RSP 13(2): 61-74.

A TEST OF THE DIFFERENCES IN EXPORT BASE MULTIPLIERS IN EXPANDING AND CONTRACTING ECONOMIES

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The current national economic situation has increased the prospects that a community may face the sudden loss of a major employer. This loss could be firms reducing their workforce by limiting work hours, layoffs, or complete closure. This can also be firms relocating production elsewhere.

In the U.S. there have been studies examining the relative shift of manufacturing from the industrialized Northeast to the Sunbelt. [13]. While they have concluded that the shift is more a difference in the rate of firm births and deaths than relocation, the spector of employment loss base is no less dramatic. Brownrigg [6] and Barkely [1] review the consequences and likelihood of such an employment loss.

Brownrigg starts with a very elemental problem facing planners and others in trying to anticipate the implications of the loss of the employment base:

> "In the absence of a literature on negative impact, or decline, consultants and others involved in public sector policy decisions would appear to have developed the practice of simply running one of the above models (multipliers) in reverse, to generate estimates of potential income and employment loss. This assumes a symmetry of multiplier effect between expansions and contraction . . ."

Brownrigg goes on to argue that such an assumption is not justified and presents some reasons for nonsymmetrical responses to expansion and contraction. The major difference being the offsetting expansion of public sector employment and spending and the increased redundancies in the trade sector. While Brownrigg suggests that the contraction multiplier will be smaller than that for expansion, his case study does not permit testing that hypothesis. The current paper will use a data set that permits such a test.

The second issue that will be examined in this paper is the question of variability in the multiplier expression that continued to plague planners regardless of an expansion/contraction event. Richardson [19] comments on this variability, as do many summaries of empirical studies of multipliers. Yet little empirical research has been done to systematically examine the factors suggested as causes of multiplier variation.

Two models will be presented. The first is a very simple multi-sector export base model that permits direct testing of the asymmetry of the multiplier. The second model permits testing the influence of the socio-economic environment on the expression of the local multiplier. A data set of 264 nonmetropolitan counties in the U.S. will be used to test the hypotheses. The results indicate that multipliers are asymmetrical and that the socio-economic environment does affect the expression of the local multiplier in a systematic fashion.

The Model

The majority of studies examining the effects of employment changes on the local economy are grounded on the economic/export base theory. This theory argues that total employment can be divided into employment to produce goods and services for local buyers and employment in basic industries which primarily export their product to business and individuals outside the region (Pfister, [17]; Richardson, [18]; Tiebout, [20])

The relationship for any time period (t) may be written:

$$(1)\quad (E_T)_t = (E_b)_t + (E_{nb})_t$$

Where E_T is total employment, E_b is basic employment and E_{nb} is nonbasic employment.

Growth or decline of the basic sector employment will lead to growth or decline in the nonbasic sector and total employment. The general relationship where changes in total and basic employment may not be proportional can be written as:

$$(2)\quad \Delta E_T = \beta_0 + \beta_1 \Delta E_b$$

where β_0 is a constant term, β_1 is the marginal multiplier, and ΔE_T, ΔE_b and ΔE_{nb} are defined as:

$$(3)\quad \Delta E_T = (E_T)_t - (E_T)_{t-\ell}$$

$$(4)\quad \Delta E_b = (E_b) - (E_b)_{t-\ell}$$

$$(5)\quad \Delta E_{nb} = (E_{nb}) - (E_{nb})_{t-\ell}$$

where ℓ is the length of the time over which the change is measured. The change in total employment, Equation (3), can be written as the sum of the change in basic employment, Equation (4), and the change in nonbasic employment, Equation (5).

$$(6)\quad \Delta E_T = \Delta E_b + \Delta E_b + (E_{nb})_t - (E_{nb})_{t-\ell}$$

Substituting Equation (6) into Equation (2), and collecting terms, the relationship between change in nonbasic and basic employment may be written as:

(7) $(E_{nb})_t = \beta_0 + (\beta_1 - 1)\,\Delta E_{bi} + u_i$

Where:

ΔE_{nb} = the change in nonbasic employment from year $(t-\ell)$ to year t.

ΔE_b = the change in basic employment from year $(t-\ell)$ to year t.

u_i = the stochastic disturbance term.

i = county.

Equation (8) will permit testing the contribution of different segments of the export base to nonbasic employment change as well as differences in multipliers caused by increases or decreases in the export sectors.

