Faculty Working Papers

DIFFERENCES IN THE COST OF LIVING AMONG STATES AND WITHIN STATES

Walter W. McMahon, Professor of Economics, and Carroll Melton, Assistant Economist, U.S. League of Savings Associations, Chicago

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Summary:

This article considers the determinants of differences in the cost of living among areas. It finds the major one of these to be housing or land costs, and it uses this together with the other determinants in a simultaneous equation context to develop and present for the first time an index of the cost of living in each state in the continental United States. It also estimates the cost of living by counties within states. Wide differences in the cost of living of up to 37.2% are found among states, as well as 19-37% differences within states, that are of significance to multiplant firms with employees in more than one area and to people being transferred. The method and the equations presented can be generalized to any locality. It is a method that avoids the prohibitive cost of collecting price data, and of doing the necessary budget studies in each locality, by utilizing existing data.

Differences in the Cost of Living

Among States and Within States

Walter W. McMahon and Carroll Melton*

While the Bureau of Labor Statistics cost of living indices for 44 localities in the United States indicate that there are significant differences in living costs among localities, there has been no systematic way of extending these to a comparison of differences in the cost of living among states or to the differences among counties within states. The ideal way to evaluate these differences would be to collect price data from each county in the country, and to also conduct detailed budget studies of family expenditures in each county to establish the necessary weights. This procedure would be prohibitively expensive and therefore probably will never be done.

The objective of this study is to develop a cost of living index for each state and for counties within states, as well as to present an alternative method of constructing cost of living indices that uses existing data, for use by individuals who contemplate moving and employers who operate plants in different labor markets. An economic theory that considers the main causes of inter-area price differences and derives the hypotheses to be tested will be developed first. This is followed by application of simultaneous equation econometric tests of the hypotheses (by "seemingly unrelated regressions"), and by use of the regression equations to obtain predictions, followed by an appraisal of the size of the differences in the cost of living among states in the continental United States. The same method is then applied to counties within a

state, and the relative size of cost of living differences within California, Pennsylvania, and Texas are considered.

The current state of knowledge about inter-area living costs is expressed by the B.L.S. standard budgets, which are calculated for a younger family of four and for a retired couple, at three standards of living, "lower," "intermediate," and "higher." The "intermediate" budget for a family of four is the one normally used for inter-area cost-of-living comparisons, and is the one that will be used in this study. These budgets have been computed by the B.L.S. for forty cities and for four nonmetropolitan regions. A major update of the Conumer Price Index in 1978, expanding the coverage from 40 percent to 80 percent of the population and increasing the market basket from its present size of 400 specific items to several thousand items, can eventually lead to publication by the B.L.S. of increasingly representative standard budgets. These in turn should increase the usefulness of the method developed here for generalizing the results to all other states and localities.

Some attention has previously been given in the literature to sources of differences in the cost of living. M. Sherwood [6], for example, used the B.L.S. indices and price data to construct standard budgets that isolate the effect of climatic differences on costs. But his cost of living indices not only focus on this one source of differences but also were constructed for only the 44 cities and regions in the B.L.S. sample. Haworth, Rasmussen, and Matilla [3], and Alonso and Fajans [2], explore the extent to which urban population and other variables explain differences in the cost of living within the B.L.S. sample. But they do not undertake predictions for non sampled areas, an Alonso [1] finds urban population size, when income is included, to be

of minor significance. In the only major effort to extend cost of living indices from sampled to non-sampled areas, Simmons [7] has constructed an index for all of the counties in Florida. This study involved sampling prices in 12 counties and then used regression equations to extend these prices to the rest of the state. This method however was an expensive effort ($240,000) which cannot easily be updated so it is not likely to be extended to all the other states. The Florida study did not include budget studies to obtain the necessary weights, so the result was not a geographical cost-of-living index but instead a geographical price index.

Examination of the data developed by Sherwood and Simmons however indicates a 31% variation in total living costs for the continental United States and a 35% variation of prices within one state (Florida). Alaska and Hawaii will be excluded from our analysis because of their geographic isolation from the remainder of the country. But with greater shipping costs, climatic variations, and unique factors such as the oil pipeline in Alaska, including them would have the effect of increasing, not decreasing, the inter-state variation in the cost of living.

The Theory of Inter-Area Differences in Living Costs

Economic theory suggests that effective demand for goods and for housing, together with supplies that are not perfectly elastic, can play a large part in the determination of differences in living costs. As effective demand rises, the prices of land and any other goods for which supplies are less than perfectly elastic rise, causing living costs to increase. Effective demand, in turn, is determined in significant part by individuals' income and population size.

To consider a specific model, as each individual's income rises he will demand more goods and services, assuming most goods are normal goods. If this individual is typical of the locality, total demand will rise in response to increases in per capita income (Y) in that locality as indicated in Equation (1) below, with $\alpha_2 > 0$. In the short run, these increases in demand will result in movement up short run supply curves, bidding prices up. But it is the longer run supply function in the locality as given by Equation (2) below that is more relevant. In this longer run supply function, $\alpha_4 > 0$ because although goods will be shipped to the area in response to higher prices, shipping costs must be covered, wages are bid up, many markets are not perfectly competitive, and even competitive industries are usually increasing cost. Some services are not completely mobile even in the longer run, and some inputs such as land costs are likely to be bid up permanently. The model is:

(1) <u>Demand</u>: $q_1 = \alpha_1 p_1 + \alpha_2 Y + \alpha_3 \Delta P + u_1$ $\qquad \alpha_1 < 0,\ \alpha_2, \alpha_3 > 0$

(2) <u>Supply</u>: $p_1 = \alpha_4 q_1 + u_2,$ $\qquad \alpha_4 > 0$

where q_1 = the quantity and

p_1 = the price index for all goods and services other than housing purchased by households in the area,

Y = per capita income,

ΔP = percent change in population in the area, and u_1, u_2 = disturbances.

