# WHAT DO FIRMS VALUE? THE ROLE OF INDUSTRY COMPOSITION IN FIRM LOCATION DECISIONS

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## ABSTRACT

*The desire to understand household location decisions has dominated the use of revealed preference models, whereby hedonic price modeling has allowed researchers to identify the implicit prices that households pay for desirable amenities such as good weather and good schools. This research contributes to the limited work on identifying the implicit valuation that firms place on these same amenities as well as other local characteristics of the business environment. Specifically, firm's implicit payment for urban agglomeration amenities is assessed, and it is found that firms place a high value on industry diversity, but consider both competition and industry specialization to be disamenities. The findings presented here also show that firms and households have very similar preferences for amenities that have previously been shown to be important to households.*

## INTRODUCTION

Over 86% of the US population currently lives in metropolitan areas. Since 2000, the US experienced a surge in urban population growth of 23.4%, far outpacing population growth at the national level (US Census Bureau, 2012). And, in the year to July 2015, population in four Texas metropolitan areas grew by 400,000 people (US Census Bureau, 2016). This aggregation of population, and strong growth, in cities reflects their importance as vital centers of economic activity. This concentration of economic activity engenders productivity spillovers thereby further enhancing the economic importance of cities. The specific factors that enhance these agglomeration economies have been extensively evaluated to determine their relative importance (Combes & Gobillon, 2015; Glaeser & Gottlieb, 2009; Melo, Graham, & Noland, 2009). These studies have explored the nature of the productivity spillovers (Rosenthal & Strange, 2004), whether labor market characteristics are driving the benefits (Wheeler, 2006), as well as whether the benefits accrue from the specific composition of the industry or firms within the city (Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Henderson, 1997; Henderson, Kuncoro, & Turner, 1995; Perumal, 2017). In conjunction with that work, there has been significant interest in understanding what particular amenities (or, disamenities) are favored (disliked) by workers with regard to their choice of where to work and reside. Rosen (1979) and Roback (1982) were the first to examine the extent to which households had to be compensated for disamenities of living and working in cities, such as high crime and pollution. Their framework was based on the inter-relationship of wages, the cost of living in cities (with a focus on housing costs), and amenities, which posited that urban locations are best viewed as bundles of these three factors. That is, relative to the wage level in a city, and its cost of living, workers would have to sacrifice the consumption of some goods so as to consumer non-market amenities of certain locations, such as good weather or good schools. Therefore, by means of a hedonic price analysis it is possible to determine the respective implicit prices that are paid for these (dis)amenities. These implicit prices have been used to weight the respective amenities in cities, and allow for constructing a Quality of Life (QOL) index across

cities. Such indexes allow for ranking urban areas depending on the stock of the preferred amenities. This early work explored measures of climate and pollution, and some local government services as determinants of location decisions. Subsequent theoretical and empirical work incorporated measures of urbanization (Blomquist, Berger, & Hoehn, 1988) and the importance of taxation and government service provision (Gyourko & Tracy, 1991). Gyourko and Tracy (1991) also carefully outlined the importance of using a rich set of amenities, as well as good controls of worker and housing characteristics, to correctly capture the implicit prices of urban amenities. More recent work on this issue has identified the importance of including measures of looking beyond the use of housing costs as the only determinant of cost of living in a city, as well as adjusting income for federal taxes (Albouy, 2012), and federal tax incentives (Reynolds & Rohlin, 2014).

With regard to understanding the particular amenities that firms view as desirable, Gabriel and Rosenthal (2004) made a significant contribution to the literature through repurposing the calculation of a quality of life index so as to reflect the location decision of firms – referring to this index as a measure of the Quality of the Business Environment (QOBE). However, rather than exploring the specific amenities that attract firms to particular locations, Gabriel and Rosenthal (2004) focused instead on broadly capturing the total amenity value of particular locations and how firms differentially value such locations. This allowed them to construct a QOBE, and subsequently rank urban areas based on this index. While providing important insight into the differences in the choice of urban locations between households and firms, their empirical approach did not identify which specific amenities were differentially valued. This approach is mirrored in the paper by Chen and Rosenthal (2008), which again estimates the broad amenity value of a particular city, without examining the particular amenities that are differentially valued by households and firms.