Model II Equation (7) can be rewritten dropping the assumption that basic sector employment multipliers are constant across all communities. Let f(z) include community factors that influence the impact of the multiplier among communities. Substituting f(z) into Equation (7) yields:

$$(\Delta E_{nb})_i = \beta_0 + (\beta_1 - 1)\,\Delta E_{bi} + f(z)\,\Delta E_{bi} + u_i$$

This study contends the most important of these community factors are the geographic location, population size and the type of manufacturing in the community.[1]

Location of a community can have considerable impact on the size of a multiplier. The residents of a community will make part of their purchases from the local retailers. However, the variety of services in a nonmetropolitan county differs from that in a SMSA, and is more limited. The well known Central Place Theory (Berry and Garrison, [3]; Richardson, [18]) contends that larger communities (higher in the central place hierarchy) will provide a greater variety of goods and services and attract spending from smaller communities (lower in the central place hierarchy). This leakage reduces the size of the local multiplier in the smaller community. Bender and Coltrane's [2] study estimating the multipliers for the Northern Plains found that nonbasic employment increased as the community was located further and further away from a trade center. They concluded that it is reasonable to expect the basic sector expansion in communities remote from a regional trade center would generate more secondary employment and thus a larger multiplier. This is consistent with Lewis' [14] findings for seven intermountain states and Harvey's [11] earlier Canadian study. Edwards and Gordon [7] reported that British data indicate a negative relationship between the propensity to import into a region and the distance to other urban centers.

[1] Other factors such as age structure, quality of the labor force, female labor force participation, and per capita income may also influence multiplier size. Because of degrees of freedom problems and problems of multicollinearity these factors are not included in f(z) at this time.

Population size of a community should affect the size of employment multipliers. Central Place Theory contends that a larger population usually implies a larger and more diversified service and retail sector. A higher proportion of inputs (labor and raw materials) and general industrial supplies required by business and industry can be locally supplied in a more diversified economy. Similarly, a greater proportion of desired consumer goods and services are available in a larger community. Thus more dollars remain within the larger community. On the supply side, a larger labor pool will reduce in-commuting to fill job openings. If most jobs are filled by local residents, the multiplier impact of basic sector expansion would tend to be greater than if many jobs are filled by in-commuters. Harvey's [11] single variable regression of the service-base ratio and city size was positive and significant for Canadian cities. The Edwards and Gordon study [7] found a negative influence from population size on the propensity to import into a region.

Different types of manufacturing will have different impacts on the economy of a nonmetropolitan community due to the variety of their input requirements. A community will gain more if the inputs required for production match the local resources and are purchased locally. An important location force in nonmetropolitan communities is labor [Haren and Holling, 1979]. If the production technique used by the manufacturing plant has a high labor-output ratio, it is expected that the community gains more from manufacturing expansion than when a high capital-output ratio exists. This is because labor and not capital is usually the input supplied by the local community. If the new manufacturing firm is capital using there will be fewer new jobs with higher wages than for a labor using firm with more jobs but with lower wage rates. Therefore, a labor using technique increases the income level of people in the lower income brackets by hiring more low skill workers. These workers will have a higher marginal propensity to consume locally. Friedly [8] in a case study of Redondo Beach, California found that families with higher income spent less within Redondo Beach than did families with less income.

Since capital use cannot be measured directly from this data set, it is proxied as the difference between manufacturing output and manufacturing wages divided by manufacturing output.

$$(16) \quad \frac{\$0 - WN}{\$0} = \frac{rK}{\$0}$$

where $\$0 - WN = rK$ is the payment to capital; $0 is the total value added; and WN is the total wages paid in the manufacturing sector.[2] This ratio measures the capital use in manufacturing. It is hypothesized that the local multiplier decreases as the value of this capital use index increases. Estimates of capital use in agriculture and the third basic sector are beyond the limits of this data set. For this analysis, however, capital use in manufacturing will suffice.

From the proceeding discussion, it is possible to write the f(z) function in a linear functional form of location (L), population (P), and type of manufacturing

[2] For a more detailed discussion of this index, see Morawatz [16].

