Intraregional Commuting and Poverty: A Cross-Sectional Analysis of "The Regional Welfare Syndrome"

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On the basis of a number of maps portraying the commuting patterns of American workers in 1960, Brian Berry has concluded that:

The regional pattern of rural poverty in the United States parallels these rhythms of the nation's commuting fields, set within a national context of heartland, hinterlands, and an urban hierarchy.¹

It is the purpose of this paper to provide an empirical evaluation of Berry's hypothesis. Commuting, like migration, ideally should act as a regional equilibrating mechanism. If urban areas provide more and/or better paying employment opportunities, commuting should increase the well-being of hinterland residents. If this is so, factor (labor) market equilibrium between hinterland and urban center could be achieved through commuting rather than migration.

In this paper, a sample of Multicounty Area (MCA) hinterlands is used to analyze the determinants of commuting and the effect of commuting on poverty in non-metropolitan areas of the United States.² These hinterlands are characterized by low, average, and high rates of growth in nominal per capita personal income between 1959 and 1969.³ By utilizing this cross section of functional economic areas, it should be possible to gain a better understanding of the effect commuting has on hinterland areas.

Literature Review

Many of the previous empirical studies of commuting are characterized by their focus on a specific area without regard to developing common factors which explain work-trip behavior.⁴ A notable exception is Yu's study of socioeconomic factors explaining commuting within SMSA's, which indicates that 63 percent of the variation in the net commuting rate was explained by the percent of an SMSA's population residing in the central city.⁵

The most extensive studies of commuting have been done by Brian Berry whose research shows that all but 5 percent of the country's labor force resides within one hour's journey of a metropolitan center. He concludes that there is a

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close correspondence between commuting or metropolitan labor market participation and the existence of rural poverty. He suggests that improving the links between periphery and center is a viable strategy to reduce poverty in hinterland areas. This paper evaluates Berry's hypothesis that an inverse relationship exists between commuting and rural poverty.

MCAs: The Units of Analysis and Their Selection

The MCA is a geographic area that includes an urban center and the periphery over which the center exercises economic influence. In other words, each county unit is attached to the urban center around which the county's economic activity is focused with each MCA closely corresponding to the closed trade area of central place theory.

In view of the fact that commuting in nonmetropolitan or noncore areas is the sole concern of this paper, 42 of the 292 MCAs were eliminated, since they had no hinterland. The remaining 250 MCA hinterlands were ranked according to the percent and absolute changes in nominal per capita personal income recorded between 1959 and 1969. The final selection, based on the criterion of income growth, produced a test group consisting of 27 areas having high income growth hinterlands (giving the convenient acronym HIGHS), 29 low income growth hinterlands (LIGHs) and 27 randomly chosen control areas from the 190 remaining MCA hinterlands which were neither HIGH nor LIGH areas.⁶ (See Appendix I for the MCA hinterlands analyzed.)

MCA Hinterland Commuting Summary Statistics

Data from the Census Bureau's 15% journey-to-work sample detail the work locations of employed people in the chosen sample areas for the calendar year 1970.⁷ The data for each hinterland group, broken down by region, are reported in Tables 1 and 1a. Table 1 shows: (1) total work force; (2) numbers working in county of residence; (3) numbers working out of county of residence; (4) place of work not reported; (5) percent of work force not reported; and (6) percent of reported work force commuting out of county of residence. Table 1a shows: (1) total reporting commuters; (2) number commuting to core; (3) number commuting out of MCA hinterland; (4) number commuting to core as percent of total reported commuters; (5) percent of reported work force commuting to core; and (6) core commuters as a percent of those commuting out of MCA hinterland.

