A Quality of Life Index of Mexican cities: An equalizing-difference approach
Índice de Calidad de Vida de las ciudades Mexicanas: Un enfoque de ecualización de diferencias

Roberto Gallardo Del Angel*

Abstract

The present analysis contains a Quality of Life Index (QLI) for most medium-large Mexican cities using the equalizing-difference approach. It contains a simple General Equilibrium models where households make locational decisions based on visible prices for land (housing), labour and the spatial amenities attached to these factors. This model allows estimation of implicit prices from amenity bundles which include geographical, environmental and socio-economic aspects. In this analysis, the amenities (disamenities) affect prices (wages and rents) are extreme weather, location near to the coast, spillovers of metropolitan areas, public safety, quality of education, access to health care as well as the provision of local public goods. The QLI ranking was constructed for the year 2010 using information of 92 medium-large cities (municipalities), from a subsample of the Household Income and Expenditure Survey. The results show that extreme temperatures and criminality are clearly bads and have negative implicit prices. Other variables such as the inverse distance to hospitals and local taxes also have negative implicit prices. The quality of education, urban metropolitan areas, access to sea coast and federal transfers have a positive impact on households' utility. Two different rankings are constructed using two slightly different amenity bundles to observe for consistency. The estimation of implicit prices shows that public safety and quality of basic education are the most valued amenities for Mexican households, followed by the access to tertiary education.

Key words: Hedonic prices, housing market, quality of life, equalizing-differences, labour market.

JEL Classification: R13, J20, R21.

Abstract

El analysis que se presenta en este documento contiene la construcción de un Índice de la Calidad de Vida (ICV) para la gran mayoría de ciudades medias y grandes en México, usando el énfoque de equalización de diferencias. Contiene un modelo de Equilibrio General simple en donde los hogares tomas decisiones de localización espacial de acuerdo con los precios de la tierra (vivienda), el trabajo y los factores externos (amenities) que acompañan a estos factores. El modelo permita la construcción de precios implícitos usando información de factores externos (amenities) que incluyen elementos geográficos, ambientales y socio-econoómicos. Los factores externos que influyen en los precios de los factores mano de obra

*Faculty of Economics, Universidad Veracruzana, email: rogallardo@uv.mx; and York University, email: rgallard@mathstats.yorku.ca. I am very grateful to Michael Veall for his support and advice during my research visit to McMaster University in 2014. I am also grateful to Jeffrey Racine, Arthur Sweetman, Byron Spencer, John Leach, Stephen Jones and other professors from the department of economics at McMaster for their valuable comments and assistance. I must also thank Juan Jose Jardon, Oscar Javier Cardenas, Leobardo Pedro Platas and Jorge Noel Valero for their valuable comments during the 5th International Seminar on Local Public Economics and Finance at the University of Quintana Roo. I also thank two anonymous referees for their significant suggestions and Shirley Sainsbury for the final English grammar check. The author is the only one responsible for any errors in this paper.

y tierra (salarios y rentas) son el clima extermo, la ubicación cerca del litoral marítimo, las ventajas que offrecen las áreas metropolitanas, la seguridad pública, la calidad de la educación, el acceso a la salud, así como la dotación de bienes Públicas locales. El ICV ranking fue construido para el año 2010 con información de 92 ciudades medianas y grandes (municipios) de una submuestra de la Encuesta Nacional de Ingresos y Gastos de los Hogares. Los resultados del análisis estadístico muestran que las temperaturas extremas y la criminalidad son claramente bienes "Bads" y tienen precios implícitos negativos. Otras variables tales como el inverso de la distancia a los centros de salud y los impuestos municipales también tienen precios impícitos negativos. La calidad de la educación, la localización en áreas metropolitanas, el acceso a litoral y las transferencias federales tienen un impacto positivo en la utilidad de los hogares mexicanos. Usando la información de los precios implícitos se construyeron dos rankings usando dos grupos de factores externos para observar la consistencia en la construcción del índice. La estimación de los precios impícitos muestra que la seguridad pública y la calidad de la educación básica son los factores externos más valiosos para las familias mexicanas, seguida del acceso a la educación superior.

Key words: Precios hedónicos, mercado de vivienda, calidad de vida, ecualización de diferencias, mercado laboral.

JEL Classification: R13, J20, R21.

1 Introduction

In the economic literature, there are several indices that intend to capture the well-being of individuals. Some capture differences in income, health conditions, productivity, consumption, etc., among human groups. Some try to measure external variables such as environmental quality. Indices offer information on how individuals or groups compare to each other. Most indices are relatively sound and most have theoretical foundations that support their construction. From the Human Development Index to the Environmental Protection Index, all indices are important tools for policy analysis and public decision making in many areas.

Most indices are obtained from objective and measurable attributes of human populations such as income, green house gases from human activity, number of hospital beds or doctors, caloric contents in food, years of schooling, etc. Every attribute is measurable and more or less homogeneous enough to make comparisons among human populations possible. But being realistic, most of these attributes are not homogeneous and vary significantly across regions and countries. Many attributes are fixed by geographic conditions such as natural resources or climate. Some other may be influence by human activity such as provision of public and/or private goods. Although quantities may be the same, quality may vary across human groups. Taking into account the possibility of large heterogeneity, it becomes very difficult to develop a consistent and comparable index.

For official statistics, an elementary school in a high income neighbourhood in Mexico City is counted as the same as an elementary school in Cochoapa El Grande municipality (the poorest municipality in Mexico), but they are qualitatively different. The quality of education and graduates from both schools may be also different. Bundling other attributes may help to capture differences in provision but not in quality. If policy officials increase transfers to the poor municipality in order to improve the provision of public goods such as education and health care, now the question will be whether the residents are valuing and profiting equally from the (unsolicited) increase in the provision of such goods.

Similarly, the supply and quality of tap water is finally determined by geography. Living in a region with abundant rain fall all year round is different from living in a desert region. Climate and ecosystems are assumed fixed at least in the short term, and human can do little to modify them. Although all individuals need and value tap water, some individuals may be willing to live with less provision and quality than others in exchange of more attributes that compensate them for the lack of water.

The central point we want to introduce to the reader is that differences in external attributes and quality of provisions matter. Then question is how to measure these differences in attributes and quality when most of them are related to the average individual's valuation in each geographical area. Counting the number of schools, teachers, hospital beds, doctors, people with access to electricity and tap water is important but not enough to construct a comprehensive index. In this paper, differences in quality also matter for the construction of a index. When we refers to quantities, we assume that individuals behave optimally in different markers. For example, individuals supply labour for a price (wages) in exchange of income, that will be used to buy and consume goods such as food, housing, clothing, etc. There will be also markets for housing, food, clothing, etc. When we mention quality, we imply the attributes that are attached to the quantities of good exchanged in each market and that are also implicit in the price of each good exchanged. For example, a house next to a polluted industrial area may be structurally similar another house located in a neighbourhood surrounded by parks and clean air. Prices will be different because external attributes invariably attached to each house.

In this paper we offer a simple estimation of the Quality of Life Index (QLI) for Mexican cities, which is an empirical application of the theory of equalizing differences, formalized by Rosen in 1976 based on previous work on hedonic prices. The important assumption under this QLI comes from the idea that individuals may be willing to pay, or give up some part of their money income, for amenities they value more. From this view, quality of life is related to the value of external amenities attached to visible prices in the market. These amenities may come in the form of clear air, clean water, safe neighbourhoods, access to local public goods, quality of education and health care, etc. It is difficult to accept that individuals ignore these amenities when making the important decision on where to live and work. Although there are many other important considerations to take into account about locational decisions of households and firms, QLI offers a first-hand measure of the relative importance of environmental and social amenities (or disamenities).