(M).[3] There are other potential causal forces for community influence on the size of the multiplier, but for this initial attempt the test will be limited to these factors.

$$(10) \quad f(z) = f(L_i,P_i,M_i) = \phi_1 L_i + \phi_2 P_i + \phi_3 M_i$$

Substituting the linear functional form of Equation (10) into Equation (9), yields:

$$(11) \quad (\Delta E_{nb})_i = \beta_0 + (\beta_1 - 1)\,\Delta E_{bi} + \phi_1 L_i \Delta E_{bi} + \phi_2 P_i \Delta E_{bi} + \phi_3 M_i \Delta E_{bi} + U_i$$

The estimated coefficient ϕ_1, ϕ_2, and ϕ_3 of Equation (11) will be the same as for Equation (10), since they have not been manipulated algebraically. The employment multiplier impact for community i at a particular location, with a specific population, and a particular type of industry is given by the sum of $(\beta_1-1) + \phi_1 L_i + \phi_2 P_i + \phi_3 M_i$. Thus Model II divides the multiplier into a constant portion (β_1-1) which is dependent on the economic linkages among industries and a variable portion which accounts for the economic linkages between the economic base and the community.

The Data Set. Most previous attempts to estimate multipliers were case studies of one or a few communities. This prevents systematic testing of the influence of community characteristics on local multipliers. The present study uses a data set consisting of observations on 276 counties for various years from 1947 to 1972.[4] The data was compiled from many sources including: *The Census of Population 1950, 1960 and 1970; Census of Manufacturers, 1947, 1952, 1967 and 1972; County Business Patterns, 1959; and Census of Agriculture, 1950, 1954, 1959, 1964 and 1969.*

The observations represent a ten percent (10%) stratified sample of the U.S. counties with nonmetropolitan status in 1950, excluding Alaska and Hawaii. For this study the original data set is modified to exclude those counties which achieved metropolitan status during the period 1950-1970. There are 264 counties which maintained nonmetropolitan status throughout the entire period.

[3] f(L,P,M) may also take log-linear or semi-log forms. Preliminary experimentation with these forms found that the linear form provided the most significant results.

[4] The data utilized in this analysis were made available by Professor Gene F. Summers, College of Agricultural and Life Sciences, University of Wisconsin-Madison. The data were collected originally as part of the Wisconsin Experiment Station Research Project 2071, Gene F. Summers, Principal Investigator. Neither Professor Summers nor the University of Wisconsin bear any responsibility for the analysis of interpretations presented here.

For purposes of this study the community is defined by the political boundaries of the county.[5] This definition of community is dictated by the availability of data at the sub-county level in nonmetropolitan areas. There may be several smaller incorporated places in the county, but limiting the community to only incorporated places ignores the significance of agriculture and scattered site residential housing in nonmetropolitan areas.

Since the data set to be used in this research mainly consists of cross section data for 1950, 1960 and 1970, the decade will be used as the time period of the changes for which the model is estimated. While the structure of local economies may change over a long period, the choice of a decade as the time period for estimation purposes appears reasonable (Hoyt, [12]; Braschler, [4]; Braschler and Kuehn, [5]).[6] The more current decade 1960-70 was used for this analysis because the interest is not the possible structural change through time, but possible asymmetry of the relationship.

Prior research suggests that the various industries which make up the basic sector in nonmetropolitan communities will have different indirect employment impacts on the local community based on their linkage with the local economy (Braschler, [4]; McNulty, [15]; Weiss & Gooding, [21]). Partitioning the basic sector into several subsectors reflecting differential employment impacts on the local economy enhances the usefulness of the empirical results. Both the assumption approach and location quotient method are used to identify the economic base for the 264 nonmetropolitan counties in this study. On an *a priori* basis, manufacturing and agriculture (including farming, mining, fishing, and forestry) are considered basic. The work by Braschler [4] and Hoyt [12] suggests this is reasonable in nonmetro areas. The proportion of all other economic sectors which are basic in each nonmetropolitan county are determined via location quotients (Tiebout, [20]; Greytek, [9]). The two digit industry classification in the census was used to estimate this portion of the export sector. Equation (7) is modified to include agriculture, manufacturing, and third basic sector in each nonmetropolitan community by simply dividing E_b into three separate variables.[7] It is recognized that this approach

5 There are two general approaches to defining the unit of observation. One suggests "functional economic areas" or labor market sheds. The second uses a smaller political unit, e.g. municipality or county. Our data set prevented the aggregation to a multi-county labor shed. Furthermore, transportation changes can affect the size of that area dramatically. Thus, a single county was selected as the unit of observation.