Other variables found significant by Haworth, Rasmussen, and Mattila [3] are either reflected above (e.g., Y reflects education and unionization), or will be taken into account in the research design below (e.g., region will be controlled for by partitioning). Increase in population ΔP, which we found more significant than population P, as discussed below, can increase the total demand in each locality

above and beyond the effect of increases in income per capita. However the relation between increases in urban population size, and the cost of living is a complex one. The effect of urban population size can be expected to be weaker than the effect of rising income, as has been found by Alonso [1], in part because larger population concentrations permit economies of scale in some urban services such as schools and total transportation costs. In the opposite direction, larger population concentrations contribute to higher costs of other urban services such as police, fire, and garbage disposal which affect the cost of living through higher tax costs, as well as contributing to higher land costs. But with this interaction of demand-pull and cost-push, in oligopoly or monopoly markets where prices are less flexible downward, once prices are raised they are likely to remain higher. Similarly where there is price discrimination as there is in public utility pricing or in the methods used by Blue Shield and Medicare for the reimbursement of physicians, these pricing rules lead to higher supply-prices in those localities where population and per capita incomes already are higher.

In equilibrium, substituting (2) into (1), the reduced form solution for p_1 is:

$$(3) \quad p_1 = \frac{\alpha_2}{1/\alpha_4 - \alpha_1} Y + \frac{\alpha_3}{1/\alpha_4 - \alpha_1} \Delta P + u_3$$

This result will be used in a moment in Equation (4). But first, since the supply of land is much more inelastic than the supply of other goods, and since housing costs constitute 23% of the budget of a four person family in the U. S. [13, p.2], housing costs require separate attention. Housing costs were found to vary widely among areas within the continental United States by Sherwood [6, p. 14] ranging from a cost index of 148 in Boston to 68 in Austin, Texas.

It is not only that land is immobile, resulting in a highly inelastic supply in any given locality, but also that climatic differences affect housing costs. Furthermore imperfections in competition in the building materials industry and in the construction trades also must be considered. Any source of increased demand for housing therefore can be expected to increase land prices and housing costs above and beyond those differences in building costs due to climate.

The problem, of course, is that it is very difficult to maintain the concept of a <u>standard</u> house, which then is priced out in each geographical area.[1] It is not only that differences in climate require heavier construction, insulation, and heating equipment (although less air conditioning equipment) in the north, but also that differences in housing costs reflect differences in interest costs, property taxes, and fuel bills. The implication of this is that the housing costs component of the cost of living should not price out an identical house in various areas, but must define that house necessary to maintain the same level of well-being and apply the appropriate budget study weights.

The cost of living index for a locality with separate treatment of housing costs next can be defined as:

(4) $C = p_1\bar{q}_1 + p_2\bar{q}_2$

where:

C = cost of living,

p_1 = price index for things other than housing, as above,

$\bar{q}_i$ = the standard market basket of these things required for an intermediate level of living in a four person family,

p_2 = price index for housing, and

$\overline{q}_2$ = the standard house for the "intermediate" standard of living.

The price index for housing, p_2, will be measured as the value of a standard house, V, defined at the median within each locality. Thus V includes an appropriate reflection of differences in land costs, construction costs, and some quality differences due to climate. Median values are not perfect, but are close to the ideal concept, and are available from U. S. Census data. To the extent that they overstate the appropriate cost-quality differences, they are doing so largely in response to differences in per capita income, which is consistent with the separate rationale presented for the income term in equation (1).

The cost of living given by Equation (4) can now be re-stated with the appropriate substitution for p_1 from Equation (3) and the replacement of p_2 with V:

$$(5)\quad C = \left(\frac{\alpha_2\overline{q}_1}{1/\alpha_4 - \alpha_1}\right) Y + \left(\frac{\alpha_3\overline{q}_1}{1/\alpha_4 - \alpha_1}\right) \Delta P + (\overline{q}_2)V + u_5$$

In this reduced form solution for the cost of living, all the items in parentheses will be treated as constants. $\overline{q}_1$ and $\overline{q}_2$ are standard market baskets containing different items, but each are designed to keep individuals living in different areas on the same indifference curve. In view of the earlier analysis, the contents within each parentheses can be expected to be positive. In summary, the hypotheses to be tested for their empirical significance are: (6) $\frac{\delta C}{\delta Y} > 0$, $\frac{\delta C}{\delta \Delta P} > 0$, and $\frac{\delta C}{\delta V} > 0$. Here V, in relation to the Haworth-Mattila results [3], includes the effects of climate and of barriers to city growth, Y reflects education and unionization, ΔP replaces P (discussed below), and the partitioning (below) controls for region.

Estimation of the Model

To test these hypotheses, the model can be simplified and re-written as follows. The specific sources of data for each variable are as indicated:

(7) $C = \beta_1 Y + \beta_2 \Delta P + \beta_3 V + \beta_0 + u_7$

C = cost of living index, from [6],

Y = personal income per capita in thousands of dollars [14],

ΔP = percent change in the population, 1960 to 1970 [8],

V = value of a standard house, measured at the median, in thousands of dollars [9], and

u_7 = disturbances.

Once this model is estimated for the 44 urban and nonmetropolitan areas for which cost of living indices are reported by the B.L.S., the values of each of the three determinants of the cost of living within the non sampled areas will be used in the regression equation to predict the cost of living in the non-sampled areas.

For this purpose it is essential that the number of determinants be kept to a minimum and limited to those variables for which data are readily available for each state and for each county within each state. It is only by careful attention to this point that it is possible to provide a general method usable for prediction in states, counties, and in other geographical areas (than those reported in this paper) as selected by the reader. Nevertheless, several variables other than those included in Equation (7) were tried, and non-linear forms also were tried for Equation (7) estimated for the entire sample of 44 cities and non-metropolitan areas, but the results were inferior to those for Equation (7) as shown. For example, P and P^2 were tried in place of ΔP, and logarithmic forms were tried

containing each, but the R^2 = .72 obtained for Equation (7) when estimated for the entire B.L.S. sample was clearly the best. Partitioning by regions, however, sharply improved the results.