This analysis is perhaps, to the best of the author's knowledge, the first Quality of Life Index constructed for Mexican cities using the hedonic prices approach. Although this methodology was developed more than three decades ago, there is almost no literature in the subject for Latin American countries. Another important structural change since its development is the advance of federalism and devolution of fiscal attributes from central to local governments. The new relation between levels of governments has increased the bundle of local public goods available and so the positive (or negative) externalities derived from them. In this context, the QLI acquires a new relevance as a useful tool for understanding qualitative differences among regions and cities.

The QLI is just a weighted average valuation of an amenity bundle in each region or city. The construction of QLI requires first the estimation of implicit prices for every amenity (disamenity) then it uses these implicit prices and the average amenity provision in every city to obtain the value of the amenity bundle. It offers information on how these amenities are valued by the average household in every city compared with other cities. Then the relevant questions are the finding of the appropriate micro-data and the proper estimation of the implicit prices.

The Quality of Life Index using the approach of equalizing differences was first developed by Rosen (1979) and later refined by Roback (1982). Since then, several authors constructed on these works and developed different models to estimate QLI adding new relations with different spatial coverage. Examples are Gyourko et al. (1991) which is a QLI construction for US that includes taxes and public goods; Colombo, et al. (2012) is a QLI construction for Italy; Albouy, et al. (2013) is a QLI construction for Canada which includes cities' productivity; Berger, et al. (2007) is a QLI for Russia and Zheng, et al. (2009) is a QLI for China. They all use hedonic prices approach and estimate wage and housing differentials.

This work uses the insight of Gyourko et al. (1991) about public goods but it returns to the straightforwardness of the Roback's model of 1982. The simplicity is justified by the reality of Mexican Municipalities (cities), which are limited to the use of property taxation and are highly dependent on federal grants as a main source of revenue. The basic administrative structure in Mexico is the Municipality which in many cases includes many cities of different size. We are separating those municipalities where there is a city with more than one hundred thousand inhabitants. In many cases, these cities make up the entire municipality so the concept of city is used in this paper instead of municipality.

The paper uses official data sets from the Mexican National Institute of Statistics, Geography and Informatics (INEGI). Household characteristics come from the Mexican National Household Income and Expenditure Survey (ENIGH) of 2010, while the information about local taxes, grants, and amenities come mainly from the State and Municipal Data Base System (SIMBAD), both supplied by the INEGI.

The ranking of Mexican cities within this new QLI is fairly consistent. Highly developed modern cities show high QLI. Most of these cities have strong economies, modern infrastructure and a large service sector, including tourist attractions like beaches, theatres, good hotels and resorts, etc. They also concentrate better health services, education and recreational facilities. These cities are usually connected to each other within a metropolitan area so they share the spillover of local public goods and the economies of scale.

On the other hand, low QLI cities have serious urban problems relative to others. They also have many illegal urban sprawls, a difficult social network and larger crime rates relative to others. They also have lower provision of public goods and usually they benefit much less from spillovers and from being close to a metropolitan area.

In this work there are two different constructions of QLI using slightly different amenity bundles. One includes only local taxes and the other also includes federal grants. Both QLI rankings show some consistency though there are some changes in the ranking especially in the top due to unusually high grants for some cities, but the bottom of the ranking remains fairly unchanged.

This paper is organized as follow: The first section contains the introduction, the second the theoretical framework, the third contains two subsections to explain the data and the methodology for estimation, and the last contains our final conclusions.

2 Theoretical background

The idea of using the framework of equalizing differences to develop a QLI comes back from Rosen (1979) and Roback (1982). Consumers (workers) and firms face a bundle of amenities in specific geographical areas where wages, rents and amenities are in spatial equilibrium which means that there is no incentive to move. Gourkyo et al., 1991; introduced a model to incorporate taxes and local public goods. This section develops a simple model following Roback, 1979 and Gourkyo, 1991. The only difference is the addition of property taxation in the consumption of land services rather than include it only to the price of land. Local public goods are determined exogenously in the model. The reason for this comes from the fact that the Mexican fiscal revenue system is highly concentrated at the federal level and most local government revenue comes from federal grants.

In this world, location and transportation costs are ignored for both consumer and firms. Consumers are identical and derive utility from a composite private good x, a local public goods G, the consumption of residential land l and local amenities a. Consumers are identical in skills and tastes and supply one unit of labour. They also receive a salary income w and pay a property (local) tax τ. The price of the private good is normalized to one and the price of land is the rent r. They also receive a categorical grant g from the federal government and have a non-labour income of I. The consumer problem is to maximize the following utility function:

$$U(x, l, G; a) \tag{1}$$

The above utility function includes the quality of local public goods in the same manner as local amenities. The budget constrain for the individual is:

$$w + g - lr\tau + I = x + lr \tag{2}$$

The problem to the consumer is to maximize 1 respect to 2. From the above problem an indirect utility function can be obtained:

$$V(w, r(1+\tau); a) = \theta \tag{3}$$

The firm's problem is similar as in Roback, 1982, but property taxation is additionally included. Firms produce a X quantity of private goods using constant returns to scale production function. The relevant factors are land used for production l^ρ and total labour N. The amenities bundle a enters the production function as follows:

$$X = f(l^\rho, N; a) \tag{4}$$

The problem of the typical firm is to minimize costs subject to 4. The equilibrium condition is that unit cost must be equal to product price which is unity:

$$C(w, r(1+\tau); a) = 1 \tag{5}$$

The standard conditions are $C_w = \frac{N}{X}$ and $C_r = \frac{l^\rho(1+\tau)}{X}$. If the amenity is unproductive then $C_a < 0$ and if the amenity is productive then $C_a > 0$. Industries may have an incentive to relocate to cities where productive amenities are available.

Finally, a simple local government budget constrain closes the system:

$$G = g + r\tau \tag{6}$$

The grants g is positive because it is a transfer from federal government to local residents, then the total amount of public goods consumed are equal to the total amounts of grants and the local property tax collected. This also implies that local public goods are not always provided by local governments, which may be the case of Mexican Municipalities[1].

It is clear from 3 and 5, that wages and rents are determined in equilibrium in both markets as functions of a. Finding the differentials from 3 and 5 and solving for $\frac{dw}{da}$ and $\frac{dr}{da}$, we find the wage and rental differentials as follow:

$$\frac{dw}{da} = \frac{C_a V_r - C_r V_a}{C_r V_w - C_w V_r} \tag{7}$$

$$\frac{dr}{da} = \frac{-C_a V_w + C_w V_a}{C_r V_w - C_w V_r} \tag{8}$$

The above equations can be used to solve for V_a, V_w and C_a considering the conditions that $C_w = \frac{N}{X}$ and $C_r = \frac{l^\rho(1+\tau)}{X}$. A relative valuation can be obtained to measure the total amount of income required to compensate a household for a small change in a, which is called full implicit price IP:

$$IP = \frac{V_a}{V_w} = l(1+\tau)\frac{dr}{da} - \frac{dw}{da} = \theta_1 \frac{d\ln r}{da} - \frac{d\ln w}{da} w \tag{9}$$

The full implicit price of an amenity is the housing price differential dr/da and the negative of the wage differential dw/da. In principle, $dw/da < 0$ because wages must be adjusted downwards if there is an

[1] In this simple model, local public goods are exogenously determined by federal government, and are solved in equilibrium outside this framework. The same is assumed for the input capital in the production function.

amenity. In this case, individuals are willing to give up some wage income to enjoy an amenity such as fresh air or safe public parks. We assume that the rent differential is $dr/da > 0$ because amenities make land (housing) expensive for households.

In the last equality, the parameter θ_1 contains information on the total expenditure on net land consumption by households. The reader may also observe that $\frac{d\ln r}{da}$ and $\frac{d\ln w}{da}$ can be easily estimated using suitable data and appropriate statistical methods. Once these differentials are estimated for each amenity (disamenity) a vector of implicit prices for each amenity can be obtained IP_{a_i}.