6 McNulty [15] used a model similar to Equation (7) to estimate differential income multipliers for different periods from 1950-1969. The best results were obtained for longer time periods. McNulty's results suggest that export growth provides a more powerful explanation of nonbasic sector growth in the long-run contrary to most of the theoretical predictions [Tiebout, 20].

7 The third basic sector becomes a collection of various nonagriculture and nonmanufacturing activities that performed an export function in a particular county. These sectors varied from trade to transportation.

may lead to some bias in the estimate of the export base, but there is no reason to expect that bias to be different for expanding or contracting manufacturing employment counties.

To test the empirical reality of symmetrical positive or negative change multipliers, the sample of 264 nonmetropolitan counties was divided into two subsamples: counties where manufacturing employment increased and counties where manufacturing employment declined.[8] Of the 264 nonmetropolitan counties studied 208 experienced manufacturing employment growth during the 1960-70 decade.

It is important to remember the direction of change in basic employment and nonbasic employment in interpreting the coefficients for the models. For counties where manufacturing employment declined, there is a negative change linked to the estimated coefficient. Thus, a positive coefficient yields a negative change in nonbasic employment, and a negative coefficient yields a positive change in nonbasic employment.[9]

For manufacturing, the above interpretation is straightforward since manufacturing employment changes are segregated into positive and negative changes. The interpretation of the agriculture and the third basic is less clear. Examination of the data indicates that agricultural employment declined during the decade regardless of the manufacturing employment change. Thus, the interpretation of coefficient signs for change in agricultural employment will presume an agricultural employment decline. The change in third basic employment was generally positive and the interpretation of the coefficient signs will presume a positive change in the third basic sector.

Results

Model I assumes growth in nonbasic employment is solely a function of growth in basic sector employment, and the expression of employment multipliers is the same for all counties. The Model I estimates for counties where manufacturing employment increased and for counties where manufacturing employment declined are reported in Table I.

In counties where manufacturing employment increased, statistically significant employment multipliers were obtained for all basic sectors. Consistent with theoretical expectations all of the employment multipliers estimated for

[8] Due to the substitution of capital for labor, agriculture employment steadily declined in most nonmetropolitan counties between 1960 and 1970. Because of exogenous demand changes, employment in basic industries other than agriculture or manufacturing steadily increased in most communities. Monotonic employment changes in agriculture and other basic industries suggests that estimation of separate positive and negative employment multipliers for these sectors would not be warranted.

[9] The average per county change in nonbasic employment was positive for both increasing and declining manufacturing employment counties from 1960-1970 eliminating the complicating factor of a negative dependent variable.

these counties were positive. The largest multipliers were obtained for the manufacturing sector. The results indicate that each additional 100 manufacturing jobs during the 1960-1970 decade increased nonbasic employment change by 78 jobs during the 1960-1970 decade. The results indicate that employment in the third basic sector contributes significantly to growth in nonbasic employment. The impact of 100 additional third sector jobs contributed 118 additional jobs during the 1960-1970 period to nonbasic employment. The significant constant term means that the average and marginal multipliers are different.

In counties where manufacturing employment declined the regression results were less consistent with theoretical expectations. Significant negative coefficients for manufacturing implies that a decline in manufacturing employment would actually increase the nonbasic employment change. One possible explanation for this unexpected phenomenon is a substitution of nonmanufacturing export base employment for the declining manufacturing sector. The significant positive coefficients for the third basic sector support this hypothesis. Another explanation is that the counties experienced a shift in the composition of the manufacturing sector. While total manufacturing employment declined, some manufacturing businesses with strong nonlabor linkages to the local economy actually grew. In this case, the net change in manufacturing employment is not a reliable measure of the impact of manufacturing on the local economy. This data set is simply too aggregated to test this hypothesis. A third possibility is the long term growth in real income led to increased demand for "nonbasic" services despite the decline in the basic sector. Much of this should be captured in the constant term, but it was not significant. Significant positive employment multipliers were obtained for the third basic sector. Much of this should be captured in the constant term, but it

Table 1. Basic Sector Employment Multipliers For Nonmetroplitan Counties: 1960-1970.

