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The Hedonic Price Structure of Faculty Compensation at U.S. Colleges and Universities

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THE HEDONIC PRICE STRUCTURE OF FACULTY COMPENSATION AT U.S. COLLEGES AND UNIVERSITIES

*David E. Clark and Thomas A. Knapp**

Abstract–Economic theory suggests that the variation in academic salaries across institutions in part reflects compensating differences associated with variation in the levels of local "quality of life" factors such as environmental quality and the provision of local public services. This paper presents an econometric analysis of the hedonic, or implicit price structure, of faculty compensation at U.S. colleges and universities using data from AAUP merged with data on a host of location-specific characteristics. Quality of life factors are found to be important, accounting for between 7 percent and 12.8 percent of total compensation.

I. INTRODUCTION

Each April, the journal *Academe* publishes the American Association of University Professors' (AAUP) comprehensive survey of average salaries and benefits, by academic rank, paid to faculty at colleges and universities in the United States, for various categories of institutions. This survey is no doubt scrutinized by faculty members who wish to compare their compensation to that of individuals within and across institutions, while administrators likely view the survey in terms of how their own institutions' salaries compare to peer institutions with which they compete for faculty. In trying to interpret these data, one should consider productivity differences associated with the faculty of the institutions, as well as compensating differences which are related to the characteristics of the institutions' location. The existence of both types of factors relies upon the assumption that equilibrium prevails in the academic labor market. Let us first consider productivity differences.

In long-run equilibrium under perfectly competitive market conditions, faculty in a given discipline would be efficiently distributed across institutions so that remaining variations in compensation would reflect variation in productivity.[1] There are possible impediments to the attainment of such an equilibrium. For ex-

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ample, one would expect certain salary differentials to remain after fully accounting for productivity factors, reflecting moving costs or other transaction costs. In addition, institutional forces such as the tenure system create barriers to mobility, and imperfect information about alternative jobs may also prevent the achievement of equilibrium. However, there is a second factor which explains wage or salary differentials between institutions, and it is related to differences in the characteristics of the job location. A large body of research on regional wage differentials and the quality of life across urban areas suggests that the variation in earnings across locations in part reflects compensating differences, associated with variation in the levels of location-specific goods such as environmental quality and the provision of local public services. These goods are purchased only through access to specific locations. For example, access to a more pleasant climate is consumed via migration to the appropriate region. Through the location choices of households, a given desirable attribute becomes indirectly priced through a mix of lower wages, higher local prices, and higher housing costs. In long-run equilibrium, the distribution of households is such that satisfaction is everywhere equalized. The resulting variation in wages, rents, and other local prices reflects the implicit value placed upon locational attributes. This information can be utilized to estimate society's willingness to pay for improvements in these location attributes. Furthermore, the analysis can also be used to investigate the nature of geographic variations in salaries for given occupations. Thus, in the case of academic salaries, the raw data do not accurately reflect the true variation in compensation across institutions, since adjustments for the hedonic component embedded in salary or total compensation structures have not been fully developed. Just as the human capital model explains wage differentials by examining productivity differences in an equilibrium setting, hedonic models also assume equilibrium. That is, wage differentials are just those that are necessary to maintain equal satisfaction across space. If the market is in *regional disequilibrium,* the accuracy of hedonic analysis is called into question.

Clearly, one would prefer to control for individual differences in productivity in an endeavor to explain faculty salaries across locations. Indeed, for the academic labor market, a number of studies utilize microdata, typically gathered from a small sample of universities. Such research has studied the relationship between personal and productivity characteristics and earnings, focusing upon issues such as the impact of gender, rate of publications, or choice of field of specialization upon earnings. See, for example, Katz (1973), McDowell (1982), Barbezat (1987) and Kenny and Studley (1993). However, this genre of research has not addressed the issue of compensating variations associated with quality of life differences across locations. Because of the geographic incompleteness of the sampling used in these studies, such research is incapable of addressing the issue of

compensating differences. Indeed, by failing to control for the impact of quality of life factors upon earnings, studies which happen to use sample data from multiple schools may be misspecified, while those focusing on a single school are, in effect, holding location-specific factors constant.

To date, relatively little research has explored the hedonic component of faculty compensation. Exceptions include Bayless (1982), who utilized AAUP data from the early 1970's to explore the willingness to pay for air quality. More recently, Jones and Ressler (1993) consider South versus Nonsouth salary differentials using state-level data.

This study develops an econometric analysis of the hedonic, or implicit, price structure of faculty compensation (salaries plus fringe benefits) for 175 Ph.D.–granting U.S. colleges and universities for 1989-1990. The compensation data is merged with measures of institutional quality and a host of county-and/or MSA-level measures. These site characteristics are categorized as amenities, size/metro characteristics, fiscal measures, and disequilibrium measures. We develop and estimate a wage opportunity locus, where the partial derivative of the wage opportunity locus with respect to, for example, a given amenity, represents the implicit price of that amenity. We derive the implicit prices for various site characteristics and develop a quality of life index. The quality of life indices are dissaggregated so that the relative contributions of the various categories of location-specific factors can be seen. The results suggest that the national structure of faculty compensation is in part reflective of hedonic compensation for a number of quality of life factors. The paper is arranged as follows. Section II reviews the relevant literature. Section III describes the theoretical model, while Section IV presents the empirical model. The final section presents the empirical findings and concludes the paper.

II. THE LITERATURE

A number of major research efforts over the last decade have established the importance of compensating differences in explaining variation in wages across locations. Examples of such work include Rosen (1979), Roback (1982), Blomquist, Berger and Hoehn (1988), Berger, Blomquist and Waldner (1987), Hoehn, Berger and Blomquist (1987), and Gyourko and Tracy (1989). These studies have compared the quality of life available in alternative U.S. urban areas, as reflected in variations in earnings and housing prices. However, few studies have explicitly investigated the hedonic structure in a specific job category. This is a contribution of the present study.

The only study which has examined compensating differences for the national academic market is the one made by Bayless (1982), which utilized a sample of 126 U.S. Ph.D.-granting universities. Bayless explored the impact of air quality upon the salaries of faculty by rank for a period in the early 1970s. The present study improves upon the Bayless study in a number of respects. We extend the data set to include 175 Ph.D.-granting institutions, using a more recent time period, 1989-1990. Bayless used a limited number of variables to represent locational characteristics. He focused upon air quality and climate, and he used factor analysis to control for a number of other regressors. In addition, Bayless did not control for property values in his study. Following Roback (1982), it is essential that hedonic wage studies control for housing values, since amenity values tend to be embedded in both wages and rents.[2] Also, unlike the Bayless study, we control for two distinct and important categories of location specific amenities. The work of Blomquist, Berger and Hoehn (1988), and Gyourko and Tracy (1989), have demonstrated that one must expand the amenity coverage beyond "natural" amenities such as climate, to more complete measures of local quality of life. For example, Ofek, Kahn and Clark (1991), Whaples (1991) and Herzog and Schlottmann (1993) find that population size and scale economies play an important role in the assessment of quality of life across urban areas.[3] We therefore control for factors related to metropolitan status and population density in our empirical work. In addition, Gyourko and Tracy (1989), show that local fiscal variables (i.e., both taxes and expenditure levels) have a significant influence on local wages. We control for fiscal conditions by using variables reflecting local tax burdens and measures of local public services.