Using the vector of implicit prices IP_{a_i}, a QLI can be easily constructed. QLI is the product of the implicit prices for each amenity by the average value of the trait in each city j:

$$QLI^j = \sum_{i=1}^{A} IP_i^j \overline{A}_i^j, \qquad \text{where} \quad i = 1, \ldots, A \quad \text{and} \quad j = 1, \ldots, J \tag{10}$$

Thus QLI can be interpreted as the money value that the average household assigns to the amenity bundle A in the city j. This QLI will be high for cities where amenities are highly valued and a simple ranking may be constructed for comparison.

3 Measuring Quality of Life

The data

Before proceeding to estimate the QLI, we must find suitable data for the experiment. It is often possible to find labour information and housing data in any household income-expenditure survey from any country. But it is unusual or extremely rare to find information about urban and environmental amenities within these types of surveys. So we must pool different data sets in order to input information on the amenities side by side with the labour and housing information.

The labour and housing data used in this work comes from the Mexican National Household Income and Expenditure Survey (ENIGH) of 2010 and information about amenities comes from the State and Municipal Data Base System (SIMBAD), both produced by the Mexican National Institute for Statistics, Geography and Information (INEGI). The ENIGH contains information from a sample of 27 thousand households representative for the whole country. The main variables used from this survey includes household income, characteristics of the head of the household, structural characteristics of houses, housing expenditure (rents), wage income and other labour market variables.

A subsample was constructed using household heads with a salaried work in the private sector, when the household is resident in a city with more than 100 thousand inhabitants. A total subsample of 7966 households was obtained with enough number of observations to represent 92 middle sized and large cities. There are two main reasons behind the construction of this subsample. The first has to do with the concept of the QLI defined above, where we only include the valuation of households whose locational decision is decided by wages, rents and, of course, prices of amenities in every city. We are excluding those households that derive mainly income from capital and other non labour income as they may also do locational decision considering the productivity effects of amenities[2].

We also decided to exclude household heads working in a public sector job as the public service in Mexico has some important institutional arrangements that may also affect locational decisions. Some individuals in public jobs may not be able to choose location like those in the military. Furthermore, almost all public workers are unionised and then willing to bargain wage hikes or other fringe benefits (e.g. support

[2]The productivity effect on firms is decided by the cost-saving effects of amenities and are not included in this analysis. Although some amenities with positive implicit prices for households may also have positive productivity effects on firms, but this may not be the case for all firms.

for rent payments) in places where there are highly-valued amenities for both households and firms. The effect of unionisation may be important especially in large cities. Due to possible rigidities in the labour market, we decided to exclude public workers in this analysis and leave these groups of workers for further research[3].

The construction of the above subsample of private-sector salary workers is representative for the whole country. The objective is to perform a simple empirical analysis as well as to construct a simple theoretical model that reflect the Mexican reality. The main scientific objective is to obtain a vector of households' valuations that may be used as weights to understand how these workers value local amenities. The vector IP_{a_i} contains the mean valuation of every amenity (disamenity) for the entire sample of private-sector and salaried workers. These weights then can be used along mean values of the amenities (disamenties) to construct the QLI.

As mentioned before, there is no information at city level, so we used information at municipality level. For most cities, the total population is the same as the entire municipal population. Table 1 at the end of the paper shows the 92 main cities used for this analysis, with the total city population and the percentage from total municipal population. On average, city-level population represents 85% of the entire municipal population in this analysis.

Information on wages and rents were also obtained from the ENIGH. Wage income can be easily estimated for every member of the household and information on rents paid by the household is also included in the data sets[4]. In the survey, households were asked to provide an imputed value of rents for their estates (land and house), later we used this imputed rents as a proxy for market rents.

Information about amenities was obtained from the SIMBAD such as climate, precipitation, crime, education, health and fiscal attributes. Several data sets were constructed and pooled together so that to construct a unique data set with labour, housing and amenities information. Standard statistics of this pooled data set are shown in table 2 at the end of this paper.

Climate and precipitation data was used to capture the weather conditions in every city. A crime rate for every city was constructed dividing the total number of crimes by total population, in order to obtain a relative measure of public safety. Dummies variables were constructed to capture the advantages of being located next to the coast as well as the advantages of being located in a metropolitan area. These two variables capture important qualitative aspects of urban agglomeration such as low transport cost, positive externalities of diversified markets, recreational activities, among others.

In order to capture the quality effects of some local public goods provided by federal and state governments, a tertiary education ratio and a teacher-student ratio were constructed. These ratios provide also a good incentives for relocation and many households might also value the provision of tertiary education and the positive externalities of living close to well educated neighbours. The teacher-student ratio captures the intensity and also quality of primary education in every city.

The time-to-hospital variable accounts for the number of hours a family must travel to the nearest hospital in case of medical emergency. This variable was introduced in the regression as the inverse of the travel time to the nearest hospital which can be interpreted as a convenience or accessibility ratio. The average time of travel is about half an hour to the nearest hospital, but there are 9 households that declare more than 20 hours of travel, and five of these are located in Mexico city and from those, two declare taking up to 45 hours of travel even though these households are located inside the city. A possible explanation

[3]There is no reason to believe public workers behave different from any other worker in any other sector. The reason for this exclusion only obeys to the lack of information on institutional variables, which may be important for a proper analysis. We believe that the theory of equalizing differences in the labour market is general and applies for all kind of workers and sectors. We also believe that all individuals have their own valuation of non market goods, which may be approached by implicit-price analysis and estimation.

[4]An important assumption is that households are identical in their labour effort and labour supply. Labour productivity differences are neither included in the theoretical model nor in the statistical estimation and left for further research.

could be the segmentation in the social security in Mexico where some households might take a long travel time to arrive to their assigned hospitals.

The last two variables inside the amenity vector are Municipal taxes and local public goods provided by the city in the form of local public infrastructure. In Mexico, municipalities have few taxes at their disposal, and perhaps the most important is the property tax. This tax is a good instrument to observe the fiscal effort of every city as well as the provision of local public goods. One problem with local taxes in Mexico is that they only represent about 10% of the total municipal revenue. In order to properly include the quality-effect of local public goods provided by the city, federal grants must also be included in the analysis. One problem is that categorical grants were almost perfect collinear with local taxes as they are linked through a design formula. On the other hand, non-matching grants cannot be combined with categorical grants as they are not entirely committed to provide local public goods. Then a third variable was used to capture the effect of grants, particularly those categorical grants that are used to build local public infrastructure. If city fiscal revenue from taxes is small compared to grants then it is possible to capture the effect of local public goods provided using the amount of investment in municipal infrastructure per household [5].

Although the theory assumes that all households are identical, in practice we must control for workers' heterogeneity. For that purpose, information about the head of household was used to capture individual-labour market characteristics such as gender, years of formal education, job experience, ethnicity and possible physical disabilities. Some dummy variables were used to capture information about industry-level and labour market characteristics. These dummies captured information about types of jobs such as managers, machinery operators or professional jobs as well as jobs in agriculture.

Finally, a vector of structural housing characteristics contains information about the number of rooms in the house, and the availability of a sewage system and hot water inside the house.

