Are a City's Entertainment Offerings Amenities or Disamenities? Evidence from Net Compensation Estimates

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Abstract

Using data from the 2018 American Community Survey for cities in North Carolina, this study examines the impact of the cost of entertainment goods and services on wages and rents in order to estimate the net implicit monetary value of a higher cost of living associated with city-based entertainment goods and services. A seemingly unrelated regression approach finds that although the cost of entertainment goods and services is capitalized into both wages and rents, individuals receive compensating differentials (i.e., larger increases in wages than in rents) for living in higher-cost cities offering more entertainment goods and services. Thus, our results suggest that individuals consider living in urban areas to be a disamenity. Our estimate of the average net marginal willingness to accept price for access to the entertainment offerings in an urban area is about $640 per year.

1 Introduction

Housing prices and wages vary substantially by city across the U.S. Growth in the demand for labor in metropolitan areas and research and technology hubs (e.g., the San Francisco Bay area, Austin, Texas, and the research triangle of North Carolina consisting of Chapel Hill, Durham and Raleigh) over recent decades has led to a rise in the demand for new housing. Additionally, many metropolitan areas and technology hubs offer other desirable amenities, such as parks, theatres, mass transit, restaurants and other entertainment and recreational facilities that further attract people to move to these areas (see Glaeser et al. (2001), Gaigné et al. (2022). At the same time, the increase in housing supply has not matched that of demand, and as a result both wages and housing prices in metropolitan areas and emerging technology hubs have risen substantially in recent years. The purpose of this study is two-fold. First, we examine whether compensating wages and price differentials exist across cities in the U.S. Second, we calculate the net implicit monetary values of the cost of living in cities with a higher cost of entertainment goods and services (hereafter entertainment offerings). These net implicit monetary values reflect an individual's willingness to pay for, or willingness to accept, life in cities with a higher cost of entertainment offerings. Viewed in this way, a city's entertainment

offerings are not clearly an amenity or disamenity. On the one hand, the higher costs of entertainment offerings may be an amenity because they might reflect the higher quality of the product. On the other hand, higher costs of entertainment offerings may be a disamenity because they may have some utility costs through their inaccessibility. Given these considerations, this study presents a unique and novel idea – mainly the implicit monetary value of households' preferences with regard to employment when wages do not fully reflect the cost entertainment offerings – that has been heretofore ignored by the academic literature.

Using data from the 2018 American Community Survey for cities in North Carolina, results from a seemingly unrelated regression approach suggest that although the cost of entertainment offerings is capitalized into both wages and rents, individuals receive compensating differentials (i.e., larger increases in wages than in rents) for living in cities with high costs associated with entertainment offerings. Before turning to an in-depth discussion of the empirical results, however, the next section of the study provides a background along with a brief discussion of related literature. This section is followed by a detailed discussion of the empirical methodology.

2 Background and Prior Literature

Determination of the cost of living involves an individual's preferences for different types of goods and services in combination with their willingness to pay for these (Koo et al., 2000). Assuming a competitive labor market, utility-maximizing individuals will choose to live and work in locations that maximize the return on their labor. Similarly, profit-maximizing firms choose that combination of inputs, including labor, that minimizes the cost of a given level of output. In this regard, if the prices of goods and services (i.e., the price of a given level of utility) is higher in larger cities, the firms located there must offer higher wages in order to induce individuals to live and work in these metropolitan areas. The resulting labor mobility will, in turn, raise the price of housing (i.e., rents) in those cities.

In order to counter higher housing prices, metropolitan firms often use a cost of living index to adjust the employees' wages. This process presumably brings both the labor and housing markets into equilibrium. In reality, however, metropolitan firms' wages may be too low to fully compensate workers for accepting a high cost of living location. In fact, although studies like that by DuMond et al. (1999) report that wages are more than 20 percent higher in the largest metropolitan areas than in smaller urban areas, Albouy and Lue (2015) point out that the downward gradient of rents observed with employment-related commutes suggests that workers are willing to travel relatively long distances in the pursuit of metropolitan amenities.[1]

Despite the potential complexities of the relationship between cost of living and both wages and rents, there are relatively few studies that investigate these relationships for different metropolitan areas. An early study by Roback (1988) argues that although regional differences in amenities can account for wage differences, cost of living variations do not account for wage differences, but instead exacerbate them. Using a large micro-level panel of German firms, Lehmer and Möller (2010) compare urban wage premia to large firm wage premia. In doing so, they report an urban wage premium of eight percent and a large firm premium of 11 percent. Thus, they suggest that observed wage premia are mainly due to productivity-enhancing employment relationships. In contrast to these, a study by Winters (2009) estimates the equilibrium relationship between wages and prices across labor markets, finding that workers receive higher wages to compensate for higher living costs. Likewise, more recent studies by McHenry and McInerney (2014) and Sturman et al. (2017) find that the cost of living differentials represent one of the most important determinants wage variations by location.