III. THE THEORETICAL MODEL

An extensive literature exists on the theory of compensating differences. The model developed here follows the work of Henderson (1982). In equilibrium, consumer mobility guarantees that the same indirect level of utility V^* is achieved at all locations, given variations in the price of housing P_h, wages W, and the amenity vector A. All other goods are uniformly available and are thus compressed into a composite good whose price is unity. Equation (1) below describes these factors.

$$V^* = V(P_h, W, 1; A) \qquad (1)$$

We employ the implicit function theorem to solve for wages in terms of housing prices, amenity levels, and the exogenous utility level, V*, leaving us with equation (2) below:

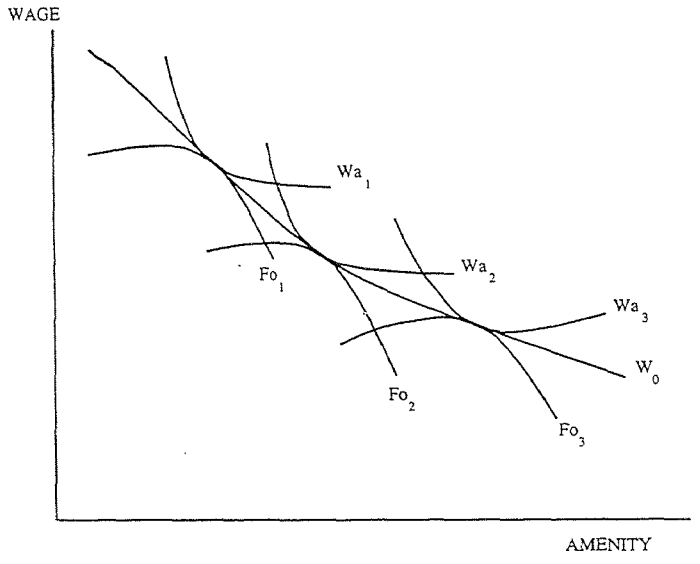
$$W_a = W_a(V^*, P_h, 1; A) \tag{2}$$

Equation (2) describes an indifference surface in wage and amenity space. What is empirically observable is a wage-amenity tradeoff, which reflects the interaction between household wage acceptances and firm wage offers. The wage offer functions of various firms depict the impact of the given amenity upon productivity (shown as F_{o1} through F_{o3} in Figure 1). The wage acceptance loci, W_{a1} through W_{a3} in Figure 1, depict individuals with different amenity preferences. The reconciliation of these forces generates a reduced-form equation (3) which Henderson (1982) defines as a wage opportunity locus, W_o.

$$W_o = W_o(P_h, 1; A) \tag{3}$$

The wage opportunity locus is an envelope, reflecting the equilibrium tradeoff between the given amenity and wages. The slope of the wage opportunity locus is defined as an implicit price. Although the wage acceptance function differs from the wage opportunity locus, there are conditions under which the implicit price derived from W_o is equivalent to the willingness to pay (i.e., slope of W_a). Willingness to pay and the implicit prices are the same if one can assume that the amenity tradeoff is continuous,[4] and that the labor market is in long-run equilibrium. Recently, the issue of labor market equilibrium has received considerable attention. Greenwood, Hunt, Rickman and Treyz (1991), and Herzog and Schlottmann (1993) have explored the impact of disequilibrium upon amenity valuations. Both studies conclude that the assumption of equilibrium in labor markets is unjustified, and that more accurate estimates of willingness to pay can be found by determining the wage premium which is required to prevent out-migration. Another issue is raised by Kahn (1987), who finds that the preferences of marginal (or more generally, recent entrants) into a given sector of the labor market tend to dominate the implicit market for occupational safety. The preferences of workers with more job tenure tend to be discounted in part due to their comparatively lower degree of mobility. Both the issues of equilibrium and mobility, as they relate to the current empirical application, will be discussed in the next section of the paper.

FIGURE 1
Household Wage Acceptance Functions,
Firm Wage Offer Functions, and
Wage Opportunity Locus



Once implicit price estimates (τ_i) for a wide range of location-specific characteristics (X_i) are derived, a quality of life index is computed as the weighted sum of the amenity level, where the weights are computed implicit prices (i.e., $QOLI=\Sigma\tau_i*X_i$). The term quality of life is actually a misnomer, since by assumption, utility levels are everywhere equal. The QOLI reflects the monetized value of the site-specific goods found at that location, and thus the value of the QOLI can be interpreted as the wage cuts which residents are willing to accept to live in that location. Indeed, it is these wage differentials which serve to maintain constant spatial utility levels.

IV. EMPIRICAL MODEL

Data

The source of the faculty compensation data is the American Association of University Professors' (AAUP) comprehensive survey of average salaries and fringes, by academic rank and gender, paid to faculty at Colleges and Universities in the U.S., by category of institution. AAUP made available to us data on faculty compensation by institution and rank for 1989-1990, although the gender breakdown was not provided. Since the AAUP data is not a microdata set, it does not

permit control for individual characteristics which may influence productivity. Furthermore, it does not allow us to control for academic discipline, or individual factors (other than rank) which may proxy amenity preferences. Thus, the estimates will undoubtedly suffer from aggregation bias. However, the AAUP data is the only geographically complete data set available for the study of faculty compensation, and insofar as compensation levels are set institutionwide, implicit valuations can be derived from aggregate data. In addition, since the data is defined by academic rank, control for the sex composition by rank is possible, and to the extent that mobility is correlated with faculty rank, it provides at least partial control for mobility. Furthermore, by including university-provided resources in the specification, we can at least partially account for productivity differences.

The compensation data for each faculty rank ($TOTCOMP_{rank}$)[5] is matched with a vector of variables about the specific institution and its faculty (*INSTITUTION*), as well as a wide range of location-specific data contained in the vectors *AMENITY*, *SIZE*, *FISCAL*, and *DISEQUILIBRIUM*. So, to be consistent with the specification in Henderson (1982), the variable median home value (MEDVALUE) is also included in the list of independent variables. Complete variable definitions and data sources are found in Table 1, and descriptive statistics are presented in Table 2.

