How Accurate Are Quality-of-Life Rankings Across Cities?

*Joseph Gyourko**

Quality-of-life comparisons across localities routinely attract the attention of executives, workers, local public officials, and academics. Private firms, many in relocation or vacation-related businesses, were the first to gauge the relative attractiveness of different areas. These firms gathered data on climate, culture, employment, home prices, and wages, all of which they thought influenced the quality of life. Then they weighted these factors in some ad hoc manner to compute an index number reflecting the quality of life in each community.

Many of these earlier efforts tended to interpret low home prices and high wages as evidence of a high quality of life, and the cities with these traits were rated as relatively more attractive. But in the late 1970s, economists introduced an entirely new methodology for ranking areas that reversed the interpretation of home prices and wages. Economists tend to

*Joseph Gyourko is an Associate Professor of Finance and Real Estate at the Wharton School of the University of Pennsylvania. He wrote this article while he was a Visiting Scholar in the Philadelphia Fed's Research Department.

view relatively low land prices and high wages as signs that an area is unattractive. Alternatively, they view high land prices and low wages as evidence that an area is relatively more attractive.

In a city such as San Francisco, for example, land prices are higher and wages are lower than they otherwise would be because of the presence of high-quality amenities—good weather, scenic views, and nearness to the ocean—for which an entrant to the community is willing to pay a great deal. The payment is in terms of higher land prices and/or lower wages because the people willing to pay the most for a house and accept the least in terms of wages are most likely to obtain one of the scarce sites and jobs in the area. Consequently, you are not necessarily better off if you live in a high-quality-of-life city such as San Francisco. The reason, of course, is that you have to pay more to enjoy San Francisco's higher quality of life.

More recent studies suggest that a locality's quality of life depends on more than amenities. Locally provided services and taxes have nearly as much influence on the quality of life as weather and pollution. Introduction of the public-service and tax variables into the quality-of-life literature has enabled economists to put a value on something policymakers long have claimed is important. The ability to provide quality service while restraining taxes improves the attractiveness of a jurisdiction. While local weather and amenity conditions usually cannot be altered by the community, the fiscal climate is under its control. Finally, the latest evidence also introduces a note of caution about the preciseness of quality-of-life rankings. Given limited data, it is still very difficult to distinguish among most cities' quality of life.

ESTABLISHING A VALUE FOR THE QUALITY OF LIFE

The value of any area's special characteristics is determined by what people are willing to pay in order to live there—in other words, the sum of what they are willing to pay for each local trait that either contributes to or detracts from the area's quality of life.[1]

The issue is how to determine the prices of these local traits. It is not immediately clear how much people are willing to pay for an amenity such as extra sunshine. Sunshine is not a standard good traded in a visible market. But even though there is no explicit price for sunshine, there is an implicit one. Assume you are considering moving into either Community A or Community B. These communities are alike in all respects except that Community A tends to experience one more day of sunshine per year than Community B. Because sunshine is something you like, you are willing to pay some positive dollar amount for more of it. For example, if you are willing to pay $100 more to move into Community A, then that is the price of the added sunshine you expect to enjoy in Community A. Because the added sunshine is the only difference between the two communities, your willingness to pay the extra $100 must be due to the sunshine differential.[2]

CAPITALIZATION INTO WAGES AND RENTS

There are two ways in which you could pay your extra $100. One is by bidding up land prices so that you are able to obtain one of the

[1]Growing interest in this topic has produced the so-called "quality of life" literature. Rosen (1974, 1979) and Roback (1980, 1982) provided the initial conceptual and empirical underpinnings for this literature.