None of the above studies explores the implicit monetary value of an individual's willingness to accept or pay for living in high cost of living cities. Recent data from the Bureau of Labor Statistics indicates that the median number of years that workers remain with the same employer is only about 4.1 years, suggesting that they change jobs, and perhaps relocate to different areas of the U.S., on a relatively regular basis. In many of these cases, cost of living differentials is almost certainly a major factor in the decision to separate from one's current employer and home location. Thus, estimatation of the implicit dollar values of an individual's willingness to accept or pay for living in high-cost cities is an important undertaking, and a motivation for

[1]See Chau et al. (2001), Ong et al. (2003), Roos (2006), Garretsen and Marlet (2017) for additional studies that examine variations in prices and amenities in metropolitan areas.

the current study.

3 Methodology

3.1 Hedonic Theory and Empirical Framework

The primary empirical question of this paper is whether the cost of entertainment goods and services that varies across the United States significantly affects housing prices and wages. As mentioned earlier, to capture compensating differentials and housing prices affected by cost of access to various entertainment offerings, this study proposes a similar type of analysis as that of Roback (1988).[2] Following the budget constraint utility maximization behavior, it is assumed that consumers compete implicitly for a city's entertainment offerings or city's amenities in two markets – the housing market and the labor market, which brings both markets in equilibrium.

The problem of maximization of the utility of the consumer for a given income m, is

$$maxU = U(X, H, C), s.t.m = X + pH \tag{1}$$

wherein the choice variable, X, is a composite numerical good, H is housing units purchased at price p, and C is the value of the city's entertainment-related goods and services.[3] It is assumed that the cost of the city's entertainment offerings and services indirectly reflects the amenities of a city and is determined by the population's housing location choices.[4] According to the consumer's maximization problem, he or she will choose X and H for a given level of C against his or her budget constraint.[5]

The interior solution of the utility-maximization problem provides the Marshallian demands,

$$X^* = X(p, m, C) \tag{2}$$

and

$$H^* = H(p, m, C) \tag{3}$$

The indirect utility function, Φ, is obtained by substituting the values of X^* and H^* from (2) and (3) into the utility function in (1), such that,

$$\Phi = \Phi(p, m, C) \tag{4}$$

Assuming free and costless mobility, a spatial equilibrium will occur when there is no utility difference between locations. Then, (4) can be represented for k cities (where $k = 1, 2, \ldots K$),

[2]Although our choice is to follow the approach in Roback (1988), as do Hand et al. (2008), Koirala and Bohara (2014), and Koirala et al. (2023), other approaches, such as that in Glaeser (2008), are also available.

[3]The hedonic methodology rests on a number of assumptions, which include assumptions regarding the existence of equilibrium in the hedonic markets, perfect information and the absence of relocation costs. Given this, although the housing sector (supply and demand) implicitly enters the formal model its explicit inclusion in the regression models is not necessary.

[4]Although we indicate that one margin of adjustment to a change in the costs of a city's entertainment offerings is a change in mobility, our empirical tests ultimately do not include population due to data constraints. This is, however, in line with other hedonic regression models that do not include a population-related variable (e.g., Hand et al. (2008); Koirala and Bohara (2014); Koirala et al. (2023)

[5]Alternatively, one might consider a city's entertainment offerings as a non-tradable good that enters the model as X, in which case the price of the good would not be used as a numeraire, but would instead be included directly in the model. This approach would allow one to model the production of entertainment offerings and include the possibility of differences in productivity in local entertainment production, such that cities with higher productivity would have higher entertainment costs. Although in our approach the price of a city's non-marketed entertainment offerings enters the amenity component of the model, it is controlled for as a composite index in order to estimate its marginal effects on wages and house rents.

$$\Phi_k = \Phi(p, m, C) = \Phi_o, \forall k \tag{5}$$

Characteristics of the good vary spatially. Differentiating the indirect utility function in (5) and setting $d\Phi = 0$ gives,

$$d\Phi_0 = \frac{\partial \Phi}{\partial p} dp + \frac{\partial \Phi}{\partial m} dm + \frac{\partial \Phi}{\partial C} dC$$

$$\frac{\Phi_C}{\Phi_m} = -\frac{\Phi_p}{\Phi_m} \frac{\partial p}{\partial C} - \frac{\partial m}{\partial C} \tag{6}$$

wherein notations Φ_C, Φ_m and Φ_p represent the partial differential of the indirect utility function with respect to cost of living, income, and price, respectively. The marginal rate of substitution between the cost of a city's entertainment offerings and goods consumption (i.e., the marginal effect of a change in income) gives an imbedded price of a city's amenities based on the cost of entertainment offerings. The supply of land or housing units is not unlimited (i.e., there is scarcity in living space), thus tradeoffs are necessary. Here, a limited supply of land is a sufficient condition for generating such a tradeoff, and generates variations in the price of property (land or housing) for a given spatially variant cost of entertainment offerings. Nevertheless, an individual will have the same level of indirect utility from any given choice of city location regardless of price variations due to the cost of entertainment offerings, which can be represented by,

$$\Phi(p_1, m, C_1) = \Phi(p_2, m, C_2) = \Phi(p_k, m, C_K) \tag{7}$$

Market wages in each location are determined by the interaction of the local demand for and supply of workers. Given that indirect utility across all locations is equal, the production cost through all locations also remains equal. As noted by Roback (1988) and Hand et al. (2008), the market for the composite good is competitive, hence it is assumed that the unit cost of production for any location is

$$\gamma(P, W, C_k) = 1, \forall k \tag{8}$$

wherein W represents the market wage rate.