These data have certain limitations: the small sample of the population (15%); the large number of persons who did not report their place of work (6.1% to 9.1% of the total work force according to Table 1); and the discrepancy in size between MCA hinterlands studied.⁸

Table 1a indicates that, in general, few of the reporting workers commute to the core area of the MCA. The percent of workers who commute to core areas ranged from 2.3 percent in nonsouth HIGHS to 8.2 percent in southern control hinterlands. As a percent of commuters who commute outside of the

TABLE 1
Work Force Statistics by Region for Selected MCA Hinterlands, 1970

	Total Work Force	No. Working In County of Residence	No. Working Out of County of Residence	Place of Work Not Reported	% of Work Force Not Reported	Worked Out of County of Residence as % of Reporting Work Force
LIGHS (29)	958,100	735,103	143,471	79,526	8.3	16.3
South (7)	276,850	201,163	50,461	25,226	9.1	20.1
Nonsouth (22)	681,250	533,940	93,010	54,300	7.6	14.8
CONTROLS (27)	2,163,955	1,698,705	308,427	156,823	7.2	15.4
South (6)	258,598	188,520	48,797	21,281	8.2	20.6
Nonsouth (21) ^a	1,905,357	1,510,185	259,630	135,542	7.1	14.7
HIGHS (27)	2,113,453	1,650,289	306,441	156,723	7.4	15.7
South (13)	1,257,199	946,477	206,337	104,385	8.3	17.9
Nonsouth (14)	856,254	703,812	100,104	52,338	6.1	12.5

^aExcludes the commuting data for the Springfield, Massachusetts, Muncie, Indiana and Longview, Texas MCA hinterlands. (see Footnote 6)
Source: 1970 *Census of Population*. 1970 Fourth Count Summary Tape (Population), Table 35. Population at Work During the Census Week by Place of Work. (unpublished)

TABLE 1a
Commuting Statistics by Region for Selected MCA Hinterlands, 1970

	Total Reporting Commuters	Number Commuting to Core	Number Commuting Out of MCA Hinterland	% of Reported Commuters to Core	% of Reported Work Force to Core	Core Commuters as % of Commuters Out of MCA Hinterland
LIGHS	143,471	52,506	46,288	36.6	6.0	53.0
South	50,461	10,543	22,315	20.9	4.2	32.1
Nonsouth	93,010	41,963	23,973	45.1	6.7	63.4
CONTROLS	308,427	108,106	96,585	35.1	5.2	51.9
South	48,797	19,527	14,671	40.0	8.2	57.0
Nonsouth	259,630	88,579	81,914	34.1	4.8	51.4
HIGHS	306,441	80,091	78,571	26.1	4.1	50.5
South	206,337	61,639	46,851	30.0	5.3	56.7
Nonsouth	101,104	18,452	31,720	18.3	2.3	36.7

MCA hinterland, commuters to the core were usually the majority. In only two cases, southern LIGHs and nonsouth HIGHs, were commuters to the core less than 50.0 percent of outside hinterland commuters.

Commuting: Its Determinants and Its Effect on Poverty

Berry considers the integration of the hinterland with its core important in explaining poverty or well-being in peripheral areas. To understand the role of commuting in regional welfare two related questions must be dealt with: the factors influencing commuting from hinterland to the core and the effect of commuting on the well-being of the hinterland.

It seems obvious that an individual's willingness to commute would be influenced by the net returns of commuting. An individual would look at both the benefits and costs involved before deciding to commute. The primary benefit would be the increase in earnings or income one could expect from changing employment location which must more than offset the additional costs associated with his journey to work.⁹ Other things equal, the greater the absolute earnings differential, the greater the propensity to commute.

Employment opportunities at the origin and destination would also be expected to influence the number of commuters. The more numerous are jobs in the hinterland, the less commuting would be expected; the less favorable the economic conditions, the more commuting. A direct relationship between commuting and destination employment conditions is hypothesized. That is, the better the opportunities at the destination (core), the greater the commuting flow to that destination.

Another factor which may influence the commuting decision is the diversity or variety of opportunities offered by the destination. It is generally recognized that the size of the area of employment and the possible diversification of employment are directly related,¹⁰ and predictably, the greater the diversification, the larger the expected stream of commuters.