[2]If you are the marginal entrant to the community, $100 is the true implicit market price of sunshine. The marginal entrant is the person who determines the price. The added $100 this person is willing to pay is just enough to secure a site in the community. Other people may place higher valuations on the extra sunshine, but they will not have to bid more than an extra $100 because they will not have to pay any more than the marginal entrant. Entrants who value the amenity more than the marginal entrant does are said to be inframarginal.

scarce housing sites in the community. However, it is not necessarily true that you will ultimately pay $100 more for a house in Community A than you would pay in Community B. Part of the cost of the added sunshine may be paid in the form of lower wages than you would accept in Community B. What must be the case is that the wage and land price differentials total to the $100 value of the added days of sunshine you will receive during your stay in Community A. The extent to which your wages are lower or your land price is higher is the extent to which an amenity's value is capitalized into the local labor and land markets, respectively. Precisely how much of the price of sunshine is reflected in land prices versus wages depends on supply and demand conditions in the local land and labor markets.[3]

To measure the local quality of life, economists attempt to determine the price of every local trait that potential entrants would find important. They then multiply these prices by the quantities of the relevant traits existing in each community to determine each trait's contribution to the local quality of life. These prices can be estimated in terms of annual dollar amounts. If a day of sunshine is worth $10, and the community typically experiences 100 days of sunshine per year, then the annual value of the locality's sunshine is $1000 ($10 x 100 days). The total annual value of the local quality of life is simply the sum of the values of all the locality's traits. (For more detail, see *Compensating Differential Models and the Quality of Life*, p. 6.)

THE IMPORTANCE OF THE LOCAL FISCAL CLIMATE

In addition to amenities, government services help determine a locality's quality of life. These services differ from pure amenities in that they are produced and have explicit tax prices. If a service, such as education, is fully priced via local taxes (in other words, you pay in taxes exactly what you think the service is worth), there will be no implicit price for the service in terms of capitalization into wages or land prices.

Consider again Community A and Community B. Now assume that Community A also provides a superior education system that you estimate will be worth $500 per year more than Community B's education system. If Community A charges you $500 more in property taxes, the education service is fully priced via taxation. You would not be willing to pay an added premium to enter the community in terms of bidding up land prices or accepting lower wages. However, the absence of any effect on wages or land prices does not imply that better education service is worthless or that it is irrelevant in determining the local quality of life. The superior education truly is worth an extra $500 a year to you.

Of course, if the extra taxes in Community A are less than $500, some of the value of the superior education will be capitalized in wages and land rents. To capture the influence of taxes and services on the attractiveness of an area, economists control for both in estimating the quality of life. Recent research suggests that intercity differences in local fiscal conditions have nearly as much independent influence on quality-of-life rankings as do differences in pure amenities.

Public-Sector Unionization. A related issue is whether the nature of local public-sector labor markets also influences the quality of life across cities. The past two decades have witnessed a striking increase in unionization among public-sector work forces. The issue for the quality of life is whether these highly unionized local public-sector work forces obtain compensation premiums or engage in overstaffing. Consider the land and labor market

[3]Gyourko and Tracy (1989a, 1989b) and Roback (1980, 1982) provide the details on relative land and labor market conditions that lead to capitalization into land prices versus wages.

Compensating Differential M

Urban economists use compensating differential models to analyze how differences across communities in amenities and fiscal conditions influence local land prices or wages. The economic value of a local amenity or publicly provided service is determined by the land price you are willing to pay and the wage you are willing to accept in order to locate in some jurisdiction. Thus, wages (W) and land prices (L) in city j are influenced by the quality of local amenities (A_j), the quality of publicly provided services (G_j), and a series of local taxes (T_j), as shown in equations (1) and (2):*

$$(1) \quad W_j = W\{A_j, G_j, T_j\}$$

$$(2) \quad L_j = L\{A_j, G_j, T_j\}$$

Estimation of equations (1) and (2) generates regression coefficients, which document by how much wages and land prices are affected by small differences in taxes or in the quality of amenities or services. Both land prices (rents) and wages are measured in terms of annual expenditures (Table 1). Each trait's coefficient is the so-called hedonic, or implicit, price of the trait.