Model Specification

Consistent with human capital theory, we employ a semilog functional form, and the separate wage opportunity loci are defined by equation (4).

$$\ln(TOTCOMP_{rank}) = f\ (INSTITUTION, AMENITY, SIZE, FISCAL, DISEQUILIBRIUM, HOUSEVALUE) \quad (4)$$

Among the variables contained in the vector *INSTITUTION* are dummy variables for private universities. To account for the possibility that compensation structures differ between public, private religious, and private nonreligious universities, two dummy variables are included ($PRIVATE_{RELIG}$, $PRIVATE_{NONRELIG}$). The percent of the faculty that is at the associate or full professor level (PCTSENIOR) is included to account for the influence of faculty mix on the overall structure of compensation. For example, universities with a significant proportion of senior faculty may successfully increase fringes, *ceteris paribus*. In addition, the inclusion of this variable also provides some control for firm-specific human capital. The compensation data is not sex-specific, and thus we include the percent of the faculty (by academic rank) that are male to account

TABLE 1
Variable Names, Definitions, and Data Sources

Variable Name	Description	Source
TOTCOMP	Total compensation per year (earnings plus benefits, by rank, in dollars).	1990 American Association of University Professors
MEDVALUE	Median value of single family homes in the county in 1990.	1992 County and City Extra: Annual Metropolitan, City and County Databook.
PRIVATENONRELIG	1=Private nonreligious university 0=Otherwise	1990 American Association of University Professors
PRIVATERELIG	1=Private religiously affiliated university 0= Otherwise	
PCTSENIOR	Percent of faculty who hold the rank of associate or full professor (includes instructors).	1990 American Association of University Professors
PCTMALE	Percent of the particular rank that is male.	*Academe*, Special Issue (March-April, 1991). The Annual Report on Economic Status of the Profession, 1990-1991.
UNION	1=University faculty are covered by a union contract. 0=Otherwise	1991 Directory of Faculty Contracts and Bargaining Agents in Institutions of Higher Education.
LIBVOLUMES	Number of volumes in the library.	*American Library Dictionary*, 1992-1993.
R&DPERFAC	Research and development expenditures (in dollars) per faculty member (not including instructors).	National Science Foundation/SRS, *Survey of Scientific and Engineering Expenditures at Universities and Colleges*, 1992.
SUNSHINE	Percent of available sunshine in the SMSA or the closest SMSA, based on 30-year average.	1983 County and City Data Book.
HUMIDITY	Average afternoon July humidity level in the SMSA or the closest SMSA, based on 30-year average.	U.S. National Oceanic and Atmospheric Administration, *Comparative Climatic Data*, 1984.
OZONENA	1=County is in nonattainment of ozone air quality standards for 1988 0=County is in attainment.	Environmental Protection Agency
HGWYDENS	1988 Total county road mileage density (miles of road per square mile).	Federal Highway Administration, 1988 Special Report on County Road Mileage.
PCVIOLENT	1988 Violent crimes per 1000 persons in the county.	1992 County and City Extra: Annual Metropolitan, City and County Databook.

TABLE 1 (Continued)
Variable Names, Definitions, and Data Sources

Variable Name	Description	Source
POPDENSITY	1988 County population in thousands divided by square miles of county land area.	1990 National Planners Association, and 1983 County and City Databook.
CNTRLCITY	1=Central city county of a metropolitan area. 0=Otherwise.	1988 County and City Databook.
SUBURBAN	1=suburban county of a metropolitan area. 0=Otherwise. based on 1983 MSA definition.	
EFFPROPTX	1987 Average statewide effective property tax rate, existing single family homes with FHA-insured mortgages.	1990 *Significant Features of Fiscal Federalism: Volume 1, Budget Processes and Tax Systems.*
INCOMETAX	1989 State marginal individual income tax rates for single individuals or married filing jointly. Marginal tax rate defined according to reported average salary in AAUP data.	1990 *Significant Features of Fiscal Federalism: Volume 1, Budget Processes and Tax Systems.*
PCEDUCATN	1987 Countywide expenditure on education per capita.	1993 County and City Extra: Annual Metropolitan, City and County Databook.
PCPOLICE	1987 Countywide expenditure on police per capita.	1993 County and City Extra: Annual Metropolitan, City and County Databook.
PCWELFARE	1987 Countywide expenditure on welfare per capita.	1993 County and City Extra: Annual Metropolitan, City and County Databook.
MIGRRATE	Change in county population between 1980 and 1986 divided by thousands of 1980 population.	1988 County and City Databook
SOUTH	1=University located in South Atlantic, East South Central, or West South Central Census Division. 0=Otherwise.	Bureau of the Census.
MIDWEST	1=University located in East North Central or West North Central Census Division. 0=Otherwise.	
WEST	1=University located in Mountain or Pacific Census Division. 0=Otherwise.	

TABLE 2
Descriptive Statistics[a]

Variable	Mean	Std Dev	Minimum	Maximum
Dependent Variables				
TOTCOMPFULL	70912.57	11124.50	42100.00	100400.00
TOTCOMPASSOC.	52853.14	6509.74	35900.00	74900.00
TOTCOMPASSIST.	44310.86	4819.12	31500.00	58900.00
Independent Variables				
MEDVALUE	107500.60	79911.28	12600.00	487300.00
Institutional Measures				
PRIVATENONRELIG	0.25	0.44	0.00	1.00
PRIVATERELIG	0.07	0.26	0.00	1.00
PCTSENIOR	72.92	5.31	57.24	90.63
PCTMALEFULL	89.93	5.44	46.07	99.29
PCTMALEASSOC.	75.87	7.05	38.89	92.41
PCTMALEASSIST.	63.26	9.53	18.52	95.45
UNION	0.11	0.32	0.00	1.00
LIBVOLUMES	1.89E+6	1.70E+6	10000.00	1.19E+7
R&DPERFAC	130.50	133.37	10.44	1171.48
Amenity Measures				
SUNSHINE	60.54	7.68	45.00	89.00
HUMIDITY	52.81	11.07	19.00	83.00
OZONENA	0.55	0.50	0.00	1.00
HGWYDENS	5.87	6.49	0.29	40.71
PCVIOLENT	5.89	4.67	0.14	26.04
Size and Metropolitan Measures				
POPDENSITY	2.29	4.53	2.2E-3	23.99
CNTRLCITY	0.78	0.42	0.00	1.00
SUBURBAN	0.07	0.25	0.00	1.00
Fiscal Measures				
PCEDUCATN	981.03	2070.35	20.81	23451.48
PCPOLICE	152.20	312.81	2.41	2763.92
PCWELFARE	153.93	389.29	0.00	2381.91
EFFPROPTX	1.26	0.49	0.22	2.38
INCOMETXFULL	5.50	2.75	0.00	10.00
INCOMETXASSOC.	5.34	2.80	0.00	10.00
INCOMETXASSIST.	5.33	2.78	0.00	9.50
Location Dummy Variables and Disequilibrium Controls				
MIDWEST	0.25	0.43	0.00	1.00
SOUTH	0.33	0.47	0.00	1.00
WEST	0.20	0.40	0.00	1.00
MIGRRATE	10.36	70.41	-109.49	311.42