The research presented here aims to address this issue by exploring a number of specific amenities that help explain the difference in location preferences between households and firms identified by Gabriel and Rosenthal (2004) and Chen and Rosenthal (2008). In addition to exploring the standard amenities – such as average weather conditions, the absence of pollution, and a number of local government fiscal variables – this research also uses measures of agglomeration economies that may help explain the location decisions of firms. The underlying hypothesis is that these determinants of the local agglomeration economies are important in firm location decisions. These agglomeration measures have been shown to be exemplary descriptors of the underlying process of knowledge spillovers and vibrant labor markets that may be the driving force of employment growth (Glaeser et al., 1992; Glaeser & Maré, 2001; Henderson, 1997; Henderson et al., 1995; Perumal, 2017; Wheeler, 2006). Furthermore, this paper uses data from the 2000 Census and thereby does update prior research, as most studies have used Census 1980 data (Blomquist et al., 1988; Gyourko & Tracy, 1991) or, most recently, the Current Population Survey in conjunction with the American Housing Survey up to 1995 (Gabriel & Rosenthal, 2004). Further, the choice of the data from the 2000 Census also allows for a direct comparison to the findings of the more recent analyses on the location decisions of households (Albouy, 2012).

This research finds that firms and households have fairly similar preferences for climate, pollution, and measures of local government fiscal policy. However, out of the measures of agglomeration, firms have a strong preference for industry diversity. It would therefore seem to be the case that, contrary to prior research (Gabriel & Rosenthal, 2004) firms and households are exploring mostly the same factors in making their location decisions. However, it is their

differential valuations of those amenities that may be driving the difference in location choices identified by Gabriel and Rosenthal (2004).

## THEORETICAL FRAMEWORK

The following exposition of the theoretical framework draws on the work of Rosen (1979), Roback (1982), Blomquist et. al (1988), Gyourko and Tracy (1991), Gyourko et. al (1999), Gabriel and Rosenthal (2004), and Albouy (2012). A model is developed that identifies the price mechanism that compensates for interregional differences in amenities – broadly defined. The model begins with the foundational framework of the quality of life of households (Blomquist et al., 1988), includes government services (Gyourko & Tracy, 1991), and measures of agglomeration economies (Combes & Gobillon, 2015; Glaeser et al., 1992; Perumal, 2017) – all tied together under the purpose of examining the factors that contribute to the local business environment.

### Wages, Rents, And Interregional Amenities

The framework used here is a compensating differential open city model in which identical mobile households and firms compete for scarce sites, with wages and rents adjusting so that, in equilibrium, the marginal household and firm are indifferent among urban areas each with different amenities. That is, households and firms maximize well-being and minimize costs, respectively, through their location decision, and are assumed to be freely mobile before location decisions are made. Households and firms remain at a particular urban area as long as they cannot improve their well-being by an appropriate move. Each urban area is composed of one of more counties each with a fixed amount of land and offers a different set of amenities that resident households and firms may enjoy. The amenities are assumed to be distributed uniformly within the urban area. Furthermore, these counties within urban areas are linked together by agglomeration effects which affect the production costs of firms, regardless of the county in which the firms are located.

Closely following Gyourko et. al (1999): A representative household is assumed to consume land-housing services, $L_i$, a composite commodity, $C_i$, a bundle of pure local amenities $A_j$ (such as good weather), and government services, $G_j$, that are locally produced (such as public schools and public safety). The amenity and service bundle available in city $j$ is considered to be exogenous by all potential households to that city, with the utility for representative household $i$ living in city $j$ given by:

$$U\{L_i, C_i; A_j, G_j\} \tag{1}$$

The household gains access to the amenities of the urban area through the purchase of land-housing services, where both the land-housing services and the consumption amenities are purchased from labor and non-labor income. The gross-of-tax cost of a unit of the consumption commodity is $(1 + s_j)$, where $s_j$ is the combined state and local sales tax rate. The gross-of-tax rental rate for a unit of land-housing services is $(1 + t_j)r_j$, where $t_j$ is the local property tax rate and $r_j$ is the local land rental rate. The household's net-of-tax wage rate is given by $(1 - z_j)w_j$, where $z_j$ is the combined state and local income tax rate and $w_j$ is the local gross wage.