*In practice, housing prices typically are used in lieu of land prices because a consistent land price series does not exist for most cities. Thus, equation (2) is augmented with a vector of housing quality controls. Workers, not just housing, differ in quality. Variables controlling for worker quality (for example, education level and experience), as well as the type of job and industry, normally are included in equation (1). See Gyourko and Tracy (1991) for these and other details with respect to the estimation of the land price and wage equations. Moreover, equations (1) and (2) are the reduced forms of a simultaneous system determining wages and rents, and the ultimate land or labor price of an amenity will depend on its value not only to consumers but to producers as well. For example, clean air is valued by consumers, but it may reduce productivity for some firms because of the need to invest in pollution-control equipment. The positive value to consumers would tend to raise land rents while the cost to firms would tend to lower them. As a result, the net effect could be positive or negative. See Voith (1991).

impacts if Community A and Community B have equally productive public workers, but Community A pays its unionized workers a 10 percent premium including better pension benefits. The higher compensation has to be financed by higher taxes, either now or in the future. To compensate for the higher taxes, a potential entrant into Community A should insist on a lower price for land and/or demand higher wages. This capitalization into lower land prices or higher wages would indicate a lower quality of life. However, after controlling for current taxes and services, recent findings indicate that differences in public-sector unionization levels do not materially affect land prices or wages.

A RANKING OF CITIES

Economists have used the implicit prices of amenities and local fiscal characteristics to rank areas according to their attractiveness. Blomquist, Berger, and Hoehn, in a 1988 study, ranked counties by their quality of life using a standard set of pure amenities. More recently, Gyourko and Tracy, in 1990, produced a ranking of cities that considers the fiscal climate along with amenities. They estimated the prices of traits, then used them to calculate an index

dels and the Quality of Life

Since these local traits are not traded on visible exchanges, their prices are revealed only implicitly through their impacts on local land and labor markets.

Estimating equations (1) and (2) reveals prices for traits in both the land and labor markets. It is important to note that each trait's full implicit price is determined by its impact across both markets. By definition, the full implicit price for trait k (FP_k) is the sum of its land market price (LP_k) and the negative of the labor market price (WP_k), as shown in equation (3):

$$(3) \quad FP_k = LP_k - WP_k$$

To understand this formula, consider a favorable trait, such as sunshine, and an unfavorable trait, such as heating degree days. All else constant, a city with more sunshine probably will have higher land prices and lower wages. Note that sunshine has a positive impact on prices in the land market and a negative impact on wages in the labor market. Subtracting the negative labor market impact from the positive land market impact ensures a positive full price for sunshine, as intuition would suggest.

However, more heating degree days generate lower land prices and higher wages, all else constant. This is because added heating degree days imply more days with temperatures below a moderate 72 degrees. These conditions typically are associated with a higher degree of personal uncomfortableness, as well as higher energy costs. Subtracting the positive labor market price of this trait leads to its negative full price. Thus, the use of equation (3) means that traits with positive (negative) full prices are viewed as beneficial (detrimental) by entrants.

The value of the local quality of life simply is the sum (Σ) of the value of all the locality's traits. The basic quality-of-life index (QOL_j) is created as follows:

$$(4) \quad QOL_j = \sum_k (FP_k * T_{kj})$$

where T_{kj} represents the quantity of trait k in city j.

value for the quality of life.[4] The prices represent the annual costs or benefits of a 1 percent increase in the local trait (Table 1, p. 8.).

Estimating Prices. Among the local amenities, the percentage of sunny days and being situated on a coast have the largest prices. The results indicate that a 1 percent increase in the amount of sunny days is worth almost $28 per year. Of this amount, nearly $22 is paid in terms of added housing expenditures and about $6 is paid in terms of lower wages. The strong influence of being near an ocean, major gulf, or one of the Great Lakes is indicated by the high positive price for the coast variable. The estimates from Gyourko and Tracy show that being on a coast was worth almost $1090 per year. That is, an entrant to a coastal city was willing to pay at least that much more per year in a combination of higher land rents or lower wages.

Many of the tax and service measures are

[4]Gyourko and Tracy (1991) offer a detailed description of how the city trait prices were estimated and how the rankings were computed. The data used cover 130 cities throughout the United States. Most of the variables, whose names are self-explanatory, are for the years 1979-80. The cost-of-living index is derived from the Bureau of Labor Statistics' intermediate family budget adjusted to measure the nonland cost of living.