The partitioning by the Northeast, North Central, South, and Western Regions, with the results as shown in Table 1 takes advantage of the greater homogeneity within regions, than among regions. This is brought about by greater similarity of climate, soil, terrain, and tastes, and by the similarity of transportation costs within regions. The partitioning reduces the signifcance of the t-statistics by reducing the sample size, but by controlling for these sources of variation, it also increases the accuracy of the predictions.

The model given by Equation (7) is estimated by simultaneous equation estimation techniques after the data are partitioned into the four regions by estimating the model as a set of seemingly unrelated regressions. This method takes into account things that affect all regions simultaneously, and that therefore lead to intercorrelation of the u's among regions.[2] These additional determinants of the cost of living include rising oil prices, and wage settlements that affect all regions, among other things. The seemingly unrelated regression method, a two stage Aitken estimator, takes this interdependence among regions into account and under these circumstances is more efficient than ordinary least squares. The gain in efficiency is directly related to the correlation among the residuals and inversely related to the correlation among the explanatory variables. There is correlation among the residuals of the four regions[3] and no increase or reduction in the correlation among the explanatory variables by partitioning into regions, so the results from use of this two stage estimator

as shown in Table 1 will be used for prediction of the cost of living index for each state or locality within its corresponding region.

To add perspective to these results, the model was also estimated by one-stage-least-square methods (1SLS). All the results need not be shown here for they are consistent with the results already shown in Table 1 (e.g., signs, and the results of significance tests are identical). But the R^2 are shown in Table 2, revealing that at least 87% to 94% of the total variation in the cost of living is explained in every region by the three determinants discussed (V, Y, and ΔP). These R^2 are good for cross section data.

Differences in the cost of housing emerges as by far the most significant predictor of geographical differences in the cost of living. Higher per capita incomes are of some importance, consistent with the hypothesis that they increase demand, local production costs, and hence prices, especially in the Northeast and West. Part of the effect of higher income is picked up by higher values of the standard house (V) as expected, but the extent of this is limited because the intercorrelation between Y and V is only .05. The effect of growth of population is also a factor, but a weak one consistent with Alonso's [2, p. 2] results, although Alonso does not include V in his regressions. In the West, the effect of in-migration alone on living costs has the only unexpected sign but this is probably due to the fact that the less crowded and non-metropolitan areas in the West that are receiving most of the in-migration have living costs to start with that are lower than the national average.[4]

Table 1

Results from Estimating the Model as a Set of Seemingly Unrelated Regressions

(t-statistics are shown below each coefficient in parentheses)

Region	Per Capita Income β_1	Population Change β_2	Cost of a House β_3	Constant β_0	R^2** (by 1SLS)
Northeast	2.73	48.30	1.03	60.35	.87
	(2.4)	(1.7)	(4.5)	(6.0)	
North Central	.81	12.83	.88	73.90	.94
	(1.0)	(1.6)	(6.4)	(12.7)	
South	.23	7.63	.91	68.12	.94
	(.2)	(.6)	(4.7)	(13.7)	
West	.97	-8.23	1.00	70.86	.90
	(1.7)	(-.9)	(7.9)	(10.4)	

*The states included in each region are:

Northeast: Connecticut, District of Columbia, Deleware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

North Central: Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.

South: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.

West: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming.

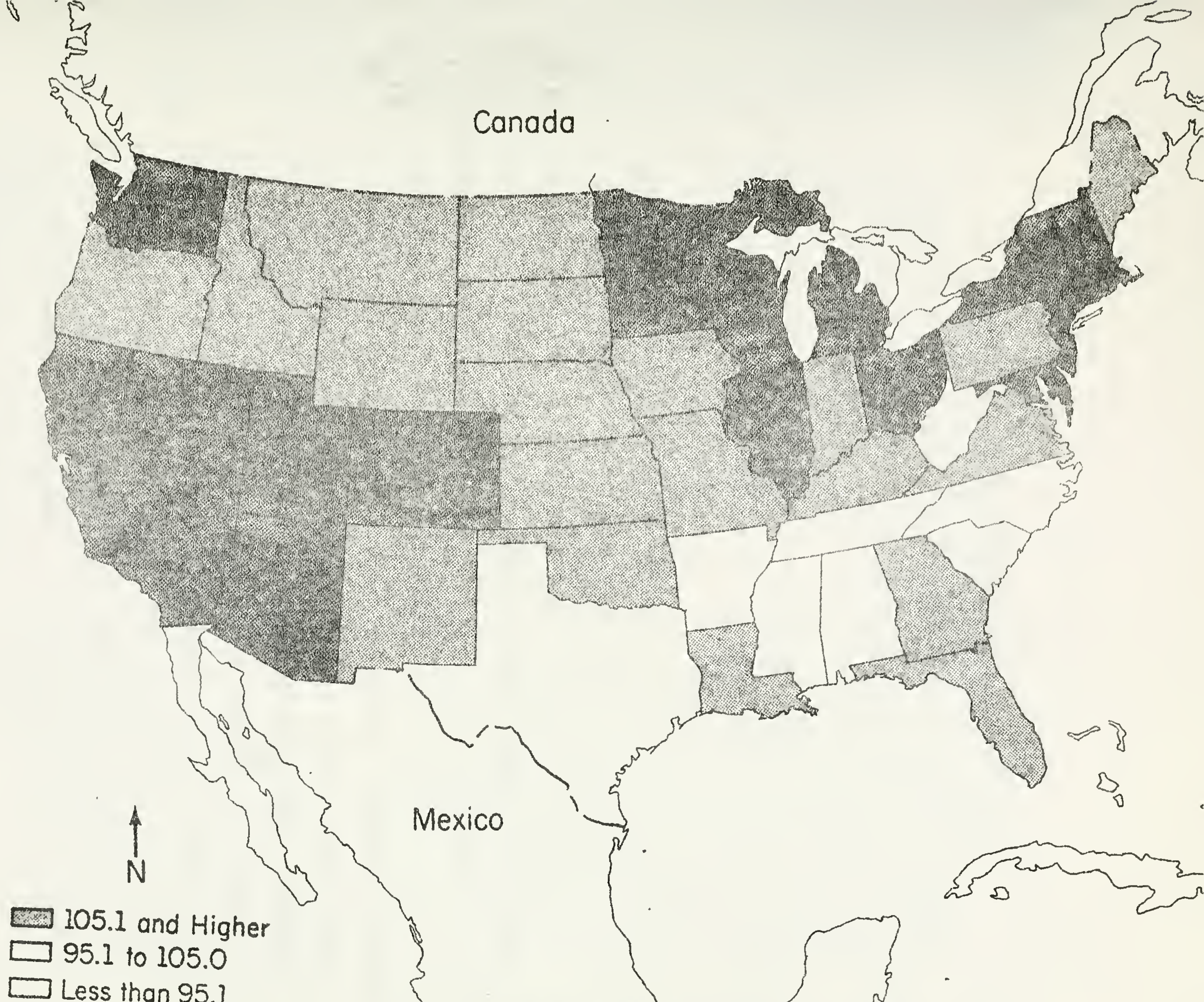
**R^2 statistics are not appropriate where there is joint dependence among the equations, and hence they were not calculated for this estimator. But due to the reduction in the sampling variance achieved by using a two-stage estimator, more of the total variance is explained here than by the less efficient one stage least square estimator for which the percent of the total variation explained is shown.