Equation (5) can be written as,

$$\Phi_0 = \Phi(P, W, C_k), \forall k \tag{9}$$

Total differentiation of (8) and (9) to find the marginal effects of cost of entertainment offerings on wages and housing unit prices, and setting $d\Phi_0 = d\gamma = 0$ yields,[6]

$$\frac{W}{C} = \frac{\Phi_C \gamma_P - \Phi_p \gamma_C}{\Omega} \tag{10}$$

$$\frac{P}{C} = \frac{\Phi_W \gamma_C - \Phi_C \gamma_W}{\Omega} \tag{11}$$

[6]See Hand et al. (2008) and Koirala and Bohara (2014) for details.

wherein Ω = -Φ_W Ω_p + Φ_p Ω_W < 0, and the subscripts indicate the partial derivatives. To estimate the left-hand-side values in (10) and (11), the variable that affects the wage rate of individuals must be known. The same cost of entertainment offerings affect both the hedonic wage and the hedonic price (Rosen (1974)). [7] Following Mincer (1974), the hedonic wage equation for econometric analysis would be,

$$W_{ik} = \alpha_0 + \rho^{'} C_k + \beta^{'} Y_i + \mu_i \tag{12}$$

wherein W_{ik}, C_k, Y_i, and μ_i are, respectively, the monthly wage of household i, the cost of entertainment offerings, a vector of human capital characteristics and other control variables for household i, and an error term.[8]

Similarly, the hedonic econometric model for housing rent is given as,

$$P_{ik} = \delta_0 + \phi^{'} Z_i + \zeta^{'} D_k + \Phi^{'} C_k + \nu_i \tag{13}$$

wherein P_{ik} and Z_i are, respectively, the hedonic rent on (price of) housing units and structural characteristics of housing units. Further, D_k represents demographic characteristics and νi is the error term of the hedonic rent model. In the hedonic rent model, the price variable is used as unit rent in the empirical analysis. Both econometric models (i.e., the housing rent and wage models) include a cost of entertainment offerings (i.e, C_k) that may effect wages and housing rents. The common bundle should be in both econometric models (Koirala and Bohara, 2014).[9]

3.2 Estimating the Net Marginal Willingness to Accept for Cost of Living

After estimating both hedonic econometric models, the net compensating differential of the cost of living, or net marginal willingness to accept the cost of entertainment offerings (Marginal Willingness to Accept), is calculated by taking the difference in the marginal effects on the cost of entertainment offerings variable in both the wage and rent models. This difference is given as,

$$MarginalWillingnesstoAccept = \frac{dW}{dC} - \frac{dP}{dC} \tag{14}$$

wherein $\frac{dW}{dC}$ is the partial of the hedonic wage, and $\frac{dP}{dC}$ is the partial of the hedonic housing rent.10 Both the wage and rent partials are estimated by the two hedonic econometric models in (12) and (13). The hedonic wage model provides the marginal effect of the cost of entertainment offerings on the monthly wage rate, $\frac{dW}{dC}$, while the hedonic rent model provides the marginal effect of the cost of entertainment offerings on monthly housing rents, $\frac{dP}{dC}$. The difference between these two provides the individual's average monthly net marginal willingness to accept (*Marginal Willingness to Accept*) the cost of entertainment offerings. If the difference is positive, the cost of entertainment offerings is a disamenity and the value of *Marginal Willingness to Accept* represents a net compensation for the disamenity associated with living and working in an expensive city. On the other hand, if the difference is negative, the cost of entertainment offerings is an amenity and the value of *Marginal Willingness to Accept* represents the individual's willingness to pay for the amenities associated with living in an expensive city. This measure, therefore, provides a net compensation (i.e., a net *Marginal Willingness to Accept* or a net *Marginal Willingness to Accept* to Pay) for the cost of entertainment offerings revealed by individuals.

[7] Hedonic pricing models in the tradition of Rosen (1974) are common in the real estate literature (for recent examples, see Caudill et al. (2017); Affuso et al. (2018); Calderón-Arrieta et al. (2019); Caudill et al. (2021).

[8] Hedonic wage models in the tradition of Mincer (1974) are common in studies of hazardous working conditions (e.g., see Vitaliano (2019), Lavetti (2020).

[9] In order to obtain the implicit price of non-traded good, such as a city's entertainment offerings, hedonic regression is the most commonly used approach.