The following equation has been estimated to test the previously discussed factors affecting commuting:

$$\begin{aligned} (1) \quad \text{COMCORE} = & a_0 + a_1 \text{LMCA} + a_2 \text{HMCA} + b_1 \text{CITYSIZE} \\ & + b_2 \text{COREUNP} + b_3 \text{DISTANCE} + b_4 \text{EARNDIF} \\ & + \tau \text{REGION} + e \end{aligned}$$

The dependent variable COMCORE is the percent of reporting workers who commuted from the hinterland to the core in 1970. LMCA and HMCA are dummy variables which capture differences in the intercept term between the control group and either the LIGHs or HIGHs respectively. CITYSIZE is the population of the core area in 1970. If size of city is viewed as a proxy for the diversity of opportunities at the destination it is expected to be positively related to commuting. COREUNP is the unemployment rate in the core area in 1970, which indicates the labor market conditions at the core and should be inversely related to commuting. The variable DISTANCE is the linear distance from the

center to the boundry of the MCA.¹¹ As previously mentioned, excessive distance is a deterrent to commuting and is therefore expected to be inversely related to commuting. EARNDF is the difference between core and hinterland mean income of the covered work force in 1970. According to our framework, the percentage of the work force commuting to the core should increase as this differential increases. REGION is a dummy variable to capture differences between South and nonsouth MCA hinterland commuting. Estimates of this equation are shown in Table 2, equation (1).

The signs of the independent variables are as expected. Both COREUNP and DISTANCE are inversely related to commuting, while CITYSIZE and EARNDF are positively related to commuting. The only quantitative variable not significant at the .10 level is EARNDF.

Berry has hypothesized the existence of an inverse relationship between metropolitan labor market participation and rural well-being or development. Metropolitan labor market participation, as represented by the percent of the reporting labor force commuting to the core, should reduce the incidence of poverty in the MCA hinterlands. The following equation has been estimated to examine this relationship:

$$(2) \quad \text{PROP} = a_0 + a_1 \text{LMCA} + a_2 \text{HMCA} + b_1 \text{COMCORE} + b_2 \text{CITYSIZE} + \gamma \text{REGION} + e$$

This equation relates the proportion of hinterland residents who were poor in 1969 (PROP) to the commuting rate to the core (COMCORE), controlling for hinterland income growth (LMCA and HMCA), the size of core (CITYSIZE) and the region. It is expected that both commuting and city size will be inversely related to poverty incidence in the hinterland: that is the greater the commuting rate to the core and/or the larger the size of the core, the lower will be the incidence of poverty in the hinterland. The estimated equation is reported in Table 2, equation (2).

The inverse relationship between poverty incidence and commuting rate is indicated in the equation. While the coefficient of the commuting variable is marginally significant, the magnitude of the coefficient is large. A one percentage point increase in the percent of workers commuting to the core would have decreased the incidence of poverty in the hinterland by 24.7 percentage points.¹² This adds support to the contention that increasing accessibility to the metropolitan center should contribute to the welfare of the hinterland.

Conclusions

The principal conclusions of this study are that:

1.¹ The principal factors influencing the hinterland-to-core commuting rate seem to be the size of the core, the core's unemployment rate and the distance between residence and core area.

2. The hypothesized inverse relationship between commuting and poverty incidence in the hinterland does seem to exist; the greater the commuting rate, the

TABLE 2

Regressions: (1) Relating MCA Group, Core Size, Core Unemployment, Distance, Earnings Differentials and Region to Hinterland to Core Commuting Rate, 1970; and (2) Relating MCA Group, Hinterland to Core Commuting Rate, Core Size and Region to Proportion Poor, 1970