TABLE 1

Annual Trait Prices[a,b]

City Trait	Full Price	
Precipitation (annual inches)	-$1.22	(8.45)
Cooling degree days (thousands per year)	-8.86	(5.59)
Heating degree days (thousands per year)	-22.58	(8.49)
Average relative humidity (%)	-3.61	(22.95)
Sunshine (% of possible days)	27.87	(26.82)
Average wind speed (mph)	21.39	(13.64)
Particulate matter (micrograms per cubic meter)	-2.01	(7.15)
Coast	1089.86	(560.28)
Nonland cost-of-living index	-27.70	(115.55)
Violent crime rate (per 100 capita)	-12.40	(2.97)
Student/teacher ratio	-3.76	(10.33)
Fire department quality rating (1 = best; 10 = worst)	-3.55	(6.36)
Hospital beds (per 1000 capita)	11.85	(3.53)
Property tax rate	-6.14	(2.37)
State and local income tax rates	-5.36	(2.41)
State corporate tax rate	15.30	(4.91)
Percentage of public union organization	-2.89	(4.54)
SMSA[c] population (millions)	-0.30	(1.20)
Percentage of the labor force working in another SMSA	3.49	(4.15)

[a]The calculations of trait prices are based on a 1 percent change about the mean of the variables. The exception is the dichotomous COAST variable, whose prices are based on a discrete change from noncoast to coastal status. All figures in these three columns are annualized. We assume 1.5 wage earners per household and that each wage earner works 49 weeks. These are the sample averages.

[b]Standard errors of the implicit prices are in parentheses.

[c]SMSA is the abbrevation for standard metropolitan statistical area.

also quite influential. Consider violent crime and tax rates on property and income. Clearly, increases in the incidence of violent crime lower the quality of life. All else constant, an entrant to the average city in terms of crime would require $12.40 in annual compensation if that city were to experience a 1 percent increase in the incidence of violent crime.[5] As expected, higher property or income tax rates have negative prices, if the service level is held constant. If taxes are higher in some city, but the locality provides no commensurate increase in service provision, we would expect an entrant to the area to demand compensation in terms of lower land rents or higher wages.

Computing Index Values. Implicit prices are used to compute quality-of-life index values by comparing each city to a hypothetical city having the average values of all city traits. The index, measured in 1979 dollars, reflects the premium individuals are willing to pay to live in any given city relative to a hypothetical city with the average amenities and fiscal conditions across all 130 cities in our sample.

Summary statistics illustrate the relative effects of the local amenity and fiscal conditions on the differences in quality of life across cities (Table 2). The full range of quality-of-life values based on all city traits is $8227. That is, an entrant was willing to pay at least $8227 more per year to live in the top-ranked city versus the bottom-ranked city. This band is wide because of some extreme cities. For a more representative view, let us focus on the middle of the distribution and analyze what statisticians call the interquartile range. The interquartile range reveals how much more per year an entrant is willing to pay to live in the city ranked in the 25th percentile (rank 32 out of 130) versus the city ranked in the 75th percentile (rank 97 out of 130). That range is only $1484.

For the moment, let us consider the impact of the 11 amenity values separately.[6] All else

[5]This is the same as saying that the entrant would pay a negative $12.40 in the city with more crime. Hence, the negative price.

[6]The amenity variables include precipitation, cooling degree days, heating degree days, relative humidity, sunshine, wind speed, particulate matter, coast, nonland cost of living, SMSA population, and percent of population working in another SMSA. The tax/service variables include violent crime rate, student/teacher ratio, fire department quality, number of hospital beds, property tax rate, income tax rates, and the corporate tax rate.

TABLE 2

Amenity and Fiscal Impacts on Quality-of-Life Rankings

Variable Set	Quality-of-Life Range	Quality-of-Life Interquartile Range
All city traits	$8227	$1484
Amenity component	$3979	$1372
Tax/service component	$6582	$1188

constant, one would pay $3979 more to live in the top-amenity city than in the city with the worst amenity set. There is a particularly wide range for the impact of the seven tax/service variables ($6582). However, looking only at the middle of the distribution shows that the fiscal characteristics have only a slightly less strong effect than amenities on the differences in quality of life across cities ($1188 versus $1372).[7] Even if the traditional amenity levels were the same for all 130 cities, differences in fiscal climate and public services would still result in a difference of at least $1188 between a city ranked in the 25th percentile and a city ranked in the 75th percentile.