Assuming that each household inelastically supplies one unit of labor, the budget constraint for the household is given by:

$$\left(1 + s_j\right)C_i + \left(1 + t_j\right)r_j L_i \leq \left(1 - z_j\right)w_j + I_i \tag{2}$$

where $I_j$ represents nonwage income. Labor transportation costs within an urban area are assumed to be negligible.

Conditional on the city location, and setting the price of the composite commodity at unity, the following indirect utility function arises from the household's maximization of (1) subject to (2):

$$V_{ij} = V\left\{\left(1 - z_j\right)w_j, \left(1 + t_j\right)r_j, \left(1 + s_j\right), I_i; A_j, G_j\right\} \tag{3}$$

Amenities enter the indirect utility function only through their impact on a household's utility; an increase in a city's amenities increases in utility in that city if $A_j$ is a consumption amenity, and decreases utility if $A_j$ is a disamenity in consumption. Services, however, enter the indirect utility function both through their impact on a household's utility and through their associated impact on the gross-and net-of-tax prices faced by the household.

Assuming costless mobility and full information about the amenity and fiscal attributes of each city, long-run equilibrium requires that the marginal household be indifferent as to his/her city location, with wages and land rentals adjusting so that household utility is equal across locations:

$$V^* = V_{ij} \qquad \forall\, j \tag{4}$$

Having identified the factors contributing to a household's location decision, I now turn to setting up the same decision for firms. The central distinction from prior theoretical models in the literature (Blomquist et al., 1988; Gyourko & Tracy, 1991) is the inclusion of some measure of agglomeration economies in the profit function of firms, which in turn influences their location decision.

With regard to the firm's location decision, profits conditional on locating in city *j*, and separating total revenue and total cost, are given by:

$$\pi_{ij} = Y_i\left\{A_j, G_j, E_j\right\} - \left(1 + t_j\right)r_j L_i - w_j N_i - \left(1 + s_j\right)M_i \tag{5}$$

where $Y_i$ is total revenue which is a function of the city's amenity, $A_j$; fiscal attributes, $G_j$; agglomeration economies, $E_j$, through their impact on the production function; $N_i$ represents the firm's labor usage; and $M_i$ is the firm's intermediate input usage –price is also assumed to be unity. Given a city location, the firm's maximization problem therefore yields the following indirect profit function:

$$\Pi_{ij} = \Pi_i\left\{w_j, \left(1 + t_j\right)r_j, \left(1 + s_j\right); A_j, G_j, E_j\right\} \tag{6}$$

Again assuming costless mobility and full information, the long-run equilibrium requires that the marginal firm is indifferent as to its city location. This requires that wages and land rentals adjust to impose the following arbitrage condition that firm profit is equal across locations:

$$\Pi^* = \Pi_{ij} \qquad \forall\, j \tag{7}$$

The two arbitrage conditions (4) and (7), once solved, determine the long-run equilibrium wage and land rentals.

The reduced form wage equation is obtained by isolating the gross-of-tax land rental in (4) and (7), equating the two expressions, and solving for wages:

$$W_j = w_j\{(1 + s_j), z_j, I_j, A_j, G_j, E_j; V^*, \Pi^*\} \tag{8}$$

The reduced form equation for the gross-of-tax land rental $(1 + t_j)r_j$, which we denote as $R_j$, is obtained in a similar fashion:

$$R_j = (1 + t_j)r_j = L\{(1 + s_j), z_j, I_j, A_j, G_j, E_j; V^*, \Pi^*\} \tag{9}$$

Using the system of equations (8) and (9), Gyourko and Tracy (1991) derive a number of comparative statics which offer some theoretical insight into the expected signs on a number of the variables explored; I briefly outline their key findings here. As would be expected property tax differentials are fully capitalized into land prices – as long as it is not offset by added services or amenities. Cities with better amenity characteristics, *ceteris paribus*, will be rationed through higher land prices and an indeterminate shift in wages. The actual shift in wages will be determined by the impact of amenities on firm profits. That is, if the amenity does not directly affect firm revenues, $\Pi_A = 0$, then wages will fall to help ration scarce sites. In this case, the amenity is capitalized in both wages and rentals. On the other hand, if the amenity is productive, $\Pi_A > 0$, then land rentals increase by even more than in the first case, and the wage effect is indeterminate. Also, higher income ($z$) and sales ($s$) tax rates, holding service levels constant, lead to lower land rentals. Since the income tax rate does not affect the firm's indirect profit function, a higher rate also leads to higher gross wages.

