-7.28*	-4.66*	-4.75*
294	-0.027	2				-3.14*	4.48*	-6.98*	-6.35*	-9.18*	-5.31*	-5.75*
200	-0.026	3					-1.19	-3.74*	-1.62	3.80*	-1.95+	-1.57
145	-0.025	4						-2.58**	-0.08	-2.01**	-0.71	-0.08
145	-0.023	5							3.05*	1.23	1.92+	2.90*
531	-0.025	6								-3.22*	-0.82	-0.01
719	-0.024	7									1.26	2.77*
184	-0.024	8										0.79
383	-0.025	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.005	0		1.60**	1.40	1.87*	1.47	1.91*	1.44+	1.82*	1.82**	1.63**
0.006	1			1.14	1.17	1.09	1.20	1.11	1.14	1.14	1.02
0.005	2				1.34**	1.05	1.37**	1.03	1.30*	1.30**	1.17
0.006	3					1.28	1.02	1.30**	1.03	1.03	1.15
0.005	4						1.31	1.02	1.24	1.24	1.11
0.006	5							1.33**	1.05	1.05	1.17
0.005	6								1.26*	1.27**	1.13
0.006	7									1.00	1.11
0.006	8										1.12
0.006	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-6a
PERCENT CHANGE IN EMPLOYMENT AFTER TAKING INTO ACCOUNT
THE EXCHANGE RATE CHANGES, 1982-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.026	0		-2.27**	-0.41	-3.28*	-3.34**	-3.98*	-1.04	-2.43**	-0.03	0.19
179	-0.024	1			2.73*	-1.40	-1.91+	-2.50**	1.99**	0.04	2.45**	3.49*
294	-0.025	2				-3.94*	-4.20*	-4.55*	-0.91	-3.02*	0.43	0.84
200	-0.023	3					-0.56	-1.33	3.33*	1.57	3.45*	4.65*
145	-0.023	4						-0.81	3.72*	2.10**	3.80*	4.95*
145	-0.023	5							3.99*	2.54**	4.10*	5.04*
531	-0.025	6								-2.20**	1.08	1.77+
719	-0.024	7									2.60*	3.84*
184	-0.026	8										0.24
383	-0.026	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.004	0		1.10	1.68**	1.58**	1.43	2.29*	2.39*	2.68*	2.73*	2.43*
0.004	1			1.53*	1.44**	1.30+	2.09*	2.18*	2.44*	2.49*	2.21*
0.005	2				1.06	1.17	1.36**	1.42*	1.59*	1.63*	1.44*
0.005	3					1.10	1.45**	1.51*	1.69*	1.73*	1.53*
0.005	4						1.60*	1.67*	1.87*	1.91*	1.69*
0.006	5							1.04	1.17	1.19	1.06
0.006	6								1.12	1.14	1.01
0.007	7									1.02	1.10
0.007	8										1.13
0.006	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-6a
PERCENT CHANGE IN EMPLOYMENT AFTER TAKING INTO ACCOUNT
THE EXCHANGE RATE CHANGES, 1980-85

Test of Differences in Means

Observations	Mean	Rural Code	T-Statistic, by Rural Code									
			0	1	2	3	4	5	6	7	8	9
56	-0.054	0		-2.60*	-2.09**	-4.67*	-4.95*	-6.45*	-4.54*	-6.16*	-3.73*	-3.75*
179	-0.051	1			1.19	-2.35**	-3.31*	-4.72*	-1.95+	-4.16*	-1.39	-1.02
294	-0.052	2				-3.79*	-4.65*	-5.97*	-3.68*	-6.25*	-2.50**	-2.46**
200	-0.048	3					-1.00	-2.68*	0.82	-1.23	0.70	1.55
145	-0.047	4						-1.74+	1.98**	0.04	1.58	2.59**
145	-0.045	5							3.83*	2.02**	3.05*	4.18*
531	-0.049	6								-2.74*	0.07	0.95
719	-0.047	7									1.86+	3.34*
184	-0.049	8										0.62
383	-0.050	9										