Table 2.

DIFFERENCES IN THE COST OF LIVING AMONG STATES

State	Index	State	Index
Alabama	92.6	Nebraska	101.3
Arkansas	90.9	Nevada	113.6
Arizona	105.4	New Hampshire	113.3
California	114.6	New Jersey	124.0
Colorado	106.9	New Mexico	101.1
Connecticut	127.8	New York	117.4
Delaware	118.1	North Carolina	93.9
District of Columbia	111.2	North Dakota	103.5
Florida	98.0	Ohio	106.4
Georgia	96.2	Oklahoma	91.2
Idaho	102.5	Oregon	104.3
Illinois	109.5	Pennsylvania	101.2
Indiana	102.4	Rhode Island	110.1
Iowa	101.6	South Carolina	94.0
Kansas	99.7	South Dakota	99.7
Kentucky	100.6	Tennessee	93.2
Louisiana	95.8	Texas	93.0
Maine	97.6	Utah	105.1
Maryland	120.4	Vermont	107.6
Massachusetts	114.5	Virginia	99.7
Michigan	107.1	West Virgina	90.6
Minnesota	107.2	Washington	108.6
Mississippi	91.1	Wisconsin	106.0
Missouri	102.6	Wyoming	104.4
Montana	102.8		

The standard error is 3.7.



Map 1. Differences Among States in the Cost of Living

The Results: A Cost of Living Index for Each State

The cost of living index for each state was estimated by choosing the regression equation for the region in which the state is located from Table 1, collected data on Y, ΔP, and V for each state, and then using the regression equation to obtain the predicted value for C. The cost of living estimate was made first for 1973 to retain comparability to Sherwood's study [6], and then was updated to 1977 by applying price changes for individual areas using the Consumer Price Index (CPI).[5] The B.L.S. also uses the CPI to update its budgets since 1969 when the last direct pricing took place [11], [13, p. 2]. The cost of living index for states then was normalized so that 100 represents the national average for all states weighted by their population. The resulting cost of living index for each state is given in Table 2 and illustrated on Map 1.

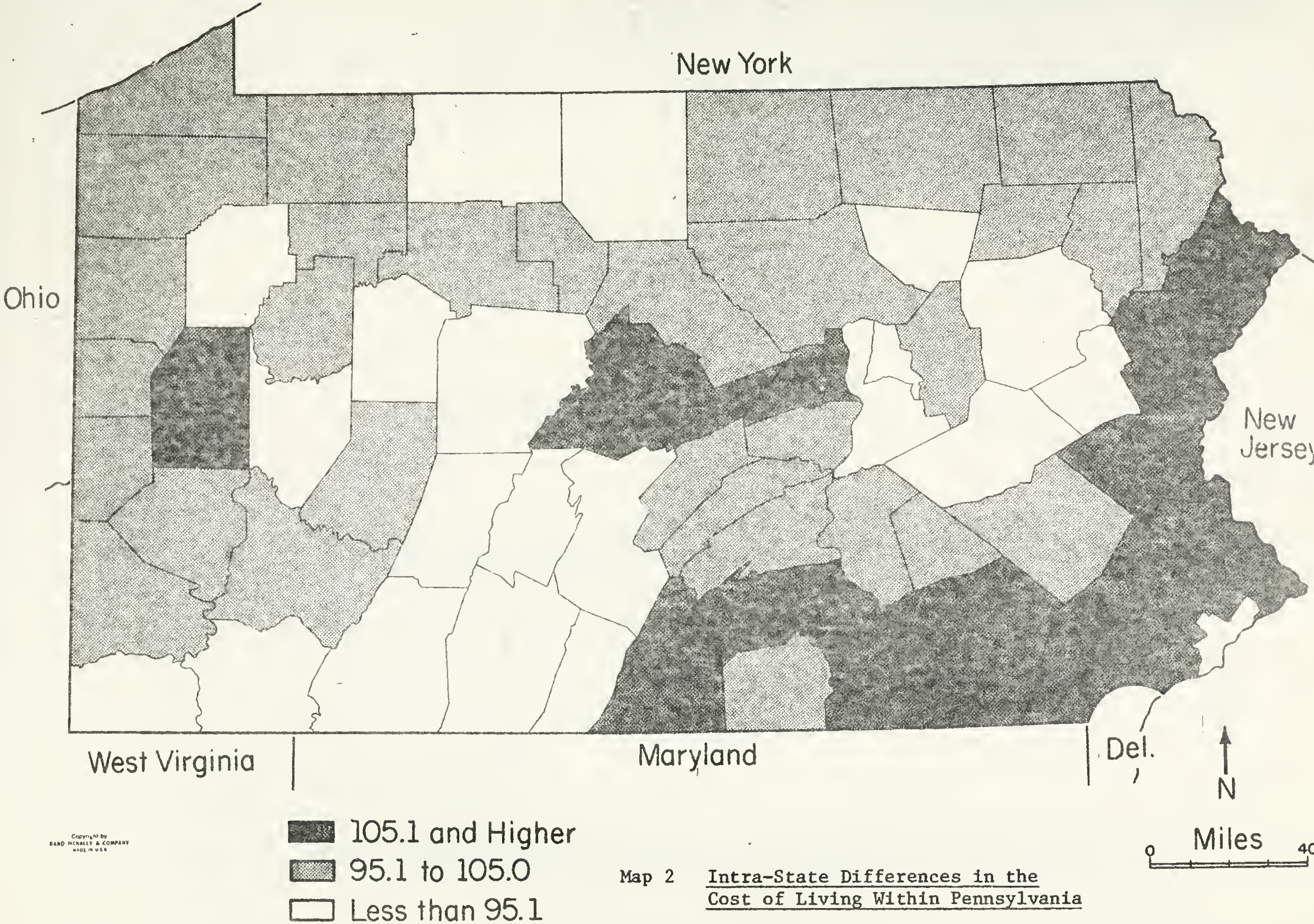
Examination of the estimates presented in Table 2 indicates that there is approximately 37% variation in the cost of living among states, which is slightly higher than the 31% variation among cities cited by Sherwood [6]. The higher cost states are those in the Northeast region where housing costs are greater due to high population density, colder weather, and higher incomes. The lowest cost of living states are those in the South. The North Central and Western regions are just slightly above the national average. The highest cost state is Connecticut at 127.8, the lowest is West Virginia at 90.6.