While readers undoubtedly will have quarrels with specific cities' relative positions in the quality-of-life ranking, the overall rankings accord with common sense (Table 3, p. 12). Norwalk, CT, and Pensacola, FL, are the top-ranked cities. Stamford, CT, San Diego, CA, and San Francisco, CA, also are in the top 20 percent. Newark, NJ, Detroit, MI, and Flint, MI, are among the lowest-ranked cities. Wilmington, DE, with a ranking of 31, is rated just among the top 25 percent. Philadelphia, PA, falls in the bottom half of the range, with a ranking of 101.

A NOTE OF CAUTION

Previous quality-of-life studies end after pronouncing the best and worst cities. Unfortunately, the rankings are not reliable enough to stop there. The underlying problem is that the estimation of the trait prices is imprecise. If there is estimation error in the trait prices, there must also be estimation error in the quality-of-life index values, which are themselves based on the trait prices.[8] It turns out that we can confidently differentiate among qualities of life only when comparing the top-ranked cities to the lowest-ranked cities.

For example, the estimation errors are so large that we cannot confidently distinguish between the rankings of cities such as Wilmington (31), which is estimated to be in the top quarter of the distribution, versus Charleston, WV, which is ranked just below the middle of the distribution (71). Given the estimation error, there is about a two-thirds probability that Charleston's ranking actually is anywhere between 47 and 95. The analogous interval for Wilmington is between 12 and 50.[9] This inability to confidently rank one city above another holds true for most of the cities in the sample. Statistically meaningful distinctions generally can be made only between top-ranked and bottom-ranked cities. For example, we can confidently distinguish between any of the top-20-ranked cities and the bottom-20-ranked cities.

CONCLUSION

What do these results mean for quality-of-life rankings? First, local fiscal conditions as

[7]In the wage equation, the partial R^2 for the fiscal variables was almost identical to the partial R^2 for the amenity variables. In the housing-expenditure equation, the partial R^2 for the fiscal variables was about one-third as great as the partial R^2 for the amenity variables. Compared with the amenity variables, then, the fiscal variables explain as much of the variation in wages, but about one-third as much of the variation in housing expenditures.

[8]The numbers in parentheses in Table 3 are the standard errors of the index values or of the rankings themselves and provide a measure of the imprecision of the underlying estimation. The standard error is a widely used measure of variability. Statistically, there is a two-thirds probability that the ranking or index value is within one standard error of its estimated value. While our estimate of Norwalk's quality-of-life index number is $3986.26, the standard error of $1135.10 implies a two-thirds probability that the true index value is between $2851.16 and $5121.36 ($3986.26± $1135.10).

[9]The standard error of Charleston's ranking is about 24 and that for Wilmington is about 19. Recall that this implies a two-thirds probability that Charleston's ranking is between 71±24 (between 47 and 95) and that Wilmington's ranking is between 31±19 (between 12 and 50).

well as amenities truly influence the attractiveness of localities. The most recent evidence suggests that the effect of fiscal conditions on the quality of life rankings is nearly as great as the effect of natural locational advantages. Moreover, the influences of these local traits on the quality of life can be measured in terms of their impact on local land and labor markets. Finally, many other local traits influencing the quality of life have not yet been captured, such as cultural and recreational opportunities. It is the omission of these traits that makes the rankings so imprecise. Given current data and estimation techniques, we simply cannot effectively distinguish among most cities. To do so requires much better data.