The econometrics

The General Equilibrium Model implies that all markets (market goods, labour and land) are in equilibrium. The market prices of interest that make for this equilibrium are, of course, wages and rents. Then we proceeded to estimate a reduced-form of wage and housing expenditures equations in order to estimate implicit prices as in 9. The functional forms follows standard Mincerian-type wage equations and housing equations which are common in the economic literature:

$$\ln w = \beta_0 + \beta_1 X + \beta_2 M + \beta_3 Z + \epsilon, \qquad \text{where} \quad \epsilon \sim N(0, \sigma_\epsilon^2) \tag{11}$$

$$\ln r = \lambda_0 + \lambda_1 Q + \lambda_2 Z + \mu, \qquad \text{where} \quad \mu \sim N(0, \sigma_\mu^2) \tag{12}$$

Where X is a vector of individual characteristics for the households' heads, M is a vector of industry-level and labour market variables, Q is a vector of structural characteristics of housing, and Z is a vector of amenities. The vector of amenities Z was included to capture implicit valuation of non market goods and β_3 and λ_2 give an estimate of the wage and housing differentials in 9. If the amenities are statistically significant, then it is possible to offer a implicit price. Both 11 and 12 are explicit semi-log functional forms that follows the standard Mincerian and housing regressions. Another feature of these functional forms it is to allow for a straightforward estimation of the differentials in 9 [6].

The first approach was to perform traditional cross-section OLS regressions on 11 and 12 using the sample of 7,966 households. Several regressions were performed with different explanatory variables. We

[5] Total federal grants were also used in the statistical analysis with similar results.

[6] Instead of elasticities, the vectors of estimates β_3 and λ_2 express the relative change on wages and rents due to absolute changes in the amenities. In other words, $\beta_3 = \frac{d \ln w}{da_i} = \frac{dw}{da_i}\frac{1}{w}$ and $\lambda_2 = \frac{d \ln r}{da_i} = \frac{dr}{da_i}\frac{1}{r}$, which is the main reason for using a semi-log functional in this experiment.

used information criterion (Akaike and Schwarz) in order to observe for the quality of the regression models. For the wage equation 11 we used 20 explanatory variables and for the housing equation 12 we used 14, from which 10 variables were included as amenities in the vector Z. As for this vector of amenities, we decided to include information on weather (temperature and precipitation), incidence of crimes as proxy of public safety, access to sea coast (seascape), metropolitan area (urban spillovers), tertiary and primary education index (university and teacher/student ratios), time to the nearest hospital in case of emergency, local taxes (property tax) and investment on local infrastructure (federal and state transfers).

As predicted by theory, almost all explanatory variables selected were significant, but a Breusch-Pagan and a White test reveal a serious problem of heteroskedasticity in the simple OLS regression[7]. A second OLS regression with robust standard errors solved the problem of heteroskedasticity and rendered again almost all explanatory variables highly significant.

Correcting for heteroskedasticity does not solve all problems in our data. In our experiment, we are dealing with household information grouped by cities (municipalities) which brings into the picture the problem of intraclass correlation. The origin of this problem is very common when data is grouped (clustered), in this case by cities or states. The OLS assumes that the standard errors of estimates are computed from data sets where observations are independent from each others and, in our experiment, we expect that preferences and responses are similar in each city, municipality or State. This problem is completely natural as we know that individuals influence each other within a group. This intraclass correlation affect the standard deviations of our estimates, making difficult to perform significance tests. Interclass correlation is not a problem to worry about when groups are small (e.g. households) but it becomes problematic when membership within a group increases (e.g. school, zone, city, etc.).

The most common answer to this problem is to use clustered standard errors, assuming that there is no correlation among groups. Two OLS regressions corrected by clustering in the 92 cities were performed, one with infrastructure expenditure and one without it[8]. The results from the regressions are in table 3, showing only the coefficients and standard errors of the amenities vector Z. The coefficients by themselves are a little difficult to interpret at first hand. But we know that a positive and significant coefficient in the wage equation means a disamenity while the same is an amenity for the housing equation. A negative and significant coefficient is an amenity for workers while a disamenity for landowners.

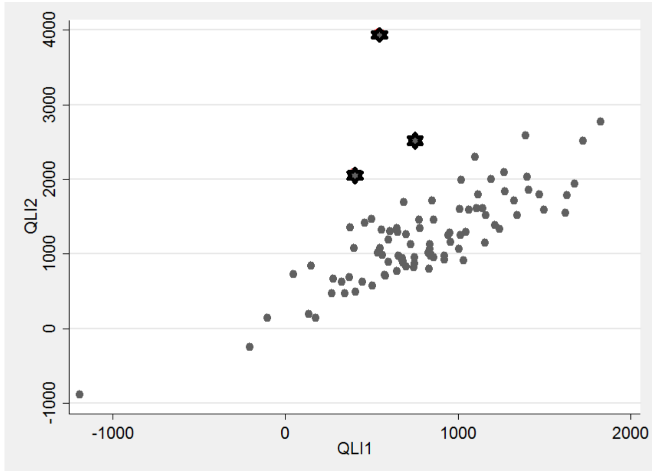
The advantage of the wage and housing regressions in 11 and 12 is that they allow us to estimate implicit prices of amenities directly. These implicit prices IP_{a_i} are calculated using mean monthly wages and rents. These prices express the implicit valuation of the average household for non-market goods as weather, public safety or education spillovers. Some of them are negative which means that these non-market goods are indeed bads, or goods that reduce utility. Negative implicit prices for climate and crime shows that extreme temperatures decrease rents and high crime rates must compensate households with higher wages. Access to hospitals in terms of time (or distance) and local taxes are also bads, as wage differentials outweigh rents differentials. All other amenities have positive implicit prices which means that they increase households' utility and influence positively the valuation of the entire bundle of amenities.

A close look to the estimates of the regression in table 3, shows that amenities such as precipitation, coastal location, metropolitan areas, teacher-student ratio and tertiary education ratio are positive, which mean that prices of housing (land) will increase with them. On the side of wage differential, only criminality, student-teacher ratio, local taxes, the inverse of time to hospital and the local public expenditure in infrastructure are statistically significant. The variable (inverse) time to hospital expresses the number of hours to arrive to the nearest hospital in case of emergency. This explanatory variable is an inverse term and both coefficients (wages and rents) are positive. This is puzzling because it means that quality of health care is

[7] For the wage equation with all variables, the Breusch-Pagan test reports a $\chi^2 = 40.23$ and the White test reports a $\chi^2 = 589.59$. Then we must reject the null hypotheses of constant variance. For the housing equation with all variables, the Breusch-Pagan test reports a $\chi^2 = 329.17$ and the White test reports a $\chi^2 = 733.99$, which are also evidence of heteroskedasticity.

[8] A similar regression was performed clustering by state rendering similar levels of significance.

Figure 1: Correlation between two amenity bundles



better when the hospital is relatively far. This is perhaps the result of the under provision and segmentation of health care system in Mexico, where good hospitals with capable doctors are only located in few large cities across the country.

With the estimation of wage and housing expenditure differentials and the full implicit prices for every amenity, the final step was to calculate the QLI using the implicit price from table 3. The price in every trait (amenity) is multiplied by the average trait in every city. We constructed two QLI using two amenity bundles, with and without transfers, and then proceeded to rank every city. The QLI final rankings as shown in table 5. This QLI contains the valuation of each amenities bundle by the average household in every city.

The advantage of the implicit prices methodology is that it may be used with different amenity bundles. Two different QLI were constructed to observe the consistency of the QLI itself when the amenities bundle changes. The first QLI1 includes only local taxes and the second QLI2 includes additionally local public investment in infrastructure. There are substantial differences in tax collection and grants allocation among cities in Mexico which may affect how households may value external factors. For example, Mexico city collects an average of more than ten thousand pesos per household in taxes, but only receive little more than seven hundred pesos in local public infrastructure from federal grants per household. On the other hand, Nuevo Laredo collects almost nine hundred pesos in taxes per household but invests more than 14 thousand pesos in infrastructure using federal grants. The new valuation is, of course, product of the redistributive effect of grants. This fiscal allocation affects the valuation of the amenities bundle and the perception of quality of life. Something similar happened for other cities such as Cuernavaca and San Juan Del Rio who sharply improved in the ranking in similar manner. A scatter plot between QLI1 and QLI2, in figure 1, shows that for most cities the estimation of a QLI is fairly consistent as both QLIs are highly correlated[9]. The three cities that increased abruptly in the ranking due to unusually high level of federal grants are Nuevo Laredo, Cuernavaca and San Juan del Rio, marked with stars in figure 1. The most common approach to these outliers is to take them off the sample as they may not truly reflect the real conditions in those cities.