Differences in the Cost of Living Within States

Intrastate cost-of-living indices were computed in essentially the same way for each county with Pennsylvania, California, and Texas. These states were chosen as large states in the East, West, and South. Observations on income, population change, and the value of a house were collected for each county in each state, from the same sources indicated below Equation (7).

Since there are actual values of C for several urbanized areas in each of the four states, it is possible to assess the predictive power of this method by comparing $\hat{C}$ with C for those areas. The value of C is then adjusted by an average of this prediction error before the updating and normalization. The updating and normalization procedure is the same as that used above for the inter-state index except that the average cost of living for all counties in the state weighted by population is used and becomes the base of 100.

Differences in the cost of living within Pennsylvania are illustrated on Map 2 and shown in Table 3. Differences within California are shown on Map 3 and in Table 4, and differences within Texas (where there are a very large number of counties) are shown on Map 4 and in Table 5. The pattern of variation in living costs within each of these states conforms to the pattern observed for the U. S. as a whole. The highest cost of living counties tend to be those which contain the bedroom-suburbs of large northern central cities, typified by high residential land costs, higher fuel costs, and higher incomes. Examples are Bucks County in Pennsylvania, and Marin County in California. The next highest cost counties are those containing the large central cities, such as Los Angeles county in California



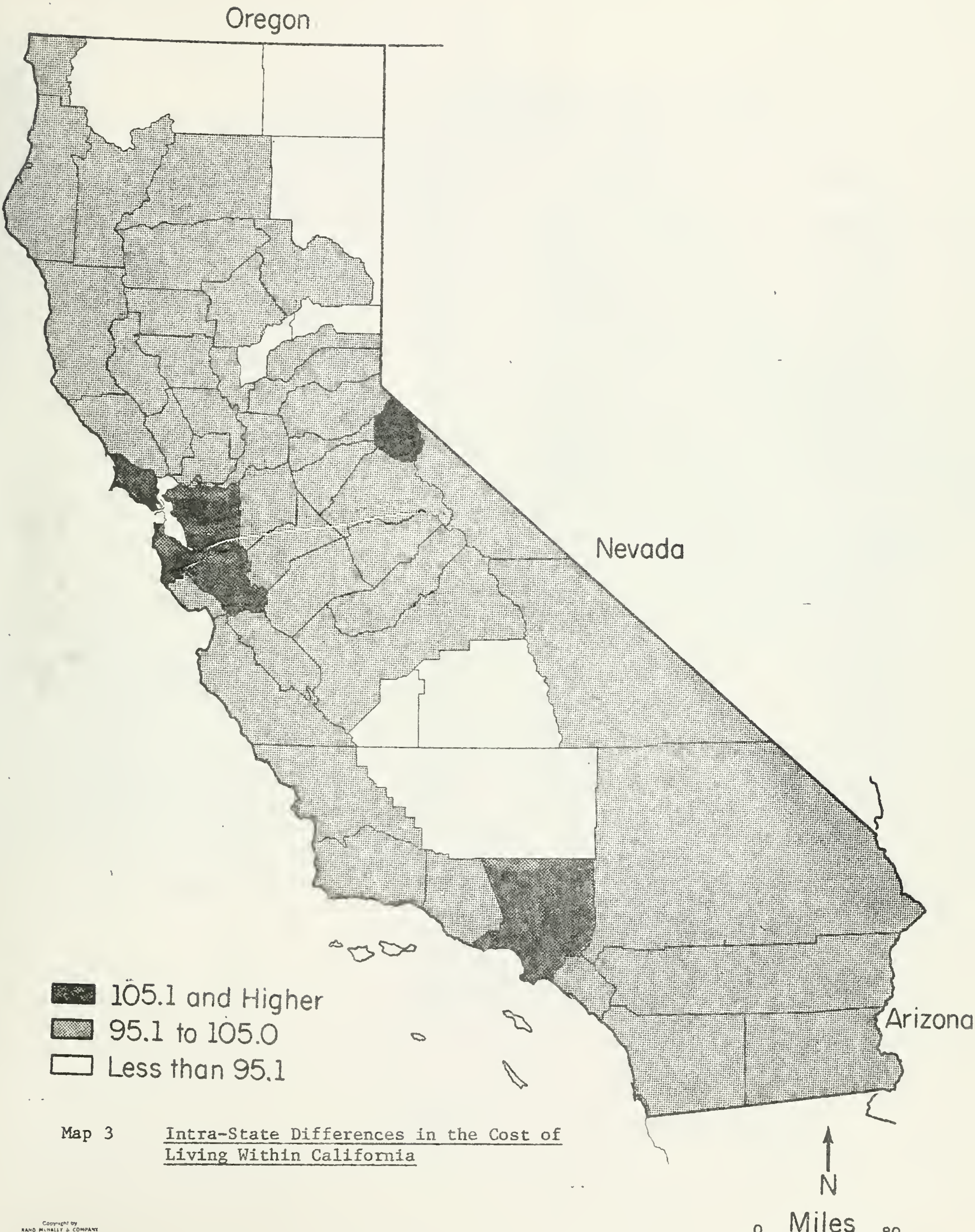
Map 2 Intra-State Differences in the Cost of Living Within Pennsylvania