**Amenity Values Based On Wage And Rent Differentials**

For the purpose of developing the amenity value estimator, consider two urban areas that differ in amenities by a small amount, $\partial A$. In equilibrium, utility opportunities across these urban areas are equal – therefore, we are able to analyze the effect of a change in amenities on utility as follows. Taking the total differential of equation (3) and rearranging, the implicit price of the amenities in city $j$ can be found as:

$$P_{Hj} = L_j^* \frac{\partial r_j}{\partial A_j} - \frac{\partial w_j}{\partial A_j} \tag{10}$$

where $L_j^*$ is the optimal amount of residential land purchased by the household, representing this by $\beta^H$ and pre-multiplying both sides of equation (10) by $A_j$, we get:

$$P_{Hj} = \beta^H r_j^H - w_j \tag{11}$$

This provides the household's urban quality of life, where $r^H$ is the quality-adjusted rent on residential land and $P_H$ is the amount of real wage families are willing to give up to live in city $j$. $P_H$, therefore, is the calculation of the total implicit value that households place on the amenities in city $j$.

For firms, on the other hand, taking the total differential of equation (5) along an isoprofit curve, rearranging, and applying Shepard's lemma, we obtain:

$$-\frac{c_A}{c_W} = \frac{L_j^*}{N_j^*}\frac{\partial r_j}{\partial A_j} + \frac{\partial w_j}{\partial A_j} \tag{12}$$

where $\frac{c_A}{c_W}$ is the ratio of the impact on production costs from a unit change in $A$ to that of a unit change in labor, or equivalently, the additional input cost a firm is willing to incur in exchange for a unit increase in $A$. Note that $\frac{L_j^*}{N_j^*}$ is the optimal amount of land per worker. Representing this value by $\beta^F$ and premultiplying both sides of equation (12) by $A_j$ we get

$$P_{Fj} = \beta^F r_j^F + w_j \tag{13}$$

where $r^F$ is the quality-adjusted rent of commercial and industrial land. This expression describes the additional input costs firms are willing to incur to locate an additional worker in city $j$ relative to the reference city. Alternatively, $P_F$ is the total implicit value that firms place on the amenities in city $j$.

Common practice in the literature (Blomquist et al., 1988; Gyourko & Tracy, 1991) is to set $\beta^H$ equal to 1, as the focus was only on deriving estimates for $P_H$. Gabriel and Rosenthal (2004) and Chen and Rosenthal (2008), however, set $\beta^F$ equal to 1 and implicitly set $\beta^H$ equal to 1, as well. Furthermore, housing values and rents implicitly include the average square foot per residential household, and per commercial establishment. This would not be of concern except that in their estimation Gabriel and Rosenthal (2004) use residential rents to proxy for commercial rent. Following their method would imply that we are also setting the price of a square foot of residential land equal to the price of a square foot of commercial land. While data limitations do restrict the extent to which such assumptions can be relieved, it is possible to partially adjust for the differences in square foot valuations between firms and households. To do so, the following analysis weights the commercial rent by the ratio of the average residential household square footage and the average commercial square footage per workers. That is, $\beta^H$ in equation (11) is set equal to 1, but $\beta^F$ from equation (13) is replaced with $\beta^F/\beta^H$. The resulting equations for determining the respective full implicit prices for households and firms are now given by:

$$P_{Hj} = r_j^H - w_j \tag{14}$$

and

$$P_{Fj} = \frac{\beta^F}{\beta^H} r_j^F + w_j \tag{15}$$

## ESTIMATION

Estimates of the city amenity valuations (implicit prices) are obtained as follows. The wage and building rent for individual $i$ and city $j$ are specified as