Another important consideration is the statistical confidence on the QLI ranking. We must be able to construct confidence intervals for each QLI in order to assess how much the position of a city may vary within the ranking. As we know, the amount of amenities in each city is fixed, at least in the period of

[9]A Correlation Coeficient of 0.7125 increases to 0.8607 when the outliers Nuevo Laredo, Cuernavaca and San Juan Del Rio are dropped from the sample.

analysis. Then, the only source of variability are the implicit prices. But in our theoretical setting, implicit prices are just weights obtained from a regression analysis on the overall sample. Therefore, we may use the standard deviation of each estimate in order to simulate implicit price variability.

We performed 1000 simulations on the implicit prices and recalculated the valuation of amenities for each city [10]. Then, we obtained the standard deviations for each QLI in every city as shown in columns SD-1 and SD-2 in Table 5. With this information at hand, we are able to obtain confidence intervals to evaluate each city ranking. In the first ranking we observe that Campeche is still better than Acapulco at 95% confidence. But it is difficult to assess whether Veracruz is better than Villa de Alvarez as both are statistically similar. There are similar cases where the QLI's are very close to each other and differences in the ranking are not significant, some clear examples are Toluca and Monterrey or Chalco and Novojoa. The case of Oaxaca is noteworthy because is a city in the bottom of both rankings with a extremely low valuation.

4 Concluding remarks

Although the theoretical model is rather basic, it offers powerful insights about the determinants of the spatial (non arbitrage) equilibrium among households and firms. The estimation of implicit prices offers a straightforward valuation of non-market goods, intrinsically linked to households' welfare. It is an objective method for estimation of non-market prices using information from visible market prices such as wages and rents. Implicit prices from table 3 are weights (average) of such valuations for the whole group, in our analysis, the Mexican households working in the private sector of the economy. They can be used for reference and also used for public policy design. Implicit prices in table 3 tell us that public safety and quality to basic education are highly valued within the Mexican Households' utility. After public safety, the most valued amenity is the spillovers of both basic and college education. A plain interpretation is that any public policy designed to decrease crime rates and increase access and quality of basic and tertiary education may certainly increase households' welfare. In the last ten years, both public safety and quality of education have been two of the top issues in the political agenda in Mexico.

The QLI is a construction that contains information of non-market prices but also information on the provision of amenities (disamenities) in a specific location. It offers the possibility to rank groups according to their valuation of these external attributes which allow us to design public policy. The QLI is not an all-purpose index, and it is only one of several analytical tools we may use to judge individuals' well-being. The Bohemian Index, for example, is a different ranking of cities according to their urban infrastructure that foster a creative or bohemian class (high quality-highly developed human capital individuals). This index explains how cities enhance development according to their ability to attract creative individuals and subsequently, firms.

Our QLI ranking offers some interesting information on the valuation of amenities in different Mexican cities. With the present amenity bundles, it may be said that cities such as Campeche, Acapulco or Xalapa Enriquez have a high QLI and cities such as Oaxaca, Ciudad Cuauhtemoc and Ciudad Acuna have a low QLI. The two rankings of table 5 give us important information on which Mexican cities the amenity bundles are more valued. The QLI cannot tell us whether an average household in Campeche is better off than an average household in Oaxaca. It rather tells us that the available amenity bundle is more valued in Campeche than in Oaxaca by an average household. It would be difficult to affirm that changes in the ranking are exclusively due to changes in preferences alone. The QLI may be affected by the amenity package in some regions which might be determined by nature over time. Some amenities or disamenities are indeed direct or indirect result of human activity such as air pollution or public safety and then can be

[10] We generated new implicit prices simulating the estimates in the form $\tilde{\beta}_i = \hat{\beta}_i + e_i$, where $\hat{\beta}_i$ is the estimate for the amenity i and $e \sim N(0, \sigma^2_{\hat{\beta}_i})$. The same procedure was done for the λ_i coefficients in the housing regression.

influenced by policy.

Another important consideration is the demographic differences in household structure in different parts of the country. For example, young workers may prefer some cities while senior workers and retirees may prefer others, affecting indirectly implicit prices in such places. Furthermore, land supply and availability may be also restricted by institutional arrangements and geographical factors. With time, households' preferences may change and therefore the value of every amenity. This will change implicit prices and then the spatial equilibrium will changed. But despite all of this, the QLI is still a valuable source of information to observe how some amenities (disamenities) influence household's locational decision across Mexican cities at least in one point of time.

Changes in the top of the ranking of table 5 are more visible when federal transfers (grants) are included in the amenity bundle as a proxy of local public infrastructure. But some cities still remain in the top 20% and might be considered places with high quality of life, such as Acapulco or Campeche. But city ranking in the bottom remains almost unchanged even after the inclusion of transfers. The city of Oaxaca is of particular interest because it is in the bottom of both rankings with the highest crime rate, very little taxes and small investment in infrastructure.

Although there is no spatial analysis in this work, it might be noted that most cities close to the US border usually have a low QLI such as Ciudad Juarez, Mexicali and Tijuana though cities such as Heroica Matamoros are better ranked. The city of Nuevo Laredo became the first place in the second ranking when local public infrastructure is included. One possible interpretation for the case of Nuevo Laredo might be the federal and state grants for improvements in public safety, because border cities are relatively more exposed to criminal activity. Nuevo Laredo is certainty an outlier and cannot be considered as a high QLI city along with Cuernavaca and San Juan Del Rio.

Cities within states along the Gulf of Mexico usually have high QLI. These cities have the advantage of relatively better access to regional and national markets with better communication routes. There are also cities along the pacific coast that also have high QLI such as Acapulco, Tepic and Colima. Mexico City is a place where QLI is relatively low even though criminality is not a decisive issue compared with other cities with higher crime rate per capita. The main disadvantage for Mexico city comes from the fiscal arrangements in place, where Mexico City residents are compelled to pay high taxes but receive relatively little transfers per capita.

The QLI is a fairly good measure of the households' valuation of amenities using information from households' wage income and housing expenditure. In Mexico, it is shown clearly that criminality is a bad and households are willing to pay for suppressing this disamenity. The QLI in this work may also be used as an instrument for public policy and can help to understand how Mexican households value their environment and are willing to pay for additional quantities of some amenities such as quality of education.

The information from table 5 offers important insights and can be used for policy design. For example, investing in public safety and education in the bottom 10 cities in the ranking may not change significantly the ranking but may reduce the relative distance between the low and high QLI cities. It is assumed that any change in the amenity bundle may affect the locational equilibrium, but we know that market prices may also adjust and, in this case, wages and housing prices will move to account for that change. So, there is no reason to expect many households relocating as many other conditions are fixed by nature (weather, coastal location, metropolitan areas, etc.). But other amenities such as the quality of education and public safety can be influenced directly or indirectly by policy, then the information in this work is certainly relevant for policy planners.

This work does not include the valuation for firms, and an extended model is needed to capture productivity differences among cities. This paper only offers information on the households' side, and we must account for other complex factors that affect wages such as work effort or unionisation. Further research must be done to improve the theoretical framework and estimation methods on implicit prices in order to explain with more detail the Mexican spatial, demographic, social and economic realities.