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TABLE 3

Quality-of-Life Index Values and Rankings

City[a]	Ranking	Index Value
Norwalk, CT	1	3986
	(4.1)[b]	(1135)[c]
Pensacola, FL	2	2963
	(4.0)	(714)
Gainesville, FL	3	2819
	(7.3)	(890)
San Diego, CA	4	2574
	(8.4)	(860)
Stamford, CT	5	2497
	(9.4)	(875)
Columbia, SC	6	2459
	(14.7)	(1137)
Santa Rosa, CA	7	1955
	(11.4)	(744)
Bridgeport, CT	8	1944
	(9.3)	(630)
Tucson, AZ	9	1822
	(13.5)	(780)
Shreveport, LA	10	1802
	(7.3)	(473)
Lancaster, PA	11	1784
	(9.0)	(547)
Modesto, CA	12	1678
	(9.4)	(550)
Asheville, NC	13	1577
	(11.8)	(622)
New Orleans, LA	14	1565
	(10.8)	(570)
Fall River, MA	15	1549
	(16.5)	(795)
Danbury, CT	16	1498
	(22.1)	(1009)
Amarillo, TX	17	1475
	(16.9)	(795)
Jacksonville, FL	18	1463
	(13.1)	(630)
San Francisco, CA	19	1416
	(16.4)	(796)
San Jose, CA	20	1403
	(16.2)	(740)
New Britain, CT	21	1389
	(23.1)	(1003)
Lake Charles, LA	22	1388
	(15.9)	(725)
New Bedford, MA	23	1316
	(17.9)	(765)
Tyler, TX	24	1175
	(14.6)	(605)
Odessa, TX	25	1118
	(17.1)	(671)
Erie, PA	26	1103
	(18.4)	(706)
Phoenix, AZ	27	1097
	(26.5)	(1038)
Knoxville, TN	28	1071
	(10.7)	(412)
Lafayette, LA	29	930
	(15.2)	(548)
Monroe, LA	30	905
	(11.1)	(404)
Wilmington, DE	31	898
	(19.2)	(666)
Waco, TX	32	880
	(21.4)	(745)
Springfield, MO	33	753
	(11.8)	(386)
Sacramento, CA	34	703
	(18.0)	(564)
Lubbock, TX	35	690
	(20.3)	(650)
Los Angeles, CA	36	605
	(15.1)	(930)
Birmingham, AL	37	590
	(25.8)	(823)
Jersey City, NJ	38	573
	(29.7)	(984)
Fresno, CA	39	542
	(24.6)	(773)
Roanoke, VA	40	518
	(16.7)	(490)
Columbia, MO	41	464
	(22.5)	(667)
El Paso, TX	42	438
	(25.8)	(787)
Savannah, GA	43	428
	(20.8)	(600)
Richmond, VA	44	398
	(20.4)	(575)
Topeka, KS	45	383
	(14.4)	(392)
Baton Rouge, LA	46	376
	(18.9)	(540)

City[a]	Ranking	Index Value	City[a]	Ranking	Index Value
Albuquerque, NM	47	365	Decatur, IL	72	-161
	(23.4)	(673)		(18.4)	(495)
Memphis, TN	48	325	Colorado Springs, CO	73	-165
	(20.2)	(576)		(22.0)	(598)
Orlando, FL	49	308	Lincoln, NE	74	-185
	(20.0)	(545)		(18.1)	(470)
Fort Wayne, IN	50	303	Altoona, PA	75	-187
	(16.1)	(437)		(27.7)	(820)
Evansville, IN	51	286	Huntsville, AL	76	-199
	(16.5)	(455)		(19.1)	(519)
Pittsburgh, PA	52	275	Anderson, IN	77	-234
	(27.4)	(846)		(18.2)	(458)
Fayetteville, NC	53	274	Oklahoma City, OK	78	-257
	(19.8)	(543)		(24.4)	(694)
Mobile, AL	54	250	Billings, MT	79	-285
	(24.7)	(712)		(26.7)	(786)
Wichita, KS	55	246	Syracuse, NY	80	-301
	(17.7)	(474)		(24.8)	(707)
Lynchburg, VA	56	241	Columbus, GA	81	-305
	(16.3)	(439)		(22.4)	(634)
Worcester, MA	57	216	Buffalo, NY	82	-314
	(21.6)	(599)		(27.1)	(806)
Austin, TX	58	180	Canton, OH	83	-340
	(23.7)	(666)		(14.8)	(375)
Lawton, OK	59	178	Omaha, NE	84	-379
	(21.0)	(578)		(12.8)	(337)
San Antonio, TX	60	110	Springfield, IL	85	-409
	(25.7)	(740)		(14.0)	(362)
Waterbury, CT	61	107	Miami, FL	86	-445
	(24.1)	(684)		(29.1)	(925)
Springfield, OH	62	101	South Bend, IN	87	-468
	(14.1)	(363)		(15.6)	(430)
Jackson, MS	63	18	Salem, OR	88	-488
	(18.7)	(504)		(21.1)	(604)
Chattanooga, TN	64	-41	Tulsa, OK	89	-496
	(18.9)	(496)		(13.7)	(377)
St. Joseph, MO	65	-53	Portland, ME	90	-498
	(17.9)	(479)		(26.5)	(812)
Pueblo, CO	66	-89	Akron, OH	91	-520
	(21.0)	(564)		(15.8)	(438)
Manchester, NH	67	-100	Harrisburg, PA	92	-537
	(26.5)	(765)		(24.3)	(724)
Terre Haute, IN	68	-112	Cincinnati, OH	93	-544
	(15.4)	(404)		(16.8)	(484)
Bakersfield, CA	69	-120	Cedar Rapids, IA	94	-544
	(27.6)	(807)		(18.1)	(529)
Macon, GA	70	-140	Indianapolis, IN	95	-600
	(16.9)	(453)		(16.3)	(477)
Charleston, WV	71	-158	Reno, NV	96	-639
	(23.5)	(647)		(29.1)	(977)