$$\log w_{ij} = \alpha_{w0} + \alpha_{w1} \Psi_{ij} + \alpha_{wj} \Omega_j + \varepsilon_{wij} \tag{16}$$

and

$$\log r_{ij} = \alpha_{r0} + \alpha_{r1} \Theta_{ij} + \alpha_{rj} \Omega_j + \varepsilon_{rij} \tag{17}$$

where $\Psi_{ij}$ controls for worker traits and $\Theta_{ij}$ controls for characteristics of the building, and $\Omega_j$ is a vector of city amenities (detailed in Section 4).

Wage regressors, $\Psi_{ij}$, include age and age squared of the worker, racial characteristics, and marital status. Education characteristics are also controlled for: high school degree, some college, 4-year degree, and more than a college degree, with less than a high school degree being the omitted category. Broad categories of occupations are also controlled for: management, professional and related occupations, service occupations, sales and office occupations, farming, fishing, and forestry occupations, construction, extraction and maintenance occupations, production, transportation and material moving occupations, and military-specific occupations (the omitted category). Gender is interacted with race, marital status, and education characteristics in the estimation of (16). Rent regressors, $\Theta_{ij}$, include the number of units in the building, number of bedrooms, extent of plumbing, availability of a kitchen and telephone service, as well as age of the building, acreage of the property, and central city status. Whether the individual is a renter is interacted with all building characteristics.

## DATA

Data for the wage and rent housing regressions used to measure amenity values were obtained from the 5-percent Public-Use Sample of the 2000 Census from USA-IPUMS (Ruggles, Genadek, Goeken, Grover, & Sobek, 2015) and other gathered data. The non-Census data were obtained from a number of sources and merged to the Census data by county or Metropolitan Statistical Area (MSA). The sample covers 3 million households in 377 counties in the year 2000. To be included in the sample, the individual had to be clearly identified as living in a county that was part of a MSA.

The wage sample includes all individuals aged 16 and had nonzero wage and salary earnings. Log monthly housing expenditure is the dependent variable in the housing equation, which for renters is gross rent, and includes household expenditure on utilities. For homeowners, reported house value is converted to monthly imputed rent using a 7.85 percent discount rate (Peiser & Smith, 1985), as used in Blomquist et. al (1988), Gyourko and Tracy (1991), and Gabriel and Rosenthal (2004). As data on commercial rents were unavailable, gross rents and the imputed

gross rent of residential properties were used in estimating the $P_H$ and $P_F$ (Gabriel & Rosenthal, 2004). The dependent variable in the wage equation is the log of monthly wage.

The rent-hedonic regression includes 2000 Census measures of structural characteristics and central city status. The wage hedonic regression uses Census-based variables controlling for personal characteristics, occupational group, and central city status. The remaining variables common to both the housing- and wage-hedonic regressions come from data merged with the 2000 Census. Four variables measure climatic conditions extracted from Comparative Climatic Data from the National Climatic Data Center. These are mean hours of sunlight for January, mean temperature for January, mean relative humidity for July and mean temperature for July. The percent of water area comprising the respective county geographic area was obtained from the Census Bureau. The dichotomous coastal variable, obtained from the Strategic Environmental Assessments Division of the National Oceanic and Atmospheric Administration, represents counties that have at least 15 percent of a county's total land area is located within the nation's coastal watershed or a portion of or an entire county accounts for at least 15 percent of a coastal cataloging unit. To capture air pollution we use two measures of suspended particulate matter – inhalable coarse particles ($PM_{10}$) and fine particles ($PM_{2.5}$) – obtained from the Environmental Protection Agency. Two other amenities without explicit market prices are the crime rate and education services. The crime rate, obtained from the U.S. FBI Uniform Crime Reports for the United States, is the number of crimes per 100,000 persons – the crimes include murder, rape, robbery, aggravated assault, burglary, larceny, and motor vehicle theft. Education services are proxied by pupil-teacher ratios obtained from the National Center for Education Statistics.