[a] Based on 175 observations.

for sex-related differences in compensation. Furthermore, the dummy variable UNION is incorporated to account for the effects of organized labor contracts on the total compensation of faculty. Finally, the number of library volumes and the research and development expenditures per faculty are included to control for university-provided resources available to faculty.

The vector *AMENITY* contains several variables which are meant to capture climatic and other amenity measures in the locality. Unfortunately, data on climate is not reported for nonmetropolitan counties. Thus, we proxy nonmetropolitan climate data by that of the closest metropolitan area if the county in which the university resides is nonmetropolitan.[6] Two climate variables are included: the percent of the available sunshine (SUNSHINE) and the average afternoon humidity reading in July. Air quality is proxied by the existence of ozone nonattainment (OZONENA) in the county in which the university resides. Highway density (HGWYDENS) proxies several different influences which may be conflicting. For example, high density levels may reflect traffic congestion or measure enhanced accessibility of a particular county to employment within the county or in other counties. Finally, the violent crime rate (PCVIOLENT) is used to measure the public safety amenity.

The vector *SIZE* captures the influence of population, as well as the metropolitan nature of the region. The variables included under this heading include the population density of the county in which the university resides (POPDENSITY), and whether the county is a central city (CNTRLCITY) or a suburban (SUBURBAN) county within a metropolitan area. Collectively, these variables may capture several distinct influences. For example, densely populated or metropolitan counties may offer a variety of cultural and recreational amenities which are not available in less densely populated or rural counties. Alternatively, more rural settings may offer more opportunities for certain forms of outdoor recreation.

To capture the effects of local public goods and their tax prices on faculty compensation, two tax rates and three types of local expenditures are included in the vector, *FISCAL*. Tax rates for property (EFFPROPTX), and income (INCOMETX) are included separately. All tax variables are defined at the statewide level,[7] with the latter variable defined as that rate that is marginal to the respective faculty rank at the university. Per capita expenditures on education (PCEDUCATN), police (PCPOLICE) and welfare (PCWELFARE) are included to approximate local service levels. Note that these measures may or may not be treated as goods by faculty. As an example, high levels of welfare may be viewed as undesirable income redistribution.

Following Henderson (1982), we incorporate several other variables. First, the median housing value is included to approximate average housing value in the

county. This variable is necessary if coefficients of the wage opportunity loci are to fully reflect the implicit price for the local characteristic. Second, regional dummy variables for the four broad census divisions and the overall migration rate (MIGRRATE)[8] into the county are included to partially control for regional disequilibrium (*DISEQUILIBRIUM*). Henderson suggests that wage differentials that remain after controlling for amenities are an indication of regional disequilibrium. However, this interpretation is true only if all other influences are controlled. It is possible, and indeed likely, that these measures are also capturing amenity and disamenity influences related to unmeasured climate variables, as well as counties that have grown quickly since 1980. Since our primary concern is in having adequate control for the various spatial influences, we deem it important to include the variables, but we caution the reader that the precise interpretation of individual coefficients in this category are unknown.

V. EMPIRICAL FINDINGS AND DISCUSSION

Regression Results

Equation (4) is estimated using ordinary least squares[9] and the White test for heteroskedasticity reveals that the uncorrected error terms are homoskedastic. Ordinary least squares regressions for full, associate and assistant professors are reported in Table 3. A Chow test reveals that pooling of faculty across rank is inappropriate. However, even though the parameter estimates differ significantly between faculty, the findings are remarkably similar across the three equations. The models explain between 50 and 67 percent of the variation in total compensation, with the explained variation rising with faculty rank. The variable MEDVALUE is positive and significant for all ranks of faculty, indicating that faculty require higher wages if they are forced to work in areas where the living expenses are high. In the *INSTITUTION* category, several variables are statistically significant. Private universities generally pay higher compensation levels than do public schools, although the differences are only significant for senior faculty. The presence of a high percentage of senior faculty raises total compensation for all three compensation equations, as does the percent of the faculty that are male. While the positive and significant coefficients on PCTMALE in all three regression models may be indicative of sex discrimination for faculty, we suggest that such an interpretation, based solely on these findings, is unwarranted. This is because female faculty are not evenly distributed across disciplines, and hence the coefficient may also reflect the relative distribution of male versus female faculty in high paying disciplines. The existence of a union contract covering faculty has

TABLE 3
Regression Findings: Wage Opportunity Locus
Dependent Variable=Log of Total Compensation by Rank
(t-statistics in parentheses)

	Faculty Rank		
	Full	Associate	Assistant
INTERCEPT	10.08117	10.35084	10.19486
	(48.18)	(64.71)	(70.76)
MEDVALUE	9.02E-07	5.97E-07	4.07E-07
	(3.72)	(2.72)	(1.99)
	Institutional Measures		
PRIVATE$_{NONRELIG}$	0.051296	0.031342	0.005918
	(2.22)	(1.52)	(0.29)
PRIVATE$_{RELIGOUS}$	0.078603	0.054768	0.035645
	(2.57)	(2.00)	(1.37)
PCTSENIOR	0.004135	0.003426	0.004605
	(2.70)	(2.46)	(3.54)
PCTMALE	0.007468	0.00387	0.002811
	(4.99)	(3.77)	(3.94)
UNION	-0.01293	-8.3E-05	-0.00557
	(-0.49)	(-0.00)	(-0.25)
LIBVOLUMES	2.53E-08	9.73E-09	9.87E-09
	(5.32)	(2.28)	(2.44)
R&DPERFAC	7.65E-05	5.44E-05	1.95E-05
	(1.34)	(1.06)	(0.40)
	Amenities		
SUNSHINE	-0.00268	-0.00336	-0.00249
	(-1.88)	(-2.59)	(-2.04)
HUMIDITY	0.000282	0.000188	0.000122
	(0.26)	(0.19)	(0.13)
OZONENA	0.044046	0.02906	0.027091
	(2.07)	(1.52)	(1.50)
HGWYDENS	0.005914	0.003697	0.002898
	(2.35)	(1.63)	(1.36)
PCVIOLENT	0.004015	0.004668	0.005439
	(1.96)	(2.54)	(3.12)
	Size and Metropolitan Characteristics		
POPDENSITY	-0.01393	-0.00857	-0.00598
	(-2.98)	(-2.05)	(-1.51)
CNTRLCITY	0.049018	0.016405	0.013037
	(1.97)	(0.73)	(0.61)
SUBURBAN	0.08031	0.054723	0.035416
	(2.06)	(1.58)	(1.07)