4 Data and Econometric Approach

The data used in this study are published by the 2018 American Community Survey (ACS) for North Carolina, which are the latest data available at the time of this research (U.S. Census Bureau, 2020).[10] The ACS data are public use microdata area (PUMA) based on the 2010 Census. They provide records on housing units along with rich micro-level information on households, including demographic information. Data on the cost of entertainment offerings are obtained from BestPlaces.net. This source provides an index of the cost of entertainment offerings using a consumer price index based primarily on the costs of restaurant dining, entertainment and clothing.[11] The cost of entertainment offerings index provides information on how one's salary is impacted by one's location. Lastly, the climate-related variables, heating degree days (*Heating Degree Days*) and cooling degree days (*Cooling Degree Days*) for each city, are obtained from the National Climatic Data Center of the National Oceanic and Atmospheric Administration.

4.1 Variable Definitions

As discussed above, this study employs two dependent variables – monthly wage and monthly housing rent. The first dependent variable, monthly wage, is created by dividing annual household income by 12 to create a monthly wage. The sample used in the wage equation is restricted to wage-earning homeowners and apartment renters. Variable for monthly wages are transformed into the natural log, $Wage$, which is created for the wage models. The second dependent variable, housing rent, captures two types of information from the American Community Survey (ACS). These are units with current monthly rent and owner-occupant units without monthly rent but with current property value. For owner-occupied units where monthly rents are not given, the monthly rents are generated by multiplying the value of the unit by an annual discount rate of 7.5 percent. Several studies (e.g., Hand et al. (2008); Koirala and Bohara (2014)) also applied the same process to calculate monthly rents of owner-occupied units. Lastly, as with wages, monthly rent is transformed into its natural log (*Rent*).

Among the several independent variables, the variable of interest is the cost of entertainment offerings index. This index is measured in points, with the national average being 100. Thus, an index below 100 signifies a below average cost of entertainment offerings, and an index greater than 100 signifies an above average cost of entertainment offerings. As with the two dependent variables, this variable is transformed into a natural logarithm (*Cost Entertainment Goods & Services*). Next, the set of control variables include the unemployment rate in percentage (*Unemployment Rate*), a series binary variables indicating whether an individual holds an associate degree or college degree (*College Degree*) or a high school diploma (*High School Diploma*), and the age of the head of household, which is transformed into a natural logarithm (Age). Similarly, other household-related variables included are household size (*Household Size*), and binary variables indicating whether the head of household head is single (SINGLE), whether head of household's income includes health insurance coverage (*Health Insurance Coverage*) and whether the head of household is not a U.S. citizen ($non - US\ Citizen$).

Further, this econometric specification controls for households with different countries of origin. The variables in these categories are binary variables capturing whether the head of household is American (*American*), of Asian origin (*Asian*), of Hispanic (*Hispanic*) origin, or from Europe (*European*). We also control for travel-related variables that could affect wages or housing prices. Those are modes of commuting to work, which include commuting by car (Car) or commuting on public transportation for ($Public\,Transportation$). The specifications also include travel time to work in minutes, which is transformed into a natural logarithm ($Travel\ Time$).

Next, housing unit structure variables used in this estimation include the annual fire/hazard insurance policy premium ($Home\ Insurance\ Premium$) and the number of bedrooms ($Number\ Bedrooms$). Similarly,

[10] Both of the dependent variables in the econometric models in (12) and (13) are transformed into natural logarithms so that their partial values are estimated as, $\frac{dP}{dC} = \exp(X\hat{B}') \times \hat{\phi}$ and $\frac{dW}{dC} = \exp(X\hat{\beta}') \times \hat{\rho}$
The empirical tests using data from North Carolina employ more than 29,000 observations. Thus, while restricting our analysis to a single state (i.e., North Carolina) does not preclude obtaining consistent and efficient results.

[11] To find this index for any city at BestPlaces.net, one must click the cost-of-living tab for that particular city. Doing so reveals a number of specific indexes, with the one labelled "Miscellaneous" containing the prices of a city's entertainment offerings.