	Manufacturing Employment Change	
Basic Sector	**Increase**	**Decrease**
ΔManufacturing	1.59***	–2.25***
	(.0785)	(.5500)
ΔAg	0.78***	–0.2014
	(.1118)	(.2837)
ΔThird Basic Sector	1.18***	0.96***
	(.0587)	(.1463)
Constant	444.00***	76.00
	(94.55)	(145.47)
	$R^2 = .83$	$R^2 = .56$

( ) Standard errors
* Statistically significant at 0.10 level using a two tail test.
** Statistically significant at 0.05 level using a two tail test.
*** Statistically significant at 0.01 level using a two tail test.

was not significant. Significant positive employment multipliers were obtained for the third basic sector. Each additional 100 third basic sector jobs between 1960-70 created 96 additional nonbasic jobs. The insignificant constant term means the average and marginal multiplier are the same.

A t test was used to compare the individual multipliers for counties with increasing manufacturing vs. decreasing manufacturing employment and the multipliers were significantly different.

Results from Model II. For Model II, the assumption that the expression of the employment multipliers is the same value in all counties is dropped. Results for counties where manufacturing employment increased and for counties where manufacturing employment declined are reported in Table II.

Employment multipliers cannot be read directly from Table II. If distance to the nearest SMSA, population of the county, and capital use in manufacturing are known, the employment multipliers for a specific county can be estimated using the results in Table II. For example, the manufacturing employment multiplier for a county where manufacturing increased is given by: $k = 0.644 + 0.0006$ (distance to nearest SMSA in miles) $+ 0.012$ (county population in thousands) -0.015×10^{-8} (capital use in manufacturing).

The unadjusted multipliers were all significantly different from zero for counties where manufacturing employment increased.[10] Distance to a SMSA and population of the county were hypothesized as accentuating and capital intensity of manufacturing as dampening the expression of the employment multipliers. Distance had a negative effect on the third basic sector multiplier in the 60's and it was not significant for manufacturing and agriculture. This suggests that the influence of isolation may not be as strong as suggested by Bender and Coltrane [2], Harvey [11], Lewis [14] and Edwards and Gordon [7].

A larger population base generally leads to a more complete expression of the multiplier in the local economy if the ability to capture the nonbasic changes is directly linked to the size of the nonbasic section and population. Population had a significant positive impact on the size of the agricultural multiplier in these counties.[11] Each 10,000 people in the community reduced the unadjusted agriculture multiplier by 0.038. This suggests the adverse impact on the local economy of employment declines in agriculture was less in

[10] The term unadjusted multiplier will be used to refer to the coefficient on the change in the specific portion of the export base, e.g., agriculture, manufacturing and third basic. The adjustment is the interaction between the export base and the community.

[11] The agriculture coefficient (multiplier) is positive, so a decline in agricultural employment reduces nonbasic employment. However, the negative coefficient on the interaction of change in agricultural employment times either distance or population leads to a positive effect since the change in agricultural employment is negative. Thus, the agriculture multiplier is increased, but the net effect is to reduce the adverse impact of the decline in agriculture.

areas with larger population. Presumably it is easier for displaced agricultural workers to find alternative employment in the local economy of larger communities where agriculture is relatively less significant to the total economy.

No statistical evidence was found to suggest that capital use in manufacturing had any impact on the size of the manufacturing employment multiplier in counties where manufacturing employment increased. Due to the crudeness of this measure, judgement about effect of capital use on local multipliers remains indeterminant.

The unadjusted multipliers were not consistently significant in the counties where manufacturing employment declined. Of particular interest is the insignificant coefficient on the change in manufacturing employment. The unadjusted multiplier for agriculture and the third basic sector was significant, and was larger than its respective value in counties with increasing manufacturing employment. One possible explanation for the relatively larger multipliers is the counties were more sensitive to manufacturing declines than increases. A 't' test performed on coefficients of individual export sectors indicate a significant difference among counties with increasing and declining manufacturing employment.

In counties where manufacturing employment declined, distance had a negative influence on the expression of changes in the third basic sector on the nonbasic sector. Distance reduced the negative impact of agricultural employment declines.

An increased level of capital use had no effect on the size of the manufacturing multiplier in counties experiencing a manufacturing employment decline.

An F-statistic was calculated to test whether the multipliers impact is constant for all counties. For counties experiencing either a growth or decline in manufacturing employment the calculated F statistic is significant at 0.01. Thus, we reject the null hypothesis that employment impacts are the same for all counties. The size of employment impacts will vary depending on specific community attributes such as population, distance, and type of manufacturing present.

An F test was used to compare the equations for counties with increasing manufacturing employment against those with decreasing manufacturing employment. There was a significant difference.