TABLE 3 (Continued)
Regression Findings: Wage Opportunity Locus
Dependent Variable=Log of Total Compensation by Rank
(t-statistics in parentheses)

	Faculty Rank		
	Full	Associate	Assistant
	Fiscal Measures		
PCEDUCATN	3.9E-05	2.22E-05	2.04E-05
	(1.71)	(1.08)	(1.06)
PCPOLICE	-0.00046	-0.00027	-0.00023
	(-2.14)	(-1.41)	(-1.28)
PCWELFARE	0.000213	0.000136	9.47E-05
	(2.79)	(1.99)	(1.48)
EFFPROPTX	0.011984	0.018573	0.014058
	(0.63)	(1.09)	(0.88)
INCOMETX	-0.00094	0.003108	0.001083
	(-0.28)	(1.09)	(0.39)
	Disequilibrium Measures		
MIDWEST	-0.02532	-0.03245	-0.01751
	(-0.89)	(-1.26)	(-0.72)
SOUTH	-0.01975	-0.04617	-0.04149
	(-0.68)	(-1.76)	(-1.67)
WEST	-0.08698	-0.09102	-0.04909
	(-2.18)	(-2.52)	(-1.44)
MIGRRATE	0.000175	0.00028	0.000212
	(1.16)	(2.05)	(1.65)
$R^2_{adjusted}$	67.12	55.98	49.73
F-statistic	15.21 *	9.85 *	7.88 *

*Joint F-test significant at the 95% level of confidence.

a negative but insignificant influence on all three faculty ranks,[10] and both measures of university resources positively affect total compensation, although only LIBVOLUMES is significant.

Among the amenities considered in the *AMENITY* classification, only SUNSHINE is considered an amenity, and it is significant at least at the 90 percent level of confidence for all ranks of faculty. Both OZONENA and HGWYDENS have positive and significant effects on the compensation of full professors. Thus, the disamenities associated with highway density appear to dominate the accessibility effect. This is perhaps not surprising given that we have no control for proximity of faculty to the university. Violent crime (PCVIOLENT) is seen as a statistically significant disamenity for all three faculty ranks.[11]

Turning to variables in the *SIZE* category, full professors require significantly higher compensation to live in metropolitan areas, but prefer more densely populated areas once metropolitan status and other amenity measures are controlled.[12] In addition, associate professors also prefer universities located in more densely populated counties. In the *FISCAL* category, the tax rates are generally positive, but they are not significant determinants of faculty compensation. However, the form of spending on local services does have a significant impact on compensation. For example, PCEDUCATN and PCWELFARE both have positive coefficients, with the latter statistically significant for full and associate professors. This implies that these faculty treat welfare expenditures as undesirable redistribution. In contrast, all three groups of faculty treat expenditures on police (PCPOLICE) as a good, with full professors significantly sacrificing total compensation in exchange for higher per capita expenditures on police.

Finally, when compared to the Northeast, all other regions are preferred. The coefficient on SOUTH is significant at the 90 percent level of confidence for associate and assistant professors, whereas the coefficient on WEST is significant at the full and associate ranks. Furthermore, all faculty require higher total compensation levels when the county in which they work has a high migration rate. The coefficient on MIGRRATE is significant at the 95 percent confidence level for associate professors, and at the 90 percent level for those at the rank of assistant professor.

Implicit Price Estimates

Implicit prices (τ_{ij}) are derived as the partial differential of the antilog of the wage-opportunity locus with respect to various locational attributes. These prices are reported by academic rank, in Table 4. Given that wage *cuts* imply that a location attribute is a good, we define $\tau_{ij}=-\partial W_j/\partial X_i$ for rank j and attribute i. By contrast, since institutional measures are proxies for human or physical capital which affect productivity, as well as other university features which determine faculty compensation, we express the partial differential as the wage *increases* which they generate. In general, the findings are consistent with theoretical expectations. Factors which are expected to be goods (e.g., SUNSHINE) have positive implicit prices, whereas variables such as OZONENA, and PCVIOLENT have negative prices. For most of the institutional measures and the various locational attributes, the implicit prices rise in absolute value with the rank. In addition, when compared to average compensation levels, it was typically the case that the percentage impact on total compensation of an absolute change in the attribute also rose with rank. Hence, both the absolute and relative importance of institutional and locational attributes increased with academic rank.[13]

TABLE 4
Implicit Price Estimates by Rank*

	Full Professor	Associate Professor	Assistant Professor
	Mean Predicted Compensation $70,675.06	Mean Predicted Compensation $52,704.30	Mean Predicted Compensation $44,198.99
Institutional Measures			
PRIVATENONRELIG	3625.32[a]	1651.86	261.55
PRIVATERELIG	5555.27[a]	2886.52[a]	1575.49
PCTSENIOR	292.25[a]	180.57[a]	203.55[a]
PCTMALE	527.82[a]	203.97[a]	124.22[a]
UNION	-913.63	-4.38	-246.04
LIBVOLUME (per 1000 volumes)	1.79[a]	0.51[a]	0.44[a]
R&DPERFAC	5.41	2.87	0.86
Amenity Measures			
SUNSHINE	189.26[b]	177.23[a]	110.06[a]
HUMIDITY	-19.93	-9.93	-5.41
OZONENA	-3112.97[a]	-1531.60	-1197.38
HGWYDENS	-418.00[a]	-194.85	-128.10
PCVIOLENT	-283.77[a]	-246.05[a]	-240.39[a]
Size and Metropolitan Measures			
POPDENSITY	984.30[a]	451.39[a]	264.47
CNTRLCITY	-3464.38[a]	-864.63	-576.23
SUBURBAN	-5675.92[a]	-2884.15	-1565.35
Fiscal Measures			
PCEDUCATN	-2.76[b]	-1.17	-0.90
PCPOLICE	32.41[a]	14.25	10.21
PCWELFARE	-15.07[a]	-7.18[a]	-4.19
EFFPROPTX	-846.98	-978.88	-621.35
INCOMETX	66.23	-163.81	-47.87
Location Dummy Variables and Disequilibrium Controls			
MIDWEST	1789.46	1709.99	773.89
SOUTH	1395.69	2433.54	1833.70[a]
WEST	6147.10	4797.33[a]	2169.59
MIGRATE	-12.39	-14.77[a]	-9.38[b]

*Values for institutional measures represent *wage increases* resulting from the characteristics of the institution. For the other categories, prices are *wage cuts* that result from locational characteristics.