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Table 1: Relative size of main city population from the total municipality population

No	City	Population	%	No	City	Population	%
1	Acapulco	789,971	85.3%	47	Merida	830,732	93.6%
2	Aguascalientes	797,010	90.6%	48	Mexicali	936,826	73.6%
3	Altamira	212,001	55.9%	49	Monclova	216,206	99.6%
4	Apocada	523,370	89.3%	50	Monterrey	1,135,550	100.0%
5	Atizapan de Zaragoza	489,937	99.8%	51	Morelia	729,279	81.9%
6	Campeche	259,005	85.1%	52	Naucalpan de Juarez	833,779	95.0%
7	Cancun	661,176	95.0%	53	Navojoa	157,729	72.2%
8	Celaya	468,469	72.7%	54	Nezahualcoyotl	1,110,565	99.5%
9	Chalco	310,130	54.4%	55	Nogales	220,292	96.5%
10	Chetumal	244,553	61.8%	56	Nuevo Laredo	384,033	97.3%
11	Chihuahua	819,543	98.7%	57	Oaxaca de Juarez	263,357	96.8%
12	Chilpancingo de los Bravo	241,717	77.5%	58	Pachuca de Soto	267,862	95.8%
13	Chimalhuacan	614,453	99.7%	59	Piedras Negras	152,806	98.3%
14	Ciudad Acuna	136,755	98.2%	60	Poza Rica de Hidalgo	193,311	95.8%
15	Ciudad Cuauhtemoc	154,639	73.7%	61	Puebla de Zaragoza	1,539,819	93.1%
16	Ciudad Juarez	1,332,131	99.2%	62	Queretaro	801,940	78.1%
17	Ciudad Madero	197,216	100.0%	63	Reynosa	608,891	96.8%
18	Ciudad Obregon	409,310	73.0%	64	Salamanca	260,732	61.4%
19	Ciudad Valles	167,713	74.3%	65	Saltillo	725,123	97.9%
20	Ciudad Victoria	321,953	94.8%	66	San Cristobal Ecatepec	1,656,107	99.9%
21	Ciudad de Mexico	8,851,080	98.0%	67	San Cristobal de las Casas	185,917	85.0%
22	Ciudad del Carmen	221,094	76.6%	68	San Francisco Coacalco	278,064	100.0%
23	Coatzacoalcos	305,260	77.3%	69	San Juan del Rio	241,699	57.5%
24	Colima	146,904	93.5%	70	San Luis Potosi	772,604	93.6%
25	Cordoba	196,541	71.7%	71	San Nicolas de los Garza	443,273	100.0%
26	Cuautitlan Izcalli	511,675	94.7%	72	Soledad de Graciano Sanchez	267,839	95.2%
27	Cuautla	175,207	88.1%	73	Tampico	297,554	99.9%
28	Cuernavaca	365,168	92.7%	74	Tepic	380,249	87.5%
29	Culiacan	858,638	78.7%	75	Tijuana	1,559,683	83.4%
30	Ensenada	466,814	59.9%	76	Tlalnepantla de Baz	664,225	98.4%
31	Fresnillo de Glz Ech	213,139	56.7%	77	Tlaquepaque	608,114	94.7%
32	Gomez Palacio	327,985	78.5%	78	Toluca	819,561	59.7%
33	Guadalajara	1,495,189	100.0%	79	Torreon	639,629	95.2%
34	Guadalupe	678,006	99.4%	80	Tulancingo de Bravo	151,584	67.6%
35	Hermosillo	784,342	91.2%	81	Tultitlan de Mariano Escobedo	486,998	81.2%
36	Heroica Guaymas	149,299	75.7%	82	Tuxtla Gutierrez	553,374	97.1%
37	Heroica Matamoros	489,193	92.0%	83	Uruapan	315,350	83.9%
38	Iguala de la Independencia	140,363	84.4%	84	Veracruz	552,156	77.6%
39	Irapuato	529,440	72.0%	85	Victoria de Durango	582,267	89.1%
40	Ixtapaluca	467,361	69.0%	86	Villa de alvarez	119,956	98.0%
41	Jiutepec	196,953	82.5%	87	Villahermosa	640,359	55.2%
42	La Paz	251,871	85.4%	88	Xalapa de Enrqz	457,928	92.8%
43	Leon	1,436,480	86.2%	89	Xico	357,645	99.6%
44	Los Mochis	416,299	61.6%	90	Zacatecas	138,176	93.4%
45	Manzanillo	161,420	80.6%	91	Zamora de Hidalgo	186,102	76.1%
46	Mazatlan	438,434	87.0%	92	Zapopan	1,243,756	91.9%

Table 2: Standard Statistics

Variable	**Mean**	**Std. Dev.**	**Min**	**Max**
Ln salary income	8.807	0.960	1.201	12.440
Ln rents	7.364	0.767	1.609	11.849
Amenities (disamenities)				
Climate (Max-Min)	7.780	3.573	2	16
Precipitation (Max-Min)	475.034	256.070	100	1700
Crime rate (per 100,000 inhab.)	0.024	0.014	0.003	0.124
Coast	0.155	0.362	0	1
Metropolitan Area	0.815	0.388	0	1
Tertiary Education ratio	0.207	0.051	0.055	0.315
Teacher/student ratio	0.052	0.007	0.038	0.074
Time to Hospital (1/hours of travel)	3.362	3.379	0.022	60
Local taxes (per household)	3067.297	3441.085	312.832	10149.28
Local infrastructure (per household)	2189.075	1532.531	388.161	14651.97
Individual and Labour market characteristics				
Gender	0.808	0.394	0	1
Education (years)	10.358	4.375	0	21
Experience	37.836	11.769	11	79
Experience2	1570.036	947.040	121	6241
Indian	0.212	0.409	0	1
Handicap	0.034	0.180	0	1
Managers	0.068	0.251	0	1
Profesionals	0.200	0.400	0	1
Farming	0.023	0.150	0	1
Operator	0.139	0.346	0	1
Housing-structural characteristics				
Number of Rooms	4.085	1.756	1	21
Sewer	0.974	0.161	0	1
Air conditioning	0.156	0.363	0	1
Hot water	0.554	0.497	0	1

Table 3: OLS clustered regression with full implicit price of amenities

Amenities (disamenities)	**With transfers**					**Without transfers**				
	ln wage		**ln rent**		**Implicit**	**ln wage**		**ln rent**		**Implicit**
	coef	**se**	**coef**	**se**	**Price**	**coef**	**se**	**coef**	**se**	**Price**
Climate (Max-Min)	0.0001	0.005	-0.012*	0.007	-27.48	0.002	0.006	-0.012*	0.007	-27.95
Precipitation (Max-Min)	0.00001	0.00005	0.00019***	0.00007	0.42	0.000011	0.000055	0.00019***	0.00007	0.42
Crime rate (per 100,000 inhab.)	2.126**	0.993	1.585	1.591	-21,216.63	2.413**	1.034	1.541	1.593	-24,081.12
Coast	0.045	0.052	0.114*	0.058	254.23	0.048	0.054	0.113*	0.058	253.13
Metropolitan Area	0.073	0.053	0.126**	0.060	281.96	0.089*	0.051	0.124**	0.059	276.77
Tertiary Education ratio	-0.204	0.416	1.335**	0.520	2,988.80	-0.266	0.404	1.345**	0.521	3,010.42
Teacher/student ratio	-4.336*	2.207	-10.388**	3.953	20,025.30	-4.905**	2.283	-10.308**	3.972	25,883.43
Time to Hospital (1/hours of travel)	0.026***	0.004	0.026***	0.003	-203.59	0.026***	0.004	0.026***	0.003	-203.33
Local taxes (per household)	0.000018***	0.000006	0.00006***	0.000006	-0.05	0.000022***	0.000005	0.000055***	0.000006	-0.10
Local infrastructure (per household)	-0.000024**	0.000011	0.000004	0.000011	0.24					

Notes:The ***, ** and * symbols represent coefficients that are statistically significant different than zero at 1%, 5% and 10% respectively. The total number of observations is 7,966. Clustered standard errors (se) by city are next to the coefficient (coef) column. For the wage equations the $R^2 = 0.2682$ before transfers and $R^2 = 0.2693$ after transfers. For the housing equations the $R^2 = 0.4697$ before transfers and $R^2 = 0.4698$ after transfers. The AIC and BIC for the wage equation before transfers were 19,500.74 and 19,640.4 respectively, while after transfers were 19,490.63 and 19,637.28. The AIC and BIC for the housing equation before transfers were 13,359.69 and 13,457.45 respectively, while after transfers were 13,361.11 and 13,465.85. A mean monthly wage income of $9,979.60 MEX and a mean monthly rent of $2,238.10 MEX were used for the estimation of implicit prices.