Sensitivity of Nonbasic Employment Changes

In order to determine the response of nonbasic employment changes to variations in the independent variables in Model II the model was estimated for the average values for each variable. Then each variable was increased by 10 percent and the resultant change on nonbasic employment change was estimated. These results are reported in Table 3.

The relative influence of the various factors hypothesized as affecting the size of the employment multiplier varies between counties experiencing a manufacturing employment increase or decrease. For nonmetro counties

Table 2. Community Influences on Basic Sector Employment Multipliers: 1960-1970

	Manufacturing Employment Change	
Basic Sector	**Increase**	**Decrease**
ΔManufacturing	0.659**	−0.62
	(.134)	(2.03)
ΔAgriculture	0.828***	2.020***
	(.185)	(.365)
ΔThird Basic Sector	0.942***	1.71***
	(.096)	(.308)
Interaction Terms		
D(ΔMfg.)@	−0.0006	0.0065
	(.0021)	(.0074)
D(ΔAg)	−0.000018	−0.0037*
	(.002)	(.0022)
D(ΔThird Basic)	−0.0022**	−0.0109***
	(.0010)	(.0025)
P(ΔMfg)@	0.012***	−0.021*
	(.002)	(.013)
P(ΔAg)	−0.0038**	−0.047***
	(.0016)	(.020)
P(ΔThird Basic)	0.0043***	0.0070**
	(.0012)	(.0029)
K(ΔMfg)@	0.15×10^{-8}	0.104×10^{-8}
	$(.77 \times 10^{-7})$	$(.92 \times 10^{-7})$
Constant	659.00***	393.00***
	(68.9)	(81.20)
	$R^2 = .93$	$R^2 = .89$

D is distance in miles.
P is population in thousands.
K is manufacturing capital share in percent.
( ) Standard errors.
* Statistically significant at 0.10 level using a two tail test.
** Statistically significant at 0.05 level using a two tail test.
*** Statistically significant at 0.01 level using a two tail test.

experiencing manufacturing employment increase the interaction between manufacturing and population followed by the manufacturing employment change had the largest relative positive impact on nonbasic employment change. The importance of the decline of agricultural employment in these counties is highlighted by the large negative impact of agricultural employment change on the change in nonbasic employment.

For nonmetro counties that experienced a decline in manufacturing employment the loss of agricultural employment had the largest relative impact (both positive and negative) on the change in nonbasic employment. The third sector when entered as a simple variable had the second largest positive impact, when it was entered as a complex variable with distance it had the second largest negative impact.

The conclusion from this analysis is that distance and population did interact with changes in basic employment to alter the rate of change in nonbasic employment.

Table 3. Sensitivity of Changes in Nonbasic Employment to 10% Change in Independent Variables Manufacturing Employment Change

	Manufacturing Employment	
	Increase	Decrease
	Percent Change Nonbasic Employment	
Mfg.	+2.56%	1.04%
Agric.	–3.66	–9.99
Third Basic	+1.42	6.05
Dist. × Mfg.	–.16	–1.15
Dist. × Ag.	.00	1.02
Dist. × Third Basic	–.09	–3.77
Pop. × Mfg.	3.02	1.76
Pop. × Ag.	.53	7.20
Pop. × Third Basic	.50	.86
Cap. Use × Mfg.	.00	.00

Summary

This study of the influence of community characteristics on economic base multipliers utilizes a sample of 264 nonmetropolitan counties. The economic base of nonmetropolitan counties was divided into three separate components. These components were agricultural employment, manufacturing employment and basic employment in all other industries. These counties experienced both increases and decreases in manufacturing employment over the decade.

Statistical tests performed on the multiplier estimates from both Model I and II indicate that the multiplier values are different among counties with increasing vs. declining manufacturing employment. Therefore, the implicit assumption of a symmetrical response to either an export base expansion of contraction is not validated. Contrary to Brownrigg's hypothesis, the multipliers for the counties experiencing a decline in manufacturing employment had a larger multiplier than did counties experiencing an increase. This may, however, reflect the adjustments over a 10 year period that Brownrigg acknowledges.

The second general conclusion of the study is that the variability of economic base multipliers is a function of the type of economic change (agriculture, manufacturing, and other basic industries), and selected community characteristics such as distance, and population. Statistical tests performed on the regression results indicate that the local expression of the economic base employment multiplier in nonmetropolitan counties is influenced by specific characteristics of the community.

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