Table 1: Variable Definitions and Descriptive Statistics

Variable	Variables definitions	Mean	Std. Dev.
Wage	Natural log of monthly wage($).	8.470	1.179
Rent	Natural log of monthly rent($).	6.897	0.942
Cost Entertainment Good & Services	Natural log of price of entertainment goods and service index.	4.571	0.141
Unemployment Rate	Unemployment rate (%)	4.044	0.870
College Degree	Dummy variable equal to 1 if individual's highest level of education is an associate or college degree, and 0 otherwise.	0.312	0.463
High School Diploma	Dummy variable equal to 1 if individual's highest level of education is a high school diploma, and 0 otherwise.	0.486	0.500
Age	Natural log of indivisual's age.	3.588	0.836
Household Size	Household size.	2.385	1.272
Single	Dummy variable equal to 1 if individual is single, and 0 otherwise.	0.364	0.481
Married	Dummy variable equal to 1 if individual is married, and 0 otherwise.	0.443	0.497
Health Insurance Coverage	Dummy variable equal to 1 if individual's income includes health insurance coverage, and 0 otherwise.	0.893	0.310
$non - US\ Citizen$	Dummy variable equal to 1 if individual is not a U.S. citizen, and 0 otherwise.	0.019	0.136
American	Dummy variable equal to 1 if individual is American, and 0 otherwise.	0.915	0.279
Asian	Dummy variable equal to 1 if individual is Asian origin, and 0 otherwise.	0.017	0.128
Hispanic	Dummy variable equal to 1 if individual is Hispanic origin, and 0 otherwise.	0.043	0.202
European	Dummy variable equal to 1 if individual is European origin, and 0 otherwise.	0.021	0.144
Car	Dummy variable equal to 1 if individual commutes to work by car, and 0 otherwise.	0.364	0.481
Public Transportation	Dummy variable equal to 1 if individual commutes to work by public transportation, and 0 otherwise.	0.000	0.012
Travel Time	Natural log of travel time to work (minutes).	1.452	1.884
Home Insurance Premium	Annual fire/hazard insurance policy premium ($).	942.32	848.72
Number Bedrooms	Number of bedrooms.	3.166	0.820
House	Dummy variable equal to 1 if home is a single unit, and 0 otherwise.	0.839	0.368
Apartment	Dummy variable equal to 1 if individual is not a U.S. citizen, and 0 otherwise.	0.019	0.136
Years Since Construction	Year since construction.	6.697	3.753
Kitchen	Dummy variable equal to 1 is home has complete kitchen, and 0 otherwise.	0.997	0.053
Heating Degree Days	Heating degree days.	1,309	211.9
Coling Degree Days	Cooling degree days.	1,687	233.1

the housing unit structure variables include an indicator for single units (House) and whether the housing unit is an apartment (*Apartment*). Further, this model also controls for kitchen type. That is, an indicator as to whether the housing unit has complete kitchen facilities (*Kitchen*), and the year of construction (*Years Since Construction*). Inclusion of Kitchen and Years Since Construction capture the contributions to price of the presence of a complete kitchen facility and the age of the housing unit, respectively. Lastly, in addition to the building-related variables, we controlled for both the heating degree days (*Heating Degree Days*) and cooling degree days (*Cooling Degree Days*), as climate-related variables may influence both wages and rents. Heating (Cooling) degree days are a measure of how cold (hot) the average daily temperature is relative to a standard temperature, and these are used to estimate the amount of energy needed to heat (cool) buildings. Heating (Cooling) degree days represent the number of degrees below (above) 65° F that the average daily temperature falls. The variable names, definitions and descriptive statistics are presented in Table 1.

5 Empirical Results

The cost of entertainment offerings variable enters both the hedonic rent and wage models as an exogenous variable. To apply corrective measures if required, we performed a Durbin-Wu-Hausman test for endogeneity.[12] This test failed to reject the null hypothesis that the regressor is exogenous ($F_{1,29030} = 0.08$), suggesting that the results from hedonic regressions would be consistent if the cost of entertainment offerings variable enters exogenously into the hedonic rent regression. Further, it is possible that the dependent variables and the error terms in the hedonic models are correlated, thus leading to a simultaneity problem. A test of independence of the errors, as suggested by Breusch and Pagan (1980) Breusch and Pagan (1980), rejects the null hypothesis of no contemporaneous correlation ($\chi^2_1 = 852.780$). To account for this, we apply a seemingly unrelated regression (SUR) estimation technique (Zellner (1962)). More specifically, this study employs an iterative SUR estimation technique, which iterates over the estimated disturbance covariance matrix and parameter estimates until the parameter estimates converge. Estimations of both the hedonic wage and rent models are presented in Table 2.

As indicated at the top of the second column in Table 2, the cost of entertainment offerings is both positively and significantly related to monthly wages. In fact, the parameter estimate of 1.240 reveals that a one percent increase in the cost of entertainment offerings leads to a 1.240 percent increase in monthly wages. This positive effect of the cost of entertainment offerings on the household wages indicates the a higher cost of entertainment offerings is a disamenity to households. This finding is similar to that reported in a study by Roback (1988), which estimated a wage-price elasticity of 0.97 using cost of living index data produced by the Bureau of Labor Statistics. Further, our result is consistent with those in more recent studies by DuMond et al. (1999), Winters (2009), Kemeny and Storper (2012), de Almeida et al. (2014) and Sturman et al. (2017). If the marginal effect of the cost of entertainment offerings is evaluated in monetary terms, the results suggest that for a one-unit increase in the cost of entertainment offerings, average monthly wages will increase by $61.62 (in 2019 dollars). This positive effect of the cost of entertainment offerings on households wages confirms that individuals are demanding and receiving additional wages, equivalent to about $739 on an annual basis, if they choose to work and live in a costly city.

In terms of some of the other covariates in the wage model, both heating degree days (*Heating Degree Days*) and cooling degree days (*Cooling Degree Days*) are associated with positive and highly significant parameter estimates. These results suggest that climate extremes represent disamenities to households. This finding is unsurprising given that higher values of these variables translate to higher energy expenditures, so households may demand higher wage in that case.[13] Similarly, variables related to demographic and region of origins are significant in explaining monthly wages. Lastly, the results also indicate that the age of head of household is negatively related to monthy wages.