Table 4: Households' monthly mean wage income and rent

No	*Municipality*	*City*	*Wage Income*	*Rent*	*Sample*
1	Acapulco de Juarez	Acapulco	6,786.36	1,170.98	102
2	Aguascalientes	Aguascalientes	10,291.11	1,730.97	113
3	Altamira	Altamira	7,902.68	1,961.48	27
4	Apodaca	Apocada	12,565.12	1,992.59	27
5	Atizapan de Zaragoza	Atizapan de Zaragoza	15,236.76	4,581.91	47
6	Campeche	Campeche	11,238.67	1,871.43	49
7	Benito Juarez	Cancun	10,736.10	2,344.30	79
8	Celaya	Celaya	7,326.44	1,206.67	90
9	Chalco	Chalco	6,577.08	827.27	22
10	Othon P. Blanco	Chetumal	7,069.87	1,107.63	59
11	Chihuahua	Chihuahua	11,065.80	2,222.57	113
12	Chilpancingo de los Bravo	Chilpancingo de los Bravo	13,005.61	2,542.86	21
13	Chimalhuacan	Chimalhuacan	6,159.61	1,250.00	54
14	Acuna	Ciudad Acuna	8,080.45	1,775.86	29
15	Cuauhtemoc	Ciudad Cuauhtemoc	10,420.51	1,324.07	27
16	Juarez	Ciudad Juarez	7,202.94	1,283.84	99
17	Ciudad Madero	Ciudad Madero	10,886.18	2,145.83	24
18	Cajeme	Ciudad Obregon	9,402.54	2,050.00	32
19	Ciudad Valles	Ciudad Valles	6,883.03	2,272.73	22
20	Victoria	Ciudad Victoria	16,908.76	2,037.14	35
21	Ciudad de Mexico	Ciudad de Mexico	12,552.79	3,486.52	1,479
22	Carmen	Ciudad del Carmen	12,830.01	4,190.20	51
23	Coatzacoalcos	Coatzacoalcos	9,001.70	2,402.78	36
24	Colima	Colima	8,865.94	1,473.08	65
25	Cordoba	Cordoba	6,905.25	1,632.61	23
26	Cuautitlan Izcalli	Cuautitlan Izcalli	14,619.99	3,360.98	41
27	Cuautla	Cuautla	8,892.78	1,648.21	28
28	Cuernavaca	Cuernavaca	9,855.50	2,093.88	49
29	Culiacan	Culiacan	8,996.46	1,748.65	74
30	Ensenada	Ensenada	8,745.59	1,693.51	77
31	Fresnillo	Fresnillo de Glz Ech	5,248.09	1,235.11	47
32	Gomez Palacio	Gomez Palacio	7,181.77	1,102.38	84
33	Guadalajara	Guadalajara	11,016.00	2,768.03	61
34	Guadalupe	Guadalupe	13,921.19	3,270.37	27
35	Hermosillo	Hermosillo	9,599.71	1,668.28	93
36	Guaymas	Heroica Guaymas	18,903.98	5,176.19	21
37	Matamoros	Heroica Matamoros	6,666.90	1,415.43	47
38	Iguala de la Independencia	Iguala de la Independencia	6,903.78	1,415.63	32
39	Irapuato	Irapuato	6,945.84	1,309.28	97
40	Ixtapaluca	Ixtapaluca	7,961.81	1,585.19	27
41	Jiutepec	Jiutepec	8,462.12	1,665.52	29
42	La Paz	La Paz	11,476.07	2,329.38	80
43	Leon	Leon	8,892.06	1,701.22	245
44	Ahome	Los Mochis	8,617.05	1,770.83	24
45	Manzanillo	Manzanillo	7,581.95	1,333.33	33
46	Mazatlan	Mazatlan	6,954.92	1,314.06	64
47	Merida	Merida	10,111.40	2,000.51	801
48	Mexicali	Mexicali	11,120.53	2,253.05	82
49	Monclova	Monclova	10,164.31	1,716.28	43
50	Monterrey	Monterrey	18,148.34	4,307.69	26
51	Morelia	Morelia	9,193.83	2,425.00	56
52	Naucalpan de Juarez	Naucalpan de Juarez	11,610.14	2,676.00	75
53	Navojoa	Navojoa	5,668.96	1,015.79	38
54	Nezahualcoyotl	Nezahualcoyotl	7,785.94	1,688.13	107
55	Nogales	Nogales	8,442.32	1,687.50	48
56	Nuevo Laredo	Nuevo Laredo	7,026.51	1,795.65	23
57	Oaxaca de Juarez	Oaxaca de Juarez	10,655.41	2,919.67	61
58	Pachuca de Soto	Pachuca de Soto	10,301.16	2,420.95	74
59	Piedras Negras	Piedras Negras	10,797.07	1,983.33	30
60	Poza Rica de Hidalgo	Poza Rica de Hidalgo	15,342.20	3,266.67	27
61	Puebla	Puebla de Zaragoza	7,733.07	1,940.42	71
62	Queretaro	Queretaro	11,219.59	2,502.48	101
63	Reynosa	Reynosa	8,153.67	2,234.38	32
64	Salamanca	Salamanca	6,352.97	1,495.88	85
65	Saltillo	Saltillo	8,134.09	3,101.81	95
66	Ecatepec de Morelos	San Cristobal Ecatepec	8,108.21	1,898.68	151
67	San Cristobal de las Casas	San Cristobal de las Casas	7,519.97	1,479.44	107
68	Coacalco de Berriozabal	San Francisco Coacalco	11,878.60	2,311.11	18
69	San Juan del Rio	San Juan del Rio	8,789.41	1,440.00	40
70	San Luis Potosi	San Luis Potosi	7,899.72	1,779.67	91
71	San Nicolas de los Garza	San Nicolas de los Garza	12,711.42	2,247.06	17
72	Soledad de Graciano Sanchez	Soledad de Graciano Sanchez	9,188.44	1,200.00	27
73	Tampico	Tampico	7,080.57	1,683.33	36
74	Tepic	Tepic	12,314.12	1,844.00	75
75	Tijuana	Tijuana	13,137.56	2,864.65	113
76	Tlalnepantla de Baz	Tlalnepantla de Baz	8,859.44	3,031.82	66
77	Tlaquepaque	Tlaquepaque	5,926.90	1,270.59	17
78	Toluca	Toluca	10,349.51	2,094.81	310
79	Torreon	Torreon	9,258.06	1,287.50	64
80	Tulancingo de Bravo	Tulancingo de Bravo	8,948.00	1,227.27	44
81	Tultitlan	Tultitlan de Mariano Escobedo	7,647.69	1,464.29	49
82	Tuxtla Gutierrez	Tuxtla Gutierrez	8,805.87	1,828.34	397
83	Uruapan	Uruapan	7,821.25	1,307.14	28
84	Veracruz	Veracruz	6,858.85	1,600.00	34
85	Durango	Victoria de Durango	8,262.68	1,419.78	91
86	Villa de alvarez	Villa de alvarez	9,725.05	1,564.42	52
87	Centro	Villahermosa	8,814.22	2,149.04	104
88	Xalapa	Xalapa de Enrqz	7,406.59	2,476.92	26
89	Valle de Chalco Solidaridad	Xico	6,885.91	1,090.91	33
90	Zacatecas	Zacatecas	9,564.23	2,480.00	35
91	Zamora	Zamora de Hidalgo	7,460.42	1,286.36	22
92	Zapopan	Zapopan	12,702.37	2,594.87	39
	MEANS & TOTAL		9,979.60	2,238.10	7,966