City[a]	Ranking	Index Value
Sioux City, IA	97 (17.9)	-675 (553)
Dayton, OH	98 (18.2)	-699 (532)
Des Moines, IA	99 (14.0)	-700 (440)
Trenton, NJ	100 (21.7)	-715 (679)
Philadelphia, PA	101 (20.7)	-736 (813)
Louisville, KY	102 (13.3)	-794 (429)
Columbus, OH	103 (11.6)	-811 (384)
Seattle, WA	104 (25.1)	-816 (848)
Rochester, NY	105 (20.8)	-842 (671)
Tacoma, WA	106 (21.7)	-846 (723)
Mansfield, OH	107 (20.4)	-965 (710)
Boise, ID	108 (13.6)	-972 (486)
Toledo, OH	109 (12.9)	-1013 (479)
Boston, MA	110 (18.3)	-1067 (703)
Minneapolis, MN	111 (20.8)	-1147 (816)
Chicago, IL	112 (17.3)	-1209 (1031)
Tuscaloosa, AL	113 (13.7)	-1259 (584)
Muncie, IN	114 (12.9)	-1373 (595)
Ann Arbor, MI	115 (14.9)	-1450 (697)
Cleveland, OH	116 (10.9)	-1492 (560)
Rockford, IL	117 (7.0)	-1532 (399)
Peoria, IL	118 (6.5)	-1634 (411)
Spokane, WA	119 (11.6)	-1815 (728)
Portland, OR	120 (8.7)	-1874 (607)
Kansas City, MO	121 (5.4)	-1900 (441)
Atlanta, GA	122 (9.7)	-1916 (671)
Hartford, CT	123 (13.9)	-1931 (871)
Baltimore, MD	124 (9.4)	-1934 (662)
Newark, NJ	125 (9.8)	-2477 (914)
Las Vegas, NV	126 (9.0)	-2832 (1027)
Grand Rapids, MI	127 (2.6)	-2947 (589)
Saginaw, MI	128 (1.4)	-3668 (646)
Detroit, MI	129 (1.1)	-4153 (751)
Flint, MI	130 (1.2)	-4241 (786)

[a]Certain cities, such as New York and St. Louis, were not included in the analysis because of lack of data.

[b]The numbers in parentheses in column 2 are estimated standard errors, which were calculated using a sample of 100,000 simulated rankings. Housing and wage coefficient vectors were drawn from the relevant normal distributions implied by the appropriate regression analysis. Full implicit prices and associated quality-of-life rankings were calculated for each set of simulated coefficient vectors. The reported standard error for a city ranking is the standard deviation in the sample of the given city's simulated rankings.

[c]The numbers in parentheses in column 3 are estimated standard errors of the index values.