The results in the third column of Table 2 show that the cost of a city's entertainment offerings is

[12]Davidson (1993) suggest use of the Durbin-Wu-Hausman test for endogeneity, which is easily formed by including the residuals of each endogenous right-hand side variable, as a function of all exogenous variables, in a regression of the original model.

[13]The estimated dollar equivalent values from the marginal effects in these cases are $1.90 and $2.38 per month (in 2019 dollars), respectively, for one-unit increase in Heating Degree Days and Cooling Degree Days.

Table 2: Iterative SUR Results

	Owners & Renters		Renters Only	
Variables	Wage Model & Rent Model	Wage Model	Rent Model	
Constant	0.384	0.552***	-2.240***	0.907***
	(0.416)	(0.243)	(0.865)	(0.228)
Cost Entertainment Goods & Services	1.240***	1.113***	1.276***	1.162***
	(0.057)	(0.032)	(0.126)	(0.028)
Unemployment Rate	-0.067***		-0.074***	
	(0.001)		(0.019)	
College Degree	-0.005		-0.036	
	(0.019)		(0.039)	
High School Diploma	-0.014		-0.016	
	(0.017)		(0.036)	
Age	-0.013*		-0.024*	
	(0.008)		(0.017)	
Household Size	0.284***		0.258***	
	(0.005)		(0.010)	
Single	-0.012		-0.009	
	(0.018)		(0.036)	
Married		-0.013		-0.022**
		(0.008)		(0.010)
Health Insurance Coverage	0.003		-0.045	
	(0.021)		(0.043)	
Non-US Citizen	0.078	0.032	0.211**	0.034
	(0.050)	(0.028)	(0.102)	(0.028)
American	0.227**	0.155***	1.227**	0.068***
	(0.100)	(0.018)	(0.503)	(0.014)
Asian	0.232*	0.231***	1.219**	0.134***
	(0.111)	(0.035)	(0.165)	(0.040)
Hispanic	-0.163		-1.150**	
	(0.108)		(0.428)	
European	0.367***		1.875***	
	(0.110)		(0.190)	
Car	0.030		0.090	
	(0.057)		(0.117)	
Public Transportation	-0.720		1.241*	
	(0.546)		(0.778)	
Travel Time	-0.011	-0.004	-0.026	0.000
	(0.015)	(0.002)	(0.031)	(0.002)
Heating Degree Days	0.000***	-0.000***	0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Cooling Degree Days	0.001***	-0.001***	0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Home Insurance Premium		0.000***		
		(0.000)		
Number Bedrooms		0.223***		0.147***
		(0.005)		(0.006)
House		1.089***		0.374***
		(0.012)		(0.017)
Apartment		1.100***		0.330***
		(0.020)		(0.017)
Years Since Construction		0.035***		0.038***
		(0.001)		(0.001)
Kitchen		0.140**		-0.271**
		(0.072)		(0.042)
N	29,047	29,047	11,597	11,597

Notes: As indicated in the text, the variables Cost Entertainment Goods & Services, Age and Travel Time are entered as natural logs. The numbers in parentheses are standard errors. ***(**)[*] denotes the 0.01(0.05)[0.10] level of significance. Residual correlation between wage and rent models for the "Owners and Renters" approach is equal to 0.17.

positively and significantly related to monthly rent. In this case the parameter estimate of 1.113 reveals that a one percent increase in the cost of a city's entertainment offerings leads to a 1.113 percent increase in

monthly rent. Taken together with our results concerning the effect of cost of a city's entertainment offerings on increases in monthly wages, this finding is consistent with Hornbeck and Moretti (2024), who report that increased earnings are partly consumed by an increased cost of living for renters. The positive cost of living elasticity associated with housing rent suggests that homeowners have bargaining power in larger cities, where renters are compelled to pay higher rents. From a homeowner's perspective, higher building costs contribute to higher housing costs, which induce higher home prices and rents. If the marginal effect of the cost of a city's entertainment offerings is evaluated in monetary terms, the results suggest that for a one-unit increase in the cost of a city's entertainment offerings, average monthly rents will increase by $11.37 (in 2019 dollars). This positive effect of the cost of a city's entertainment offerings on monthly rents is equivalent to about $136 on an annual basis.

As indicated in the third column of Table 2, other variables also explain monthly rents. The size of the insurance policy (in dollars), the number of bedrooms, and the year of construction are each positively related to monthly rents. Thus, more home-related amenities are associated with higher monthly rents. On the other hand, both heating degree days and cooling degree days are negatively associated with monthly rents. This result is unsurprising given that energy consumption is sensitive to climate extremes (Moustris et al. (2015). Lastly, controlling for local wages, rents fall weakly with commute times, suggesting that workers travel farther in the pursuit of amenities. However, this result is not significant at the usual levels.