With regard to taxes, the analysis uses a number of measures from the Tax Foundation: local government property tax revenue per capita, state and local corporate income tax collections per capita, state and local general sales tax collections per capita, and state and local individual income tax collections per capita. Per capita measures were used instead of tax rates due to significant difficulties in obtaining comprehensive tax rate data at the county level.

To capture the impact of agglomeration economies and firms attraction to the resulting productivity spillovers, three measures of the composition of the industry mix were used: measures of the diversity and specialization of the industry base, and the average level of competition within that industry base at the county level (Combes & Gobillon, 2015; Glaeser et al., 1992; Perumal, 2017). *Specialization*, (18), measures the extent to which a particular industry in a particular city is more or less concentrated than that industry at the national level. *Diversity*, (19), measures the proportion of employment in that city that is not accounted for by a particular industry. *Competition*, (20), calculates the number of firms per worker in an industry in a city and compares it to the national average of firms per worker in that industry. These measures are computed using County Business Patterns data for the year 2000:

Specialization:

$$\varepsilon_i = \frac{\text{industry employment in city}/\text{total employment in city}}{\text{industry employment in U.S. }/\text{total employment in U.S.}} \tag{18}$$

Diversity:

$$\tau_i = \frac{(\text{total employment in city-industry employment in city})}{\text{total employment in city}} \tag{19}$$

Competition:

$$\alpha_i = \frac{\text{firms in city-industry/workers in city-industry}}{\text{firms in U.S.industry/workers in U.S.industry}} \quad (20)$$

Finally, estimates of $\beta^H$ and $\beta^F$ are required to calculate the full implicit prices of amenities for households and firms, respectively. These values are obtained from the U.S. Energy Information Administration: $\beta^H$ is 2066 average total square feet per household, obtained from the 2001 Residential Energy Consumption Survey; and $\beta^F$ 823 square feet per worker, obtained from the 1999 Commercial Buildings Energy Consumption Survey. Using these values yields $\beta^F/\beta^H$ = 0.3984.

Table 1 provides descriptive statistics for the various amenities that are being used in the estimation. All data pertain to counties that are identified as part of a MSA in 2000. All the amenities have substantial variability in the data set, with fairly large standard deviations. For example, mean hours of sunlight in January is at 52 hours for a minimum – a little over two days of sunlight in an entire month – and with a maximum of 266 hours which works out to approximately 8.5 hours of sunlight a day throughout the month. The other climate, pollution and crime variables lend themselves to similar descriptions. Pupil-teacher ratios peak at 36, with a minimum just under 11. Out of the fiscal variables, only property taxes seem to be used in all the counties in this sample as there are some instances where the corporate income, individual income, and sales taxes collections are zero per capita. For the agglomeration measures, average competition at the metropolitan level is over twice the national average of firms per worker, the average specialization at the metropolitan area is just above industry concentration in employment at the national level, and the industry composition at the metropolitan level is very diverse and exhibits substantial variation across the sample.

## RESULTS

Table 2 presents the results of the estimation of wage and rent hedonic equations ((16) and (17), respectively) in columns 1 and 2. Those estimates are used to calculate the implicit prices of amenities for households, equation (14), and firms, equation (15) for each amenity. While the coefficients do offer some insight into the respective impact of amenities on rental rates and labor earnings, of more interest is how these effects are combined in the location decisions of households and firms. The amenity coefficients are first adjusted to reflect mean annual household housing expenditure by multiplying the coefficients by 12, thereby converting monthly values to annual values. Similarly, for the wage equation, amenity coefficients are converted to annual household labor earning. These values now can be combined using equations (14) and (15) to create the respective full implicit price of each amenity. Due to the opposing effect of the impact of amenities on wages in the calculation of the respective full implicit prices, it would seem reasonable to have very different outcomes with regard to household versus firm preferences. However, the coefficients on the amenities in the wage equation are very small, thereby creating an outcome where there is very little difference between households and firms in terms of their respective preference for amenities. This would seem to indicate that the majority of the value of amenities in urban areas falls squarely on housing expenditure. Using the individual implicit prices, quality

of life (QOL) indexes and quality of business environment (QOBE) indexes are calculated for each metropolitan area in the sample; by means of multiplying the implicit price by the quantity of the