$$\begin{aligned}
 (1) \quad \text{COMCORE} &= 11.3^{***} + 2.0 \text{ LMCA} - 1.4 \text{ HMCA} + 16.0 \times 10^{-7} \text{ CITYSIZE}^* - 0.7 \text{ COREUNP}^{**} \\
 &\quad (2.3) \quad (1.6) \quad (1.6) \quad (10.0 \times 10^{-7}) \quad (0.4) \\
 &\quad - .05 \text{ DISTANCE}^{***} + 15.0 \times 10^{-6} \text{ EARNDIF} + 0.5 \text{ REGION} \\
 &\quad (.01) \quad (187.0 \times 10^{-6}) \\
 &\quad F_{8,75} = 19.9^{***} \quad R^2 = .68 \\
 (2) \quad \text{PROP70} &= 16.4^{***} + 8.6 \text{ LMCA}^{***} + 0.9 \text{ HMCA} - 24.7 \text{ COMCORE}^* + 13.6 \times 10^{-7} \text{ CITYSIZE} \\
 &\quad (1.6) \quad (2.5) \quad (2.6) \quad (17.3) \quad (20.0 \times 10^{-7}) \\
 &\quad + 13.0 \text{ REGION}^{***} \\
 &\quad (2.0) \\
 &\quad F_{6,77} = 105.6^{***} \quad R^2 = .89
 \end{aligned}$$

*—indicates statistical significance at the .1 level

**—indicates statistical significance at the .05 level

***—indicates statistical significance at the .01 level

Numbers in parentheses are the standard errors of estimate.

lower the incidence of poverty. However, the statistical significance of the relationship was weak.

3. In terms of reducing poverty, policies to increase the integration between hinterland and core should be stressed, since it would appear from this analysis that promoting labor access to the core would have a substantial and positive impact on the well-being of the peripheral areas.

In order to increase commuting between periphery and center, increasing access to the core is essential. Time or distance is a major deterrent to commuting. In analyzing the determinants of commuting rate between hinterland and core, it was found as would be expected that a significant inverse relationship existed between the commuting rate and distance. Since time and distance are directly related, reducing the time necessary to commute from hinterland to core would reduce commuting costs. This would induce hinterland residents to avail themselves of opportunities in the core which may not be available in the hinterland.

While previous studies have questioned the importance of transportation in improving regional well-being, the findings of this study indicate that transportation is important. Policies which allow hinterland residents to increase their job mobility should be implemented.

These policies might include urban "outreach" programs, extension of or more hinterland-core highways, hinterland-core mass transit staging points or transportation subsidization. The urban "outreach" program would have the most immediate payoff in that the mechanism needed to provide information about core employment opportunities could be implemented quickly through local employment offices. Not only would this additional information benefit hinterland residents, but core residents would also benefit. As others have mentioned, improving employment information would lead to more efficient labor markets and increase society's welfare.

By improving the transportation links between hinterland and core the costs of commuting would be reduced. With the decrease in costs, commuting between hinterland and core should increase. This policy would also assist core workers who could now avail themselves of opportunities in the periphery. However, it should be noted that improving or building highways, or constructing mass-transit systems involves large capital outlays. Alternatively, mass-transit staging areas could be developed. This would involve placing assembly areas in the hinterland from which persons could commute into the core. Such a program would involve less costs, yet it would enable persons to reduce their transportation costs.

A less expensive and more direct program is transportation subsidization to the poor. Under such a program, low-income individuals would receive vouchers or payments to cover their transportation expenses to work. This program could be operated like the food stamp program, where benefits are determined by a means test; the higher one's income the less the benefits.

The conclusions of this study argue for a policy mix to improve the integration of hinterland or nonmetropolitan areas and their urban centers. While these policies may not completely eliminate poverty in hinterland areas, they would help in ameliorating the poverty problem.