Table 5: Quality of Life Index for Mexico 2010

City	RANK-1	QLI-1	SD-1	RANK-2	QLI-2	SD-2	City (continue)	RANK-1	QLI-1	SD-1	RANK-2	QLI-2	SD-2
Campeche	1	1829.9	139.1	2	2774.4	117.5	Cuernavaca	47	754.1	129.7	5	2513.3	111.5
Acapulco	2	1725.7	113.0	4	2518.4	97.5	Navojoa	48	748.4	72.4	63	955.5	59.0
Xalapa de Enrqz	3	1675.1	139.1	12	1943.8	119.1	Chalco	49	746.7	89.1	71	875.5	77.1
Veracruz	4	1634.6	109.4	17	1783.0	91.4	Cuautitlan Izcalli	50	743.2	64.7	74	816.5	54.6
Villa de alvarez	5	1625.9	125.7	26	1554.3	104.8	Ciudad Victoria	51	724.7	90.0	50	1125.9	72.6
Tampico	6	1498.9	92.6	25	1588.8	74.1	Ciudad Obregon	52	701.4	50.8	43	1261.1	39.3
Poza Rica de Hidalgo	7	1473.3	115.7	15	1791.4	97.5	Uruapan	53	698.5	89.1	73	831.2	72.0
Tepic	8	1411.3	90.8	13	1854.5	71.6	Fresnillo de Glz Ech	54	686.4	100.3	20	1690.6	82.7
San Nicolas de los Garza	9	1401.0	98.8	9	2028.9	84.2	San Francisco Coacalco	55	682.6	82.7	68	906.3	69.3
Coatzacoalcos	10	1394.6	99.7	3	2583.5	83.2	Cancun	56	681.7	19.4	70	885.4	12.2
Altamira	11	1343.6	108.8	28	1517.3	93.6	Naucalpan de Juarez	57	677.1	64.9	64	946.2	55.6
Ciudad Madero	12	1324.4	68.4	18	1716.1	52.3	Gomez Palacio	58	672.2	90.8	65	933.5	74.3
Ciudad del Carmen	13	1274.5	86.9	14	1836.6	68.5	Chimalhuacan	59	654.2	82.6	59	977.1	69.6
Morelia	14	1269.2	93.4	7	2092.1	76.5	Pachuca de Soto	60	653.1	87.0	41	1290.7	71.6
Guadalupe	15	1241.0	101.2	37	1334.2	85.4	Aguascalientes	61	648.1	66.6	35	1347.1	50.6
Colima	16	1217.1	111.3	33	1381.2	89.7	Chetumal	62	646.7	90.9	76	769.7	74.9
Jiutepec	17	1190.7	123.6	10	2003.4	106.6	Celaya	63	605.6	114.1	39	1297.9	97.2
Villahermosa	18	1161.0	80.1	27	1523.5	66.4	Tlalnepantla de Baz	64	597.4	61.1	69	890.0	50.5
Torreon	19	1156.0	102.2	48	1148.8	85.3	San Cristobal de las Casas	65	595.8	68.1	46	1187.2	53.7
Tuxtla Gutierrez	20	1145.9	72.6	22	1607.1	59.6	La Paz	66	579.1	86.8	79	711.5	70.8
Puebla de Zaragoza	21	1117.1	88.7	16	1791.0	73.6	Monclova	67	576.8	62.2	78	718.4	45.7
Apocada	22	1107.1	83.5	21	1613.7	71.3	Salamanca	68	561.6	93.8	57	989.4	78.1
Iguala de la Independencia	23	1097.7	132.5	6	2297.8	110.9	Leon	69	557.8	63.2	38	1324.0	50.5
Los Mochis	24	1062.5	71.5	24	1595.0	58.4	Chihuahua	70	548.8	62.1	51	1079.5	50.6
Manzanillo	25	1046.9	97.4	40	1293.9	81.3	Nuevo Laredo	71	544.3	64.6	1	3946.9	52.0
Soledad de Graciano Sanchez	26	1031.5	70.5	67	908.7	56.2	Merida	72	533.8	98.7	55	1013.9	82.1
Chilpancingo de los Bravo	27	1019.3	74.8	11	1989.3	58.1	San Cristobal Ecatepec	73	502.5	77.6	84	573.5	64.6
Ciudad Valles	28	1017.5	110.3	45	1250.7	91.2	Queretaro	74	498.9	27.8	29	1462.2	22.8
Heroica Matamoros	29	1008.7	73.9	23	1604.8	59.5	Cuautla	75	458.9	80.6	32	1414.0	61.4
Nezahualcoyotl	30	1005.3	102.7	53	1070.3	87.0	Guadalajara	76	444.6	25.5	82	624.2	14.7
Heroica Guaymas	31	958.5	47.8	47	1156.8	38.4	Piedras Negras	77	406.3	54.5	85	496.4	38.8
Saltillo	32	954.6	93.8	42	1278.0	77.9	San Juan del Rio	78	401.6	55.5	8	2056.3	46.3
Mazatlan	33	945.7	69.0	44	1253.2	56.8	Reynosa	79	395.7	41.9	52	1072.0	30.7
Tlaquepaque	34	921.4	73.5	61	969.4	63.2	Irapuato	80	377.1	75.2	34	1354.3	62.7
Ixtapaluca	35	920.2	100.6	66	926.6	86.4	Victoria de Durango	81	369.9	105.1	80	688.1	86.0
Toluca	36	861.5	86.9	62	957.9	73.8	Zapopan	82	345.6	3.1	86	471.9	10.3
Monterrey	37	859.2	69.9	30	1455.4	56.9	Mexicali	83	327.6	82.6	83	620.0	68.0
Culiacan	38	851.9	46.9	19	1709.8	34.8	Ciudad de Mexico	84	276.9	11.9	81	662.2	3.4
Atizapan de Zaragoza	39	844.5	75.5	58	982.8	65.4	Ciudad Juarez	85	270.3	47.1	87	471.4	38.9
Cordoba	40	842.7	94.3	60	976.2	74.7	Ciudad Cuauhtemoc	86	175.2	63.7	89	144.9	49.8
Zamora de Hidalgo	41	838.1	83.6	49	1129.5	67.0	Zacatecas	87	150.7	64.8	72	841.3	49.1
Xico	42	838.1	93.2	54	1064.1	79.9	Ensenada	88	137.1	81.8	88	196.6	67.1
Tulancingo de Bravo	43	835.1	106.8	75	803.3	90.5	Tijuana	89	48.1	26.4	77	729.4	16.7
Tultitlan de Mariano Escobedo	44	828.5	70.4	56	1011.3	59.5	Nogales	90	-104.2	27.0	90	142.9	16.7
Hermosillo	45	781.5	34.1	36	1343.8	25.2	Ciudad Acuna	91	-205.4	47.7	91	-248.0	32.1
San Luis Potosi	46	773.4	92.9	31	1454.7	77.0	Oaxaca de Juarez	92	-1194.2	109.3	92	-880.4	92.0