Table 3.

DIFFERENCES IN THE COST OF LIVING WITHIN PENNSYLVANIA

County	Index	County	Index
Adams	104.6	Juniata	98.1
Allegheny	101.7	Lackawanna	96.6
Armstrong	90.6	Lancaster	110.0
Beaver	101.0	Lawrence	95.1
Bedford	94.9	Lebanon	103.5
Berks	102.3	Lehigh	107.5
Blair	90.8	Luzerne	92.5
Bradford	98.6	Lycoming	102.3
Bucks	123.2	McKean	92.3
Butler	105.4	Mercer	98.9
Cambria	90.1	Miffling	95.9
Cameron	96.4	Monroe	116.0
Carbon	89.7	Montgomery	120.6
Centre	115.1	Montour	94.6
Chester	122.2	Northampton	105.2
Clarion	96.7	Northumberland	88.2
Clearfield	85.8	Perry	98.4
Clinton	96.5	Philadelphia	101.7
Columbia	95.9	Pike	122.8
Crawford	99.6	Potter	88.1
Cumberland	122.2	Schuylkill	86.2
Dauphin	103.1	Snyder	104.5
Delaware	110.3	Somerset	91.1
Elk	99.2	Sullivan	90.6
Erie	101.4	Susquehanna	97.3
Fayette	85.9	Tioga	98.6
Forest	97.2	Union	108.2
Franklin	109.0	Venango	90.9
Fulton	95.0	Warren	101.9
Greene	86.2	Washington	96.3
Huntingdon	92.2	Wayne	103.4
Indiana	96.0	Westmoreland	102.1
Jefferson	89.3	Wyoming	104.4
		York	107.9

The standard error is 4.0.



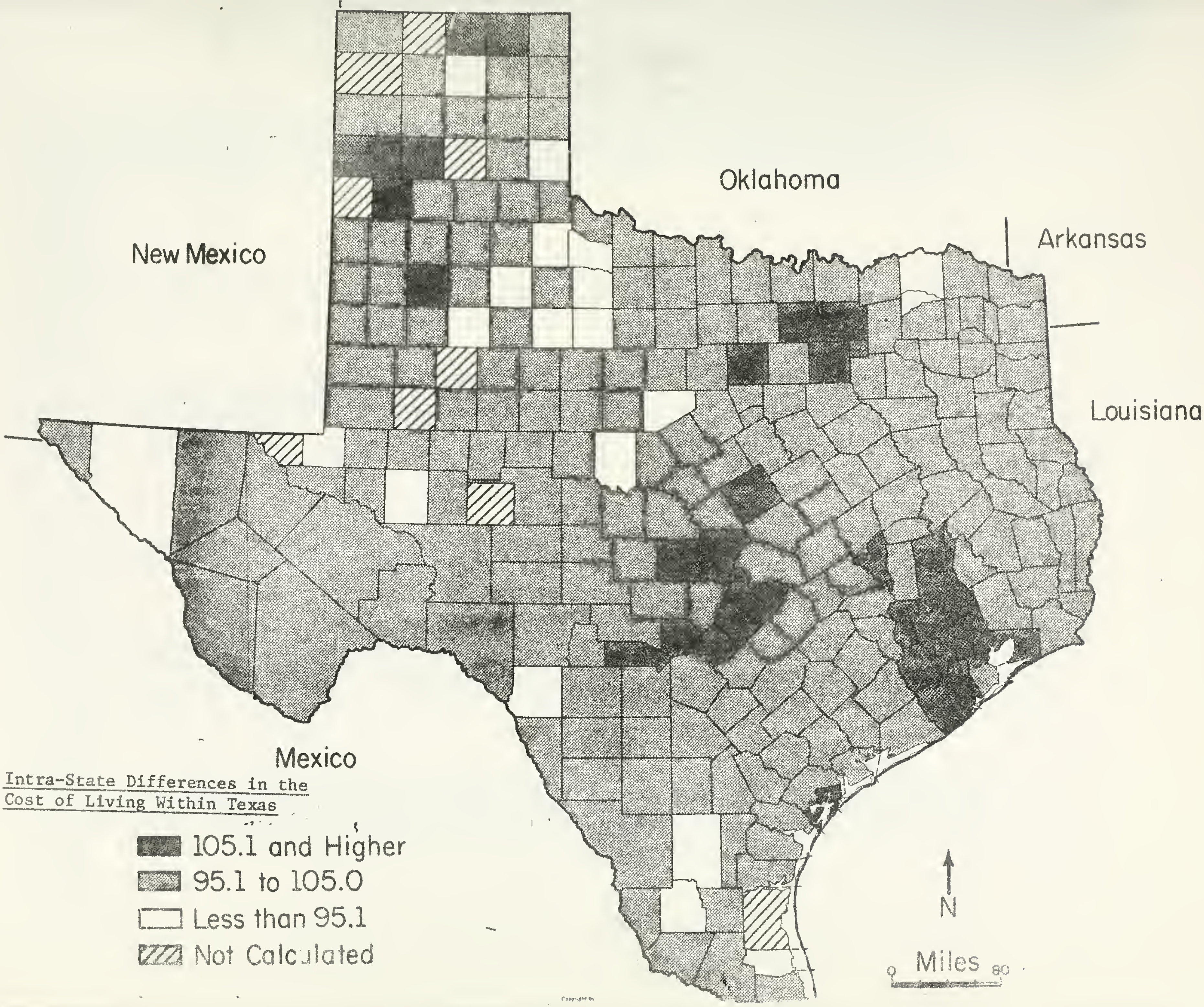
Map 3 Intra-State Differences in the Cost of Living Within California