**Table 1**
**DESCRIPTIVE STATISTICS**

| Amenity Variables | Mean | St. Dev. | Min | Max |
|---|---|---|---|---|
| *Climate* | | | | |
| Mean hours sunlight January | 161.444 | 43.377 | 52.000 | 266.000 |
| Mean temperature January | 39.394 | 12.518 | 5.900 | 66.800 |
| Mean relative humidity July | 59.219 | 14.468 | 14.000 | 80.000 |
| Mean temperature July | 75.574 | 5.897 | 58.500 | 93.700 |
| Nat.log pct. water area | 6.171 | 1.622 | 0.972 | 8.923 |
| Coast | 0.675 | 0.468 | 0.000 | 1.000 |
| *Pollution* | | | | |
| PM 10 conc. ug-m3 | 20.867 | 18.582 | 0.000 | 70.000 |
| PM 2.5 conc. ug-m3 | 11.224 | 8.243 | 0.000 | 28.000 |
| Crime rate (per 100,000 persons) | 4287.820 | 1639.910 | 785.320 | 13654.170 |
| Pupil/teacher ratio | 17.555 | 2.919 | 10.900 | 36.000 |
| *Fiscal* | | | | |
| Corp. Income Tax Revenue Per Capita | 212.328 | 156.240 | 0.000 | 714.000 |
| General Sales Tax Revenue Per Capita | 1050.060 | 308.896 | 0.000 | 2108.000 |
| Individual Income Tax Revenue Per Capita | 1092.930 | 708.537 | 0.000 | 2389.000 |
| Property Tax Revenue Per Capita | 1043.350 | 463.301 | 171.950 | 3733.920 |
| *Agglomeration* | | | | |
| Competition | 2.43825 | 0.58156 | 1.42257 | 4.60535 |
| Diversity | 0.996099 | 0.0003898 | 0.99451 | 0.996528 |
| Specialization | 1.08383 | 0.23286 | 0.76021 | 2.35292 |

**Table 2**
**AMENITY PARAMETER ESTIMATES, QUALITY OF LIFE AND QUALITY OF BUSINESS ENVIRONMENT**

| Amenity Variables | Monthly Wage Eq. | Monthly Rent Eq. | $QOL$ | $QOBE$ |
|---|---|---|---|---|
| Mean hours sunlight January | 0.00054319<br>(0.00000918) | 0.00016269<br>(0.00001785) | 0.64059 | 0.75777 |
| Mean temperature January | 0.00458<br>(0.00003990) | 0.00121<br>(0.00007659) | 1.408488 | 1.47534 |
| Mean relative humidity July | -0.00047340<br>(0.00002369) | -0.00042672<br>(0.00004636) | 0.026908 | -0.4876 |
| Mean temperature July | -0.01077<br>(0.00006765) | -0.00153<br>(0.00013130) | -8.16157 | -5.5966 |
| Nat.log pct. water area | 0.00650<br>(0.00019407) | -0.00201<br>(0.00037708) | 0.613577 | 0.012207 |
| Coast | 0.04523<br>(0.00074105) | 0.01894<br>(0.00139) | 0.141077 | 0.25546 |
| PM 10 conc. ug-m3 | -0.00012789<br>(0.00001972) | -0.00014280<br>(0.00003845) | 0.007374 | -0.03771 |
| PM 2.5 conc. ug-m3 | -0.00307<br>(0.00003655) | 0.00018547<br>(0.00007143) | -0.32028 | -0.09731 |
| Crime rate | -0.00000494<br>(2.024827E-7) | -0.00000434<br>(3.952808E-7) | 0.01424 | -0.38128 |
| Pupil/teacher ratio | 0.00935<br>(0.00011841) | 0.00740<br>(0.00023066) | 0.094493 | 2.53414 |
| Corp Income Tax Per Capita | -0.00029726<br>(0.00000383) | -0.00029991<br>(0.00000706) | 0.127535 | -0.97395 |
| General Sales Tax Per Capita | 0.00002452<br>(0.00000108) | 0.00001558<br>(0.00000210) | 0.07269 | 0.3532 |
| Ind. Income Tax Per Capita | 0.00003214<br>(8.239979E-7) | 0.00005951<br>(0.00000159) | -0.4357 | 0.93433 |
| Property Tax Rev. Per Capita | 0.00012842<br>(8.631415E-7) | 0.00013845<br>(0.00000167) | -0.40782 | 2.34939 |
| Agglomeration: Competition | 0.00159<br>(0.00054458) | -0.00617<br>(0.00106) | 0.269858 | -0.20315 |
| Agglomeration: Diversity | -17.18685<br>(1.04410) | 27.94918<br>(1.99336) | -606.137 | 318.9567 |
| Agglomeration: Specialization | -0.11151<br>(0.00133) | -0.04621<br>(0.00256) | -0.8369 | -1.49101 |
| Number of observations | 2,466,325 | 2,398,190 | | |
| Adj. R-Squared | 0.2895 | 0.3761 | | |