[a]Coefficient in wage opportunity locus is significant at 95 percent level of confidence in two-tailed test.

[b]Coefficient in wage opportunity locus is significant at 90 percent level of confidence in two-tailed test.

Quality of Life Estimates

Since the implicit price reflects the monetized value of a locational attribute, a quality of life index can be derived separately for each category of location-specific factors and for all factors combined. For example, the monetized value of the amenity adjustment for a particular rank j is defined as $QOLI_{AMENITY}=\Sigma_i\tau_{ij}*X_i$ (for all i attributes in the amenity category), and can be derived for each university by academic rank. Its value reflects the reduction in compensation that results in return for the bundle of amenities and disamenities available *at that site*. We note that this index is driven completely by site characteristics and is not dependent on attributes of the institution. We derive the total quality of life index as the sum of the individual indices for the *AMENITY*, *SIZE*, *FISCAL*, and *DISEQUILIBRIUM*[14] categories. We also point out that the MEDVALUE control variable is not included in the quality of life index. This is because the implicit prices derived from wage differentials fully reflect willingness to pay. Further, by controlling for median housing value, we are theoretically evaluating the individual locating at the edge of the city, where land rents are assumed to be uniform.

In Table 5, we report the predicted compensation, exclusive of the quality of life factors,[15] followed by the quality of life adjustment for the top 20 and bottom 20 universities in the sample. The complete ranking is available from the authors on request. Thus, for example, the New Mexico Institute of Mining and Technology, which ranked number one in quality of life for all academic ranks, has a predicted total compensation for full professors of $91,794, assuming no quality of life adjustments. However, total compensation declines by $14,624 as a result of favorable amenities; it drops by $2 as a result of the size and metropolitan characteristics; it drops $5,759 as a consequence of disequilibrium (and/or unmeasured locational attributes); and it increases by $663 as a result of an unfavorable mix of public goods and taxes. Thus, the overall quality of life adjustment to compensation is a reduction of $19,722. Given the similarity across faculty rank of the various attributes, it is not surprising that quality of life rankings are also quite similar. The pairwise correlation between the quality of life ranking of full and associate professors is 0.94; it is 0.90 for full and assistant professors; and it is 0.96 for associate and assistant professors. In addition there are several interesting generalizations that can be derived from these findings. First and foremost, a distinct regional pattern emerges. Those institutions which rank in the top twenty are generally located in the Mountain and Pacific regions, regardless of rank. This is due to the prominence of the amenity component in the quality of life measure. Furthermore, institutions ranking high on quality of life have a relatively favorable disequilibrium influence. It is usually the case that the fiscal component

TABLE 5
Quality of Life Rankings and Components: Full Professors

Top 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
1	New Mexico Inst. Min.&Tech.	91794	19722	14624	2	-663	5759
2	Univ. of Illinois-Urbana	109953	18989	7520	-3294	12409	2354
3	Northern Arizona University	94735	18501	13099	4	-453	5851
4	University of Wyoming	95316	16924	9889	6	246	6783
5	University of Montana	93095	16530	10194	30	-378	6684
6	Utah State University	97996	16360	10361	57	-398	6340
7	University of Arizona	100544	15746	14004	-3396	-90	5228
8	Washington State University	97646	15721	9924	18	-738	6517
9	Oregon State University	96986	14938	8449	97	-1005	7397
10	Montana State University	96492	14824	10555	19	-1350	5600
11	Golden Gate University	93810	14552	-2868	12523	-147	5044
12	Univ. of Calif.-San Fran.	92193	14552	-2868	12523	-147	5044
13	University of Nevada, Reno	90434	14070	10655	-3427	1965	4877
14	Columbia U.-Teachers Coll.	90317	13903	205	20153	-6512	57
15	Columbia University	106373	13903	205	20153	-6512	57
16	Fordham University	92194	13903	205	20153	-6512	57
17	New York University	97703	13903	205	20153	-6512	57
18	New Mexico St. Univ- Main	102624	13868	13682	-3432	-336	3954
19	U. New Mexico-Albuquerque	92984	13762	9757	-3051	1600	5456
20	Kansas State University	95787	12261	9949	109	-521	2724

Bottom 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
155	Emory University	99579	-1561	1190	-3720	91	878
156	University of Rhode Island	94663	-1592	5326	-5371	-1031	-516
157	SUNY at Binghamton	94861	-1631	6895	-3170	-5825	469
158	Lehigh University	102328	-1657	4455	-2829	-3031	-252
159	Rensselaer Poly. Institute	103136	-1894	6568	-3233	-5539	310
160	Drew University	90960	-1916	4686	-4776	-1877	51
161	Syracuse University	101751	-1984	5798	-2877	-5412	507
162	University of Rochester	101801	-2021	5448	-2412	-5568	511
163	Carnegie-Mellon University	100827	-2205	-269	-1596	-1103	763
164	Univ. of Pittsburgh-Main	95826	-2205	-269	-1596	-1103	763
165	SUNY at Stony Brook	96675	-2453	3122	-4199	-1529	153
166	University of Connecticut	95578	-2464	5048	-5378	-1984	-150
167	SUNY at Albany	98068	-2622	6716	-5468	-3573	-297
168	Drexel University	97803	-2646	-13117	8677	1218	576
169	Temple University	92982	-2646	-13117	8677	1218	576
170	University of Pennsylvania	105063	-2646	-13117	8677	1218	576
171	SUNY at Buffalo	97273	-3236	4834	-2552	-6361	843
172	Princeton Theol. Seminary	98023	-3352	1938	-2045	-3060	-185
173	Princeton University	103791	-3352	1938	-2045	-3060	-185
174	Georgia Institute of Tech.	103069	-3916	-2984	-2315	118	1265
175	Georgia State University	91651	-3916	-2984	-2315	118	1265

TABLE 5 (Continued)
Quality of Life Rankings and Components: Associate Professors