Table 4.

DIFFERENCES IN THE COST OF LIVING WITHIN CALIFORNIA

County	Index	County	Index
Alameda	105.3	Orange	102.2
Alpine	114.9	Placer	99.3
Amador	97.7	Plumas	97.6
Butte	97.4	Riverside	96.5
Calaveras	96.2	Sacramento	97.5
Colusa	101.7	San Benito	101.5
Contra Costa	106.5	San Bernardino	95.1
Del Norte	98.1	San Diego	102.3
El Dorado	99.6	San Francisco	113.9
Fresno	95.5	San Joaquin	96.9
Glenn	99.1	San Luis Obispo	99.3
Humboldt	99.8	San Mateo	113.8
Imperial	98.2	Santa Barbara	101.6
Inyo	104.2	Santa Clara	105.7
Kern	94.3	Sanra Cruz	101.9
Kings	92.8	Shasta	97.8
Lake	95.2	Sierra	94.1
Lassen	94.2	Siskiyou	95.0
Los Angeles	105.9	Solano	100.8
Madera	95.9	Sonoma	102.8
Marin	116.6	Stanislaus	98.2
Mariposa	96.4	Sutter	100.0
Mendocina	100.5	Tehama	96.0
Merced	96.5	Trinity	99.6
Modoc	94.8	Tulare	94.9
Mono	102.8	Tuolumne	97.3
Monterey	104.2	Ventura	98.1
Napa	104.9	Yolo	99.0
Nevada	98.4	Yuba	93.9

The standard error is 2.2.



ap 4 Intra-State Differences in the Cost of Living Within Texas

Table 5

DIFFERENCES IN THE COST OF LIVING WITHIN TEXAS

County	Index	County	Index	County	Index
Anderson	99.1	Collin	111.7	Gains	100.5
Andrews	98.6	Collingsworth	94.6	Galveston	103.1
Angelina	103.7	Colorado	101.0	Garza	95.0
Aransas	106.3	Comal	106.3	Gillespie	104.1
Archer	97.2	Comanche	97.4	Glasscock	103.3
Atascosa	98.6	Concho	94.6	Goliad	99.1
Austin	102.3	Cooke	101.2	Gonzales	98.8
Bailey	101.4	Coryell	107.0	Gray	98.8
Bandera	105.1	Cottle	94.4	Grayson	101.5
Bastrop	99.1	Crane	97.4	Gregg	104.1
Baylor	99.4	Crockett	99.7	Grimes	99.0
Bee	99.5	Crosby	99.8	Guadalupe	104.6
Bell	105.0	Culberson	101.0	Hale	102.1
Bexar	102.1	Dallam	98.0	Hall	96.6
Blanco	102.8	Dallas	110.2	Hamilton	96.4
Bosque	99.3	Dawson	101.2	Hansford	105.8
Bowie	102.8	Deaf Smith	111.5	Hardeman	96.2
Brazoria	108.5	Delta	94.9	Hardin	101.8
Brazos	107.3	Denton	112.5	Harris	107.4
Brewster	101.7	De Witt	96.8	Harrison	100.4
Brisco	98.7	Dickens	93.2	Haskell	94.7
Brooks	96.9	Dimmit	95.9	Hays	107.8
Brown	99.1	Donley	96.2	Hemphill	101.0
Burleson	97.1	Duval	93.1	Henderson	102.7
Burnet	105.8	Eastland	95.0	Hidalgo	96.6
Caldwell	100.5	Ector	101.4	Hill	96.9
Calhoun	103.4	Edwards	97.4	Hockley	98.8
Callahan	97.7	Ellis	102.6	Hood	102.4
Cameron	96.9	El Paso	103.0	Hopkins	100.9
Camp	97.1	Erath	100.5	Houston	97.9
Carson	100.2	Falls	95.1	Howard	101.1
Cass	99.7	Fannin	95.9	Hudspeth	94.1
Castro	105.6	Fayette	99.0	Hunt	103.2
Chambers	105.2	Fisher	96.0	Hutchison	94.9
Cherokee	97.5	Floyd	99.9	Jack	96.8
Childress	96.6	Foard	95.0	Jackson	99.6
Clay	97.1	Fort Bend	107.1	Jasper	101.4
Cochran	95.8	Franklin	98.4	Jeff Davis	95.3
Coke	96.7	Freestone	98.1	Jefferson	101.7
Coleman	93.3	Frio	99.7	Jim Hogg	94.5

*An index was not calculated for several Texas counties because they are sparsely populated, have no towns, and some have very high per capita income due to large oil and gas production. They were Armstrong, Borden, Hartley, Irion, Kenedy, Loving, Martin, Parmer, and Sherman.

Table 5 (Cont.)