Before turning to the net marginal willingness to accept price for the cost of entertainment offerings, we would note that there may be measurement challenges with our use of a price index to capture the cost of entertainment offerings. The main measurement challenge here is that many entertainment offerings are only available in some large cities. For example, Charlotte is the only city in North Carolina with major league professional sports teams, while the research triangle comprised of Raleigh, Durham and Chapel Hill has high-level college sports, although college sports exist in other places of North Carolina to varying degrees. Bigger cities also have museums, performing arts centers and other entertainment offerings that do not exist in smaller towns. Given that the price index for entertainment goods and services that we use is at least somewhat correlated with other urban amenities and disamenities, and that these individual amenities and disamenities are not explicitly included in the regression equations, omitted variable bias may be a concern. To investigate the possibility of omitted variables bias, we conducted a version of Ramsey (1969) regression specification error test by including the squares, cubes and fourth powers of the predicted values of $Wage$ and *Rent* alongside the other regressors in the two models and testing this new set of regressors against a zero vector by way of a traditional F test (Kennedy, 2008). Based of F-statistics of 1.22 and 1.68, both tests fail to reject the null hypothesis of no omitted variables bias.

Table 3: Net Marginal Willingness to Accept Price for the Cost of Entertainment Offerings

Variable	Mean	Std. Error	Confidence Interval 95%	
net *marginal Willingness to Accept*	53.39	0.23	52.94	53.84

As indicated in the second section of this study, the net marginal willingness to accept ($Marginal\ Willingness\ to\ Accept$) price for the cost of entertainment offerings is calculated using Equation (14). This calculation is provided in Table 3. As indicated there, the average estimated value of net $Marginal\ Willingness\ to\ Accept$ is $53.39 per month (in 2019 dollars).[14] If annualized, net $MarginalWillingnesstoAccept$ is about $640. Thus, the positive net Marginal Willingness to Accept value, calculated from two statistically significant marginal effects obtained from wage and rent equations, shows that individuals are fully compensated for living in a costly city. This finding is consistent with the casual observation that costly cities are crowded, and with Winters (2009) assertion that individuals are fully compensated for living in high-cost cities.[15]

This study also further analyzes how the net $Marginal\ Willingness\ to\ Accept$ follows both the cost of

[14]See Hand et al. (2008) and Koirala and Bohara (2014) for more on the statistical significance of the mean net marginal willingness to accept estimate.

[15]Some studies (e.g., Davis and Ortalo-Magné (2011); McConnell (2013) report that expenditure on house rent varies with income groups for a given city. Davis and Davis and Ortalo-Magné (2011) submit that rental prices are too low in many high-cost cities.

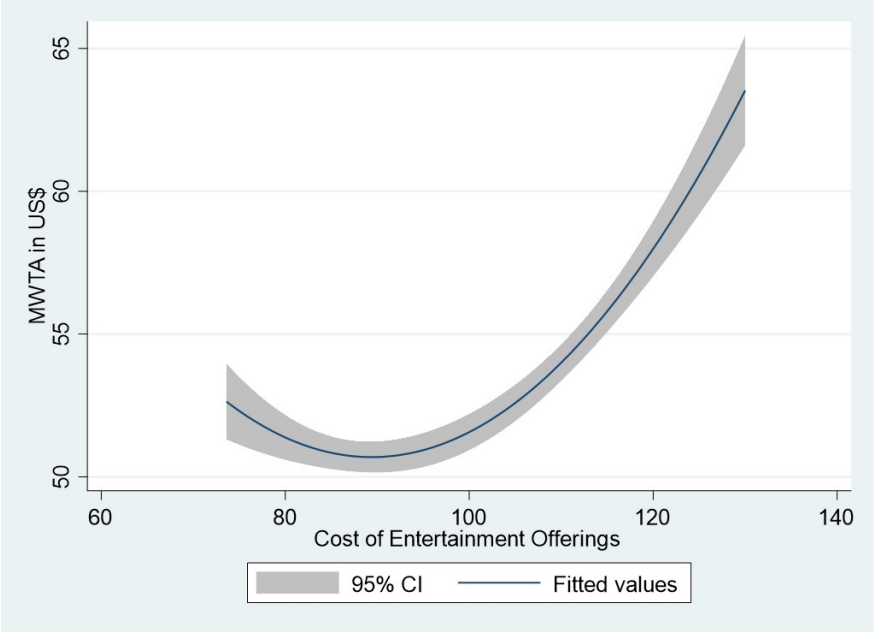


Figure 1: Net Marginal Willingness to Accept and the Cost of Entertainment Offerings

entertainment offerings index and monthly wages. Figure 1 traces robust evidence of a nonlinear relationship between net *Marginal Willingness to Accept* and the cost of entertainment offerings. This figure indicates that net Marginal Willingness to Accept initially falls until the cost of entertainment offerings reaches to 90 percent, after which it increases over cost of entertainment offerings. Thus, it can be argued that individuals will accept higher net *Marginal Willingness to Accept* price of a higher cost of entertainment offerings after reaching a threshold point of 90 percent. Next, the relationship between net *Marginal Willingness to Accept* and monthly wages is shown in Figure 2. As indicated there, an increase in monthly wages is associated with an increase in the net *Marginal Willingness to Accept* price of a higher cost of entertainment offerings