Top 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
1	New Mexico Inst. Min.&Tech.	60209	16031	13993	0	-2297	4335
2	Northern Arizona University	60430	15235	12721	2	-1932	4444
3	University of Wyoming	61428	15025	9667	3	-201	5556
4	University of Arizona	63008	14680	13627	-833	-1816	3702
5	Univ. of Illinois-Urbana	66790	14307	8149	-786	4561	2383
6	Washington State University	61640	14057	9777	8	-966	5238
7	University of Nevada, Reno	59591	13299	10412	-847	450	3284
8	Utah State University	61844	13010	10084	26	-2127	5027
9	University of Montana	61629	12705	9976	13	-2721	5437
10	New Mexico St. Univ- Main	64812	12360	13196	-850	-2169	2183
11	U. New Mexico-Albuquerque	59028	11913	9925	-675	-1311	3974
12	Oklahoma State Univ.-Main	61985	11854	10817	43	-1628	2622
13	University of Mississippi	59990	11661	10057	22	-1611	3193
14	Oregon State University	61947	11491	8680	44	-3520	6287
15	Univ. of Northern Colorado	59417	11491	9935	-848	-2119	4523
16	University of South Dakota	58940	11426	9998	14	-1913	3327
17	Montana State University	60375	11113	10283	9	-3325	4146
18	Texas Tech University	60683	11093	10357	-752	-1237	2725
19	University of Idaho	61606	11051	9976	7	-4225	5293
20	Kansas State University	60897	11009	10170	50	-2036	2825

Bottom 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
155	Univ. of Pittsburgh-Main	60684	2910	3728	-8	-1719	909
156	Emory University	62082	2811	4697	-1987	-1716	1817
157	Drexel University	61964	2430	-2226	4703	-733	686
158	Temple University	61035	2430	-2226	4703	-733	686
159	University of Pennsylvania	65372	2430	-2226	4703	-733	686
160	Adelphi University	58357	2382	5101	-788	-2109	178
161	Hofstra University	59107	2382	5101	-788	-2109	178
162	University of Connecticut	61847	2346	7149	-2747	-1877	-179
163	Drew University	60792	2065	7240	-2471	-2765	61
164	SUNY at Binghamton	61211	1992	7514	-729	-5353	560
165	University of Rhode Island	60970	1605	7532	-2744	-2568	-615
166	Rensselaer Polytechnic In	65566	1595	7199	-758	-5215	369
167	Syracuse University	61918	1534	6713	-595	-5189	605
168	University of Rochester	63210	1532	6573	-382	-5268	609
169	Princeton University	62168	1203	4986	-214	-3349	-220
170	Princeton Theol. Seminary	65063	1039	4986	-214	-3513	-220
171	Georgia Institute of Tech.	64671	1016	778	-337	-1703	2278
172	Georgia State University	58388	1016	778	-337	-1703	2278
173	SUNY at Stony Brook	61636	954	6375	-2206	-3397	182
174	SUNY at Buffalo	62430	846	5945	-446	-5658	1005
175	SUNY at Albany	61733	-161	7283	-2788	-4302	-354

TABLE 5 (Continued)
Quality of Life Rankings and Components: Assistant Professors

Top 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
1	New Mexico Inst. Min.&Tech.	48044	9478	8696	0	-1094	1876
2	Northern Arizona University	47295	8474	7393	1	-865	1945
3	University of Wyoming	50468	8323	5822	1	-151	2651
4	University of Arizona	51042	8068	7860	-557	-709	1474
5	Univ. of Illinois-Urbana	55094	8024	4576	-530	2777	1201
6	Washington State University	49820	7762	5951	4	-642	2449
7	Oklahoma State Univ.-Main	50863	7756	6501	25	-723	1953
8	University of Mississippi	48770	7735	6176	13	-770	2316
9	Utah State University	49638	7563	6216	15	-983	2315
10	University of Montana	50851	7403	6068	8	-1249	2576
11	Mississippi State Univ.	50808	7136	5618	21	-673	2170
12	New Mexico St. Univ- Main	54803	6888	7924	-567	-978	509
13	Virginia Poly.Inst.&St.Univ.	52732	6810	5837	54	-829	1748
14	University of Nevada, Reno	48808	6763	5745	-566	376	1208
15	Kansas State University	49683	6717	6183	29	-976	1481
16	Texas Tech University	50348	6697	5998	-510	-810	2019
17	Oregon State University	49929	6691	5307	26	-1758	3116
18	Auburn University-Main	49724	6685	5254	35	-327	1723
19	U. of Southern Mississippi	46749	6611	5350	37	-694	1918
20	Montana State University	47739	6583	6366	5	-1543	1755

Bottom 20 Institutions

Rank	Institution Name	Predicted Compensation (based solely on institutional characteristics)	QOLI	Quality of Life Adjustments (compensation reduction from location characteristics) Amenity component	Size component	Fiscal component	Disequilibrium component
155	Carnegie-Mellon University	51614	1213	1710	-74	-1000	577
156	Univ. of Pittsburgh-Main	49535	1213	1710	-74	-1000	577
157	University of Rhode Island	48961	1126	4315	-1483	-1316	-390
158	Rensselaer Poly. Institute	52718	1095	4280	-514	-2905	234
159	University of Rochester	50450	1013	3793	-293	-2873	386
160	Syracuse University	50652	1004	3873	-418	-2835	384
161	Michigan State University	51523	973	2006	-446	-1860	1273
162	Western Michigan University	50048	859	1507	-473	-1182	1007
163	Wayne State University	50693	841	-611	342	-645	1755
164	SUNY at Stony Brook	50487	726	3470	-1168	-1692	116
165	Boston College	50212	395	-2621	2544	393	79
166	Northeastern University	49445	395	-2621	2544	393	79
167	SUNY at Buffalo	51015	370	3146	-331	-3083	638
168	SUNY at Albany	49119	275	4345	-1509	-2336	-225
169	Drexel University	50519	121	-2768	2686	-233	436
170	Temple University	50421	121	-2768	2686	-233	436
171	University of Pennsylvania	53645	121	-2768	2686	-233	436
172	Princeton Theol. Seminary	48605	-162	2114	-195	-1941	-140
173	Princeton University	51962	-162	2114	-195	-1941	-140
174	Georgia Institute of Tech.	53668	-1327	-2038	-267	-757	1735
175	Georgia State University	47980	-1327	-2038	-267	-757	1735

is negative, although it is small relative to the amenity and disequilibrium components. One notable exception is the comparatively high quality of life reported for the University of Illinois at Urbana, which ranks in the top 5 for all faculty primarily due to its favorable fiscal mix. In addition, the size and metropolitan component of quality of life is a small factor in the overall quality of life assessment for top 20 institutions for all ranks except full professors. This results from the relatively large impact of population density for full professors, which is more than twice that of associate professors, and more than 3.5 times larger than that of assistant professors.