DIFFERENCES IN THE COST OF LIVING WITHIN TEXAS

County	Index	County	Index	County	Index
Jim Wells	97.7	Motley	95.7	Swisher	104.3
Johnson	104.9	Nacogdoches	104.8	Tarrant	104.7
Jones	95.4	Navarre	97.1	Taylor	100.1
Karnes	99.0	Newton	99.0	Terrell	95.3
Kaufman	101.2	Nolan	96.9	Terry	100.5
Kendall	107.2	Nueces	102.5	Throckmorton	97.0
Kent	96.8	Ochiltree	107.3	Titus	99.2
Kerr	104.7	Oldham	103.6	Tom Green	101.1
Kimble	99.3	Orange	103.1	Travis	109.2
King	99.3	Palo Pinto	104.7	Trinity	97.4
Kinney	93.8	Panola	98.5	Tyler	101.2
Kleberg	103.5	Parker	107.4	Upshur	99.2
Knox	94.5	Pecos	101.7	Upton	92.5
Lamar	99.6	Polk	99.1	Uvalde	101.1
Lamb	97.1	Potter	98.1	Val Verde	101.4
Lampasas	101.3	Presidio	95.7	Van Zandt	102.5
La Salle	95.9	Rains	100.1	Victoria	103.7
Lavaca	98.8	Randell	113.2	Walker	108.1
Lee	98.4	Reagon	97.6	Waller	105.2
Leon	96.3	Real	98.6	Ward	96.9
Liano	109.6	Red River	95.9	Washington	104.2
Liberty	100.3	Reeves	97.6	Webb	99.3
Limestone	95.4	Refugio	98.5	Wharton	102.5
Lipscomb	102.0	Roberts	100.8	Wheeler	96.2
Live Oak	97.4	Robertson	96.2	Wichita	100.0
Lubbock	105.2	Rockwall	105.6	Wilbarger	97.2
Lynn	98.1	Runnels	95.4	Willacy	94.9
Madison	103.8	Rusk	98.1	Williamson	101.1
Marion	97.9	Sabine	96.5	Wilson	100.4
Mason	96.6	San Augustine	98.0	Winkler	93.8
Matagorda	103.5	San Jacinto	99.3	Wise	100.9
Maverick	103.0	San Patricio	103.7	Wood	99.8
McCulloch	96.8	San Saba	97.6	Yoakum	100.6
McLennan	100.6	Schlieicher	96.8	Young	98.3
McMullen	99.0	Scurry	97.7	Zapata	95.5
Medina	101.2	Shackelford	96.0	Zavala	97.2
Menard	95.4	Shelby	97.2		
Midland	104.9	Smith	103.4		
Milam	98.4	Somervell	100.6		
Mills	97.4	Starr	96.5		
Mitchell	95.6	Stephens	96.7		
Montague	98.7	Sterling	97.1		
Moore	102.5	Stonewall	94.9		
Morris	98.0	Sutton	97.1		

The standard error is 2.0.

or Tarrant County in Texas, although there is heterogeneity within these areas reflecting living and shopping patterns. The lower cost counties are those made up of smaller towns and rural areas. There are a few unusual but explainable cost of living indices such as the one for Philadelphia County in Pennsylvania which is far below the index for the larger Philadelphia urbanized area. This is due to the fact that Philadelphia County is located in the south-central section of the city of Philadelphia and is a low-income, low-rent district.

The areas farther north generally tend to have higher living costs than those farther south, reflecting higher heating and related construction costs.

Conclusions

There are large differences in the cost of living among states. Connecticut, New Jersey, and Maryland, at the high end within the continental United States, are 37% above the cost of living in Alabama and Oklahoma where costs are lowest. Within states, similar differences are found. There is a variation of 37% in the cost of living among counties in Pennsylvania, for example, 23% within California, and 21% within Texas. These have significance to individuals in assessing the costs and the relative advantages of moving, as well as to firms and governmental units who may wish to assess the purchasing power of wages, salaries, grants, or service expenditures in more than one geographical area.

Another new finding of this study is the development of a method designed to generalize the B.L.S. cost of living studies to new geographical

areas. The large expenditure required to directly sample prices and to conduct the additional budget studies makes it unlikely that comparable cost of living indices for each state and for each county will ever be developed. Since the method suggested has high explanatory power (e.g., R^2's over .90), it is possible at vastly reduced cost to obtain a geographical cost of living index with the potential of numerous useful applications.

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Footnotes

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1. The Bureau of Labor Statistics currently is conducting research on the development of measures of inter-area shelter cost differentials based on stronger conceptual and statistical foundations.

2. For properties of the seemingly unrelated regression estimator see Zellner [15], [17], Zellner and Huang [16], and Kmenta and Gilbert [4].

3. The correlation coefficients showing non-zero correlation among the residuals for the different regions are as follows:

	Northeast	North Central	South	West
Northeast	1.00			
North Central	- .05	1.00		
South	- .45	- .16	1.00	
West	- .62	.56	.17	1.00

4. The negative relation of population change to the cost of living in the West may be due to the fact that the cost of living is lower there in most areas outside of San Francisco and Los Angeles and this acts as one factor attracting business and more rapid population growth. When this is investigated, those areas in the West which have the highest rates of growth of population are also those areas with lower living costs. The four fastest growing areas, for example, San Diego, Seattle, Denver, and the non-metropolitan areas in the Western Region, have living costs less than or equal to the national average as shown below:

Area	Growth Rate of Population	Living Costs
San Diego	43%	97
Seattle-Everett	43%	100
Denver	30%	96
Nonmetropolitan areas	33%	90
San Francisco	24%	106

The highest living cost area in California, San Francisco, has a slower growth rate.

5. As a check, the revised standard budgets [13] were compared to the 1973 budgets for the same 44 cities and non-metropolitan areas after the latter were adjusted to 1976 using the change in the CPI. There is no significant difference (e.g., $t = .69$). To make adjustments in the cost of living index from 1973 to 1977 the variables were multiplied by the percent change in the consumer price index that is specific to each region and (for counties) each city size class.