*All coefficients are significant at the 1% level.*

amenity available in a particular metropolitan area. Columns 3 and 4 of Table 2 present the average of the indexes across the metropolitan areas for each amenity.

A positive QOL or QOBE for a particular amenity indicates that on average it is a marginal net amenity, while a negative QOL or QOBE indicates a marginal net disamenity. For the climate variables households (QOL) and firms (QOBE) exhibit similar preferences. Firms and households consider mean hours of sunlight, mean temperatures in January, weather the county is close to a coast, and the presence of a body of water to be amenities. For relative humidity in July firms view it as a disamenity, while households do not. For the measures of pollution, both households and firms have similarly negative preferences for fine suspended particulates, but diverge in regard to the coarse particulates. Firms and households also diverge in regard to the crime rate.

The pupil-teacher ratio, however, is the only variable to have an unexpected sign for both firms and households – that is, households and firms do not consider more pupils per teacher as a disamenity. Though this could reflect demand for schools outpacing supply – whereby pupil-teacher ratios are rising as a reflection of household's demand for certain schools, and firms placing value on being located in counties with good schools.

For the government fiscal attributes, both firms and households view sales tax revenue per capita as an amenity, but diverge on all the other measures. Firms view corporate income tax collections as a disamenity, but view income and property tax collections as amenities; households seem to take the opposite stance on these on average. While improved government services through marginally higher taxes may be viewed positively or not, there is definitely disagreement on the optimal sourcing of government revenue.

Finally, with regard to the agglomeration measures, households and firms only agree on specialization as a disamenity. Prior research has shown that industry specialization does hinder long term employment growth at the metropolitan level, possibly by diminishing knowledge/productivity spillovers thereby limiting firm potential, but also hindering labor market opportunities for workers. Interestingly, households view competition among the local industry as an amenity, possibly reflecting the greater availability of jobs with a particular industry. Though, households do view industry diversity as a disamenity. Firms on the other hand, view competition in an industry as a disamenity. However, industry diversity is strongly viewed as an amenity by firms. These findings mirror the findings of research that explores the importance of industry composition for fostering the most knowledge spillovers to spur economic growth at the metropolitan level.

## CONCLUSION

The findings presented here confirm our understanding of household perception of amenities and disamenities in cities. The unique contribution, however, is the examination of these amenities within the scope of determining the quality of the local business environment. The results showed that firms and households share many of the same preferences for amenities, such as good weather and low pollution. Of particular value was the exploration of the importance of local industry composition. That is, whether it was characterized by a highly specialized industry mix, a highly diversified one, and whether it was characterized by competition. Households and firms both considered a highly specialized industry mix to be a disamenity. Firms, however, were found to highly value a diversified industry mix, but with little/no competition at the local level. And, households were found to value the opposite scenario of little/no diversity, but high competition. Therefore, differential stocks of these amenities in different locations may drive

differential location choices between firms and households. Given the findings of Gabriel and Rosenthal (2004) that households and firms prefer different cities, it is possible that their results were reflecting the differential stocks of amenities across locations rather than a complete reversal of preferences by firms and households; as well as the strongly divergent valuation of industry diversity by households and firms. Future work should aim to update the wide range of analyses that have explored the relative importance of amenities for households and firms, with a view to depicting the extent to which these revealed preferences have changed over time.

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