An examination of the bottom 20 schools reveals a similar regional consistency. Most of these institutions are found in the Northeast, especially the Middle Atlantic states. While the amenity component of the overall index is typically positive, the size and fiscal components are consistently negative and strong. Moreover, the disequilibrium component is usually small relative to the other components. Finally, it interesting to note that at least among the universities considered in this study, the value of QOLI is typically positive, indicating that faculty are accepting cuts in compensation to live in those areas. In fact, full professors require positive adjustments to total compensation for only 31 of 175 universities in the sample. Assistant professors require such adjustments for just four of the universities, and associate professors display a negative QOLI for only one institution.

Discussion

These findings reflect a growing realization of the importance of quality of life factors such as air quality, public safety, and a favorable mix of public goods to workers. Indeed, the quality of life adjustments range between 7 and 12.8 percent (on average) of total compensation for professors in the sample of universities considered in this study. Moreover, the amenity component of quality of life is a strong determinant of the ranking of institutions for all faculty. While faculty compensation is the focus of this empirical investigation, the findings also apply to other occupations as well. In a society where workers and jobs are increasingly mobile over space, investigations of wage and total compensation differentials cannot ignore the relevance of location-specific factors in determining compensation levels. Important areas of research remain. This study examines aggregate data and due to data limitations does not distinguish between male and female or white and nonwhite implicit valuations. By extending this analysis to consider a microdata set, valuable insights can be derived regarding the relative importance of quality of life factors to these different groups of faculty. In addition, the issue of disequilibrium in faculty labor markets can be more readily addressed.

ENDNOTES

1. In true long-run equilibrium, one would expect that variations in salaries across disciplines would be arbitraged away by the mobility of graduate students across fields so that remaining wage differences reflect differences in training costs, etc. However, this is the subject of another paper.

2. Henderson (1982) shows that wage differentials measure implicit prices only where average housing values are controlled in the hedonic wage equation.

3. See Kahn and Ofek (1992) for a thorough development of the dynamic relationship between local wages and population.

4. Clark and Kahn (1989) show that when an amenity is noncontinuous, willingness to pay may not be revealed in the estimated implicit price. Given that our data covers a wide range of geographic areas as well as central city, suburban and rural areas, we are confident that the assumption of continuity is satisfied in this application.

5. Faculty receive compensation in the form of both salary and fringe benefits. As a result, it would be inappropriate to simply examine salary data, since two institutions with identical salary levels may have very different levels of fringe benefits. Hence, we estimate the wage-opportunity locus in terms of total annual compensation (i.e., the sum of the salary and fringes).

6. When two or more metropolitan areas were equal, or near equal distance from a nonmetropolitan county, the metropolitan area which approximated the latitudinal location of the county in question was chosen.

7. While countywide property tax revenues per capita for 1987 are available, these are revenues from residential and nonresidential sources. Since we are interested in the impact of residential property taxes, we view the more aggregated statewide effective residential property tax rate as preferable.

8. Unfortunately, we do not have data on the migration rates of faculty, and thus we cannot derive more precise estimates of willingness to pay for location-specific attributes in the same way that Greenwood, Hunt, Rickman and Treyz (1990) and Herzog and Schlottmann (1992) do.

9. Roback (1982) shows theoretically that wages and land rents are simultaneously determined by an interaction between the firms' spatial isocost and households' iso-utility surface. To test for the possible correlation between the median housing value and the error term, we conduct the Hausman specification test (Hausman, 1978). We find that the assumption of exogeneity of median housing value is upheld empirically.

10. Hamermesh and Woodbury (1992) find little effect of unionization of the campus on fringes, but a large effect of the statewide teachers' unionization on

the level of fringes. Although we did not have the latter measure, we found no effect for the overall statewide unionization rate of all workers.

11. In commenting on an earlier draft of this paper, Daniel Hamermesh suggested that equity considerations in salaries across ranks constrain the compensation of faculty, especially among the most productive faculty. He noted that an interaction term between the various amenities and school quality variables may be important. There is some limited support for that contention. When we interacted LIBVOLUME and R&DPERFAC with the various amenity measures, the variables SUNSHINE and HUMIDITY interacted with R&DPERFAC were statistically significant in the equation for full professors. However, the coefficients on those interaction terms were positive. This implies that compensation for humidity was higher, but that such individuals place a smaller implicit value on sunshine. Furthermore, no other interaction terms were significant at the 95 percent level of confidence, and the standard errors increased for most of the amenities. Given that we were interested in developing precise estimates of implicit prices to derive quality of life indices, we chose to omit the interaction terms. However, if this study were to be conducted on a wider range of colleges and universities, then this interaction could become more important.

12. Following Herzog and Schlottmann (1993), we considered various combinations of population levels and population density, both in linear and quadratic form. In no case were the population or $POPDENSITY^2$ variables significantly different from zero.

13. So as to ascertain the effects of large changes in site-specific factors, we also derived the percentage change in total compensation resulting when the site-specific characteristics in the *AMENITY, FISCAL* and *SIZE* categories changed from their minimum to their maximum values. In the *AMENITY* category, the most substantial impacts were for SUNSHINE (total compensation fell 11 percent-15 percent), HGWYDENS (compensation increased 11 percent–23 percent) and PCVIOLENT (compensation rose 10 percent–14 percent). Of the variables in the *FISCAL* classification, the expenditure levels displayed relatively strong impacts, with changes in PCEDUCATN from the minimum to the maximum value increasing compensation between 48 percent and 91 percent, PCPOLICE decreasing compensation between 63 percent and 127 percent and welfare increasing compensation between 22 percent and 51 percent. Note, however, that these increases in expenditure typically represent changes on the order of 10 standard deviations. Interestingly, by contrast, tax variables display effects of less than 5 percent, even when tax rates increase from zero to their maximum value. Finally, changes in POPDENSITY from its minimum to its maximum value reduced total compensation between 14 percent and 33 percent overall.

14. While the *DISEQUILIBRIUM* category is included to account for regional disequilibrium, we believe it is an important component of quality of life for at least two reasons. First, it captures unmeasured amenities and disamenities. For example, the coefficients on regional dummy variables inevitably capture the influence of temperature extremes and seasonal temperature variance. Second, even if regional dummy variables capture only disequilibrium influences, we believe that these influences affect the quality of life in the region. For example, if the dummy variable for the WEST region is negative and significant, this implies that total compensation is lower (after having accounted for equilibrium influences) than the omitted category. Thus, this cut in total compensation, which would be expected to be eventually eliminated by the movement of firms and households, reflects the decrease that residents are currently willing to accept to locate in that region.

15. The predicted compensation represents the sum of the antilog of the constant term, plus the additions to compensation resulting from the institutional characteristics.

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