APPENDIX I. TABLE 1
Income and Poverty Status Change in High Income Growth
Hinterland (HIGH) Areas, 1959-69

MCA Core	Number of Core Counties	Number of Hinterland Counties	Change in Hinter- land Income 1959-69		Change in Persons in Poverty 1959-69	
			Absolute	Percent	Absolute	Percent
Baltimore (SMSA), MD	6	14	1940	107.0	- 62771	-40.5
Norfolk (SMSA), VA	4	31	1263	109.7	-123503	-44.5
Dothan, AL	1	8	1571	139.4	- 36699	-42.0
Savannah (SMSA), GA	1	23	1308	124.8	- 68275	-39.1
Albany (SMSA), GA	1	18	1368	127.5	- 58879	-41.8
Valdesta, GA	1	6	1289	128.2	- 15683	-44.0
Richmond, IN	1	2	2143	132.2	- 3895	-51.8
Sioux City (SMSA), IA	2	18	1658	115.9	- 39208	-50.6
Mason City, IA	1	6	1870	116.2	- 13736	-59.3
Fort Dodge, IA	1	4	1825	118.5	- 7840	-53.1
Owensboro, KY	1	3	1716	183.8	- 7272	-47.0
Lake Charles (SMSA), LA	1	5	1737	132.7	- 13057	-29.4
Jackson (SMSA), MI	1	1	1634	113.2	- 3327	-44.7
Lincoln (SMSA), NB	1	26	1876	114.2	- 41949	-53.4
Durham (SMSA), NC	2	6	1351	116.5	- 40985	-47.1
Raleigh (SMSA), NC	1	8	1312	108.0	-104265	-45.9
Fargo (SMSA), ND	2	25	1315	109.5	- 48431	-46.2
Bismarck, ND	1	21	1426	123.4	- 26427	-50.2
Minot, ND	1	16	1638	121.6	- 22141	-46.9
Columbia (SMSA), SC	2	12	1269	120.0	-112389	-43.3
Greenville (SMSA), SC	2	3	1451	107.2	- 21885	-55.2
Anderson, SC	1	2	1457	119.8	- 8329	-49.7
Sioux Falls (SMSA), SD	1	46	1581	122.2	- 74899	-49.0
Chattanooga (SMSA), TN	2	19	1321	116.0	- 76412	-45.3
Jackson, TN	1	5	1476	124.8	- 27642	-49.9
Waco (SMSA), TX	1	7	1351	114.1	- 30440	-52.0
Texarkana (SMSA), TX	2	4	1313	119.0	- 11200	-44.2

APPENDIX I. TABLE 2
Income and Poverty Status Change in Low Income Growth
Hinterland (LIGH) Areas, 1959-69

MCA Core	Number of Core Counties	Number of Hinterland Counties	Change in Hinter- land Income 1959-69		Change in Persons in Poverty 1959-69	
			Absolute	Percent	Absolute	Percent
Mobile (SMSA), AL	2	11	978	76.7	-37015	-33.6
Phoenix (SMSA), AZ	1	7	962	51.8	- 5339	- 9.0
San Francisco (SMSA), CA	5	2	837	33.2	- 1502	- 4.3
Albuquerque (SMSA), NM	1	20	866	59.0	-39203	-24.0
Corpus Christi (SMSA), TX	2	11	950	68.0	-25445	-35.1
Gadsden (SMSA), AL	1	3	921	82.6	-19532	-40.2
Tuscaloosa (SMSA), AL	1	4	751	88.6	-21105	-37.8
Santa Barbara (SMSA), CA	1	1	869	42.4	400	2.8
Colorado Springs (SMSA), CO	1	2	773	51.5	- 982	-19.3
Idaho Falls, ID	1	6	928	61.8	- 1968	-25.7
Quincy, IL	1	10	898	56.3	-17424	-45.6
Dubuque, IA	1	5	957	66.3	-19788	-51.2
Alexandria, LA	1	5	917	86.3	-16532	-32.3
LaFayette (SMSA), LA	1	3	830	86.2	-29574	-30.4
Cumberland, MD	1	1	625	39.6	- 2135	-31.4
Greenville, MS	1	5	966	89.7	-38322	-36.2
Hattiesburg, MS	1	3	787	60.7	-13190	-34.6
Butte, MT	1	4	753	40.4	- 2530	-36.9
Missoula, MT	1	2	581	38.4	- 1101	-26.2
Las Vegas (SMSA), NV	1	4	- 41	- 2.1	- 1349	-27.9
Portsmouth, OH	1	1	513	50.4	- 4932	-44.4
Muskogee, OK	1	1	425	48.9	- 2107	-23.5
Medford, OR	1	4	960	43.4	- 2866	-17.7
Beaumont-Port Arthur- Orange (SMSA), TX	2	4	805	67.8	-12389	-40.5
Laredo (SMSA), TX	1	2	351	23.2	- 1756	-26.7
Brownsville (SMSA), TX	1	1	772	57.6	- 4153	-31.9
Clarksburg, WV	1	5	884	77.9	-14212	-43.3
Eau Claire, WI	1	6	877	62.0	-17717	-44.7
Cheyenne, WY	1	3	657	31.9	- 1165	-14.9