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code									
		0	1	2	3	4	5	6	7	8	9
0.008	0		1.41	1.54+	1.74**	1.46	2.24*	1.97*	2.36*	2.44*	2.16*
0.009	1			1.10	1.23	1.04	1.59*	1.40*	1.68*	1.73*	1.54*
0.010	2				1.12	1.05	1.45*	1.28**	1.53*	1.58*	1.40*
0.010	3					1.19	1.29+	1.13	1.36*	1.40**	1.25+
0.009	4						1.53**	1.35**	1.62*	1.66*	1.48*
0.012	5							1.14	1.06	1.09	1.03
0.011	6								1.20**	1.24+	1.10
0.012	7									1.03	1.09
0.012	8										1.13
0.011	9										

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1980-82

Test of Differences in Means for Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code				
			01	23	45	67	89
32	-0.0272	01		1.77+	2.13**	1.23	1.07
79	-0.0325	23			0.71	-1.35	-1.55
34	-0.0339	45				-2.16**	-2.23**
127	-0.0307	67					-0.39
86	-0.0303	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code				
		01	23	45	67	89
0.0156	01		2.37*	3.21*	4.51*	4.15*
0.0102	23			1.35	1.90*	1.75**
0.0087	45				1.41	1.29
0.0074	67					1.09
0.0077	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1982-85

Test of Differences in Means for Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code				
			01	23	45	67	89
32	-0.0251	01		2.00+	2.36**	1.51	1.41
79	-0.0310	23			0.70	-1.31	-1.39
34	-0.0324	45				-2.13**	-2.12**
127	-0.0294	67					-0.22
86	-0.0291	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code				
		01	23	45	67	89
0.0156	01		2.48*	3.53*	4.75*	4.53*
0.0099	23			1.42	1.92*	1.83*
0.0083	45				1.35	1.29
0.0072	67					1.05
0.0073	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1980-85

Test of Differences in Means for Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code				
			01	23	45	67	89
32	-0.0539	01		1.71+	1.82+	0.91	0.77
79	-0.0646	23			0.21	-1.85+	-2.01**
34	-0.0654	45				-2.22**	-2.27**
127	-0.0592	67					-0.39
86	-0.0584	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code				
		01	23	45	67	89
0.0322	01		1.88**	3.85*	5.28*	4.76*
0.0235	23			2.05**	2.81*	2.54*
0.0164	45				1.37	1.24
0.0140	67					1.11
0.01476	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1980-82

Test of Differences in Means for States Other than Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code 01	23	45	67	89
203	-0.0378	01		-1.08	-1.61	-6.06*	-6.41*
415	-0.0368	23			-0.75	-5.45*	-5.84*
256	-0.0361	45				-3.71*	-3.81*
1123	-0.0331	67					-0.91
481	-0.0327	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code 01	23	45	67	89
0.0099	01		1.47*	1.69*	1.26**	1.29**
0.0120	23			1.15	1.17+	1.89*
0.0129	45				1.35*	2.18*
0.0111	67					1.61*
0.0088	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1982-85

Test of Differences in Means for States Other than Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code				
			01	23	45	67	89
203	-0.0357	01		-0.72	-1.43	-5.80*	-5.59*
415	-0.0350	23			-0.87	-5.58*	-5.32*
256	-0.0342	45				-3.40*	-3.32*
1123	-0.0314	67					-0.05
481	-0.0313	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code				
		01	23	45	67	89
0.0096	01		1.51*	1.68*	1.24+	1.27**
0.0117	23			1.11	1.22**	1.91*
0.0124	45				1.35*	2.13*
0.0106	67					1.57*
0.0085	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.
+Significantly different at the 10 percent level.

Appendix Table C-5b

PERCENT CHANGE IN EMPLOYMENT (Using Branson and Love Findings), 1980-85

Test of Differences in Means for States Other than Fifth District

Observations	Mean	Rural Code	T-Statistic, by Rural Code				
			01	23	45	67	89
203	-0.0782	01		-1.41	-2.39**	-7.03*	-7.43*
415	-0.0750	23			-1.24	-6.89*	-7.34*
256	-0.0721	45				-4.81*	-4.76*
1123	-0.0642	67					-1.10
481	-0.0631	89					

Test of Differences in Variances

Standard Deviation	Rural Code	F-Statistic, by Rural Code				
		01	23	45	67	89
0.0267	01		1.12	1.07	1.38*	2.26*
0.0282	23			1.05	1.55*	2.54*
0.0275	45				1.47*	2.41*
0.0227	67					1.64*
0.0177	89					

*Significantly different at the 1 percent level.
**Significantly different at the 5 percent level.