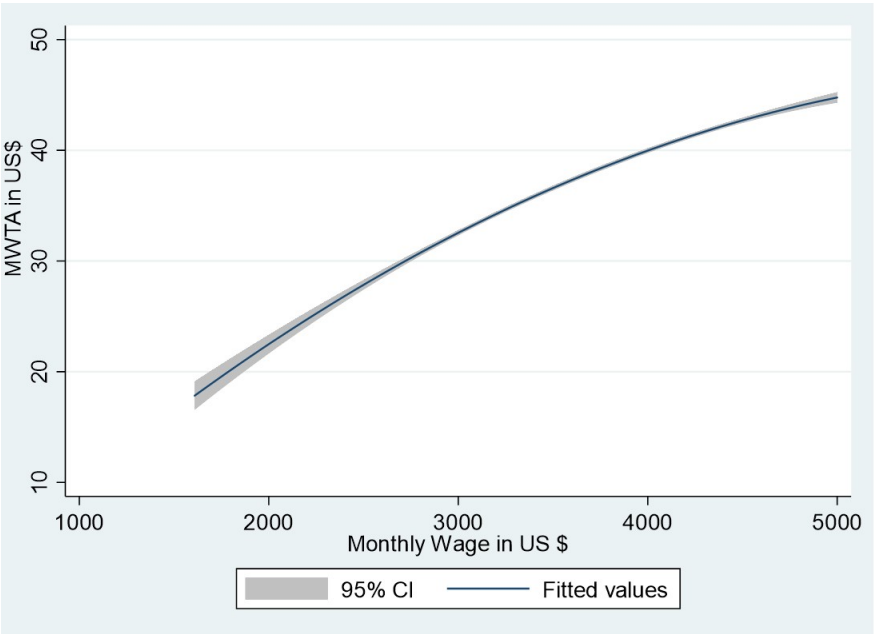


Figure 2: Net Marginal Willingness to Accept and Monthly Wages

Lastly, given that housing rents are not observable for owner-occupied housing units, but are instead inferred in our analysis, the introduction of measurement error is a distinct possibility. To assess this, we also restrict the prior empirical analyses to only renter-occupied housing units. The results of these new tests are presented in the final two columns of Table 2. As indicated there, the cost of a city's entertainment offerings is both positively and significantly related to monthly wages and monthly rents. In fact, the stability of the estimates across the "owners and renters" analyses and that for "renters only" is noteworthy. In terms of the wage equation, the coefficient estimates are 1.240 and 1.276, respectively. For the monthly rent equation, they are 1.113 and 1.162, respectively. The consistently positive result for the impact of the cost of a city's entertainment offerings on montly wages indicates that a higher cost of a city's entertainment offerings is a disamenity to renters. Further, the net marginal willingness to accept (*net Marginal Willingness to Accept*) price estimate for the cost of a city's entertainment offerings for renters only that is shown in Table 4 is positive, with the average estimated value of *net Marginal Willingness to Accept* $21.08 per month (in 2019 dollars).

Table 4: Net Marginal Willingness to Accept Price for the Cost of Entertainment Offerings

Variable	Mean	Std. Error	Confidence Interval 95%	
net *marginal Willingness to Accept*	21.08	0.15	20.78	21.38

6 Conclusion

This study estimates the net marginal willingness to accept price for the cost of entertainment offerings in urban areas in the U.S. In doing so, it measures the extent to which the cost of living is capitalized into wages and house rents across cities. Utilizing the American Community Survey of 2018 along with U.S. Census Bureau data from North Carolina cities to estimate both rent and wage differentials, this study finds that individuals are indeed compensated for living in cities in the U.S with high-cost entertainment offerings. This finding suggests that a high-cost entertainment offerings are a disamenity. If annualized, the net marginal willingness to accept price for entertainment offerings in urban areas in the US is about $640.

One avenue for future research regarding the formal approach to the subject of this study might, as stated earlier, consider a city's entertainment offerings as a non-tradable good whose price enters directly into the model. As indicated above, this approach would allow one to model the production of an urban area's entertainment offerings in order to identify productivity differences that differences in the costs of entertainment offerings. Additionally, given that one margin of adjustment to a change in the costs of entertainment is a change in mobility, future work might consider formalization of this channel utilizing Glaeser's (2008) approach (see also Rosen (1979); Roback (1982). Next, although our model considers climate conditions as a control, there are other amenities that are important for location decisions that might be included in future empirical investigation(s). In conducting these, one might employ panel data and control for city-fixed effects that capture all time-invariant amenities. In this case, one could provide some exogenous variation in the change of costs of entertainment in order to estimate hedonic regressions.

Of course, other avenues for future research are available. According to the Associated Press, between 2010 and 2020 about 6.1 million people left California for other U.S. states, in large part due to the high cost of living in the urban areas comprising much of the state's population base.[16] At the same time, only about 4.9 million people from other states migrated to California. Future research might extend the current study by investigating migration tipping points in relation to marginal willingness to accept prices for living in urban areas. Subsequent study might also focus on differences in marginal willingness to accept prices across regions of the U.S., or in relation to economic freedom variations across the U.S. states

[16]See https://www.cbs8.com/article/news/local/california/california-population-declines.

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