APPENDIX I. TABLE 3
Income and Poverty Status Change in Control Hinterland Areas, 1959-69

MCA Core	Number of Core Counties	Number of Hinterland Counties	Change in Hinterland Income 1959-69		Change in Persons in Poverty 1959-69	
			Absolute	Percent	Absolute	Percent
Denver (SMSA), CO	5	79	1235	63.6	-36226	-25.3
Wichita (SMSA), KS	2	42	1838	104.0	-42845	-41.7
Springfield-Chicopee-Holyoke (SMSA), MA	2	3	1255	62.6	-5000	-25.9
Kansas City (SMSA), MO	6	32	1074	67.1	-71691	-44.0
Columbus (SMSA), OH	3	11	1394	84.9	-31130	-39.2
Tulsa (SMSA), OK	3	14	1023	67.0	-37436	-35.8
Dallas (SMSA), TX	6	25	1277	91.1	-94602	-41.7
Lubbock (SMSA), TX	1	19	1153	52.0	-17780	-25.7
Montgomery (SMSA), AL	2	14	1000	99.1	-76107	-38.5
San Jose (SMSA), CA	1	1	1337	60.6	378	2.2
West Palm Beach (SMSA), FL	1	2	1370	77.3	1827	10.7
Rome, GA	1	1	1279	97.1	-3725	-50.6
Decatur (SMSA), IL	1	5	1529	92.0	-10453	-51.0
Muncie (SMSA), IN	1	2	1574	72.6	-11699	-41.9
Davenport (SMSA), IA	3	6	1840	99.2	-19047	-49.6
Hutchinson, KS	1	1	1664	98.2	-976	-41.3
Bangor, MA	1	7	1175	78.6	-41819	-46.9
Bay City (SMSA), MI	1	6	1166	84.2	-12193	-37.8
Meridian, MS	1	9	1069	134.1	-39848	-38.4
Reno (SMSA), NV	1	11	1388	61.8	217	3.1
Binghamton (SMSA), NY	3	1	1499	83.9	-3256	-40.0
Catawba, NC	1	3	1480	104.9	-20327	-53.2
Lima (SMSA), OH	3	4	1530	83.4	-13605	-47.7
Eugene (SMSA), OR	1	3	1272	63.4	-2837	-11.8
Altoona (SMSA), PA	1	6	1285	81.5	-28645	-37.3
Wichita Falls (SMSA), TX	2	9	1265	74.3	-14192	-38.9
Longview, TX	1	2	1045	111.5	-4069	-33.3
Lynchburg, VA	3	3	1065	94.7	-7517	-44.1
Green Bay (SMSA), WI	1	17	1191	77.7	-45005	-44.1
Casper, WY	1	4	994	50.1	-3206	-32.9

FOOTNOTES

¹Brian J. L. Berry, "Labor Market Participation and Regional Potential," *Growth and Change*, Vol. 1 (October 1970), p. 8.

²Multicounty Areas are a functional regional delineation which possess a relatively closed labor market. They were developed by David L. Huff. See, David L. Huff, "Planning for Growth and Development in Rural Areas in the Context of a National System of Regions," The University of Texas Center for Economic Development Discussion Paper No. 55 (April 1973); and _____, "The Delineation of a National System of Planning Regions on the Basis of Urban Spheres of Influence," *Regional Studies*, Vol. 7 (1973), pp. 323-329.

³Stuart J. Greenfield, "An Analysis of Nonmetropolitan Poverty Reduction: A Cross-Sectional Analysis of Economic Growth, Industrialization and Labor Mobility in Selected MCA hinterlands, 1959-1969." Ph.D. dissertation, The University of Texas, (1975), pp. 12-14.

⁴Charles F. Floyd and Terry D. Robertson, "Some Urban Policy Considerations of Rural Journey-To-Work Commuting," *The Review of Regional Studies*, Vol. 1 (Spring 1971-72), pp. 29-36; Richard E. Lonsdale, "Two North Carolina Commuting Patterns," *Economic Geography*, Vol. 42 (April 1966), pp. 114-148; Richard W. Poole, "Implications of Labor Characteristics and Commuting Patterns for Regional Analysis: A Case Study," *Land Economics*, Vol. 40 (February 1964), pp. 110-116; and James H. Thompson, "Commuting Patterns of Manufacturing Employees," *ILRR*, Vol. 10 (October 1956), pp. 70-80.

⁵Eni-Young Yu, "Correlates of Commutation Between Central Cities and Rings of SMSAs," *Social Forces*, Vol. 51 (September 1972), pp. 74-86.

⁶Originally 30 control MCAs were selected, however, 3 MCAs were eliminated because of insufficient data. The 3 MCAs are Springfield, Mass., Muncie, Ind., and Longview, Texas.

The use of both relative and absolute change in per capita personal income as the criteria in selecting MCA hinterlands insures that these areas do represent high and low income growth. Traditionally either absolute or percent change in income have been used as proxies to study the "economic growth" of areas. However, which is the appropriate standard has not been resolved. When treated separately neither calculation will reveal the full picture of economic growth. Differences resulting from use of these measures stem from the influence of the size of the base. An absolute measure overemphasizes the growth in areas with a high initial level of income, while the percentage increase overemphasizes the growth of areas with smaller initial levels of income. Furthermore, Perloff contends that "regional economic trends can best be measured through an analysis of absolute and relative changes in income . . ." [See, Harvey S. Perloff, "Problems of Assessing Regional Economic Progress," in National Bureau of Economic Research, *Studies in Income and Wealth*, Vol. 21 (Princeton: Princeton University Press, 1957), p. 56.]

⁷The data are not available in published form. They are contained in the fourth count of population of the 1970 Census, tabulation number 35, tabulation title "Population At Work During the Census Week by Place of Work." The data, based on a 15 percent sample, include persons fourteen years of age or older. Persons who held two or more jobs or who traveled in their work were assigned to the place of work where they worked the most hours.

⁸Since commuting is directly related to distance, smaller hinterland areas may be expected to report more extensive commuting than larger hinterland areas, for example, in the western portion of the U.S.

⁹Lowdon Wingo, Jr., *Transportation and Urban Land* (Baltimore: The Johns Hopkins Press, 1961), Ch. 3; and Gary S. Becker, "A Theory of the Allocation of Time," *Economic Journal*, Vol. 75 (September 1965), pp. 493-517.

¹⁰William Alonso, "The Economics of Urban Size," *Papers of the Regional Science Association*, European Congress, Vol. 26 (1971), pp. 67-83; Harry W. Richardson, *The Economics of Urban Size* (Lexington, Mass.: Lexington Books, 1973); and Wilbur Thompson, *A Preface to Urban Economics*, (Baltimore: The Johns Hopkins Press, 1968).

¹¹The distance variable was found by solving for R in the equation $A = \pi R^2$, where A is the total area of each MCA.

¹²Since the aggregate commuting rate between hinterland and core in 1970 was 4.6 percent, an increase of 1 percentage point to 5.6 percent means the commuting rate would have to increase by 21.8 percent.