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Title **Can Cities Manage Growth through Taxation?**

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Abstract

Local government policy often relies on taxation to address the central concern of ensuring municipal growth. This paper uses the Kosmont Cost of Doing Business rating compiled by the Rose Institute of State and Local Government called to discuss the effects of tax policy on growth. The goal of this paper is to use the spatial equilibrium model to estimate the correlation between the cost of doing business and certain basic observable outcomes. These outcomes are reflected in wage, population, and price levels. The underlying spatial equilibrium model leads to "deep effects" equations, which are used to connect these observable correlations to more tangible measures of growth. Through the deep effects equations, we analyze the effect of the cost of doing business on the productivity, amenities, and economic success of California's cities. We find that a higher cost of doing business does not lead to lower productivity and amenities, but rather improves amenities and maintains steady levels of productivity under a long-term equilibrium.

Introduction

Elected officials on the national scale face difficult political and legislative challenges, among which a prominent theme is economic prosperity. Economists labor at deriving the sources of success on the federal level and have produced highly insightful work to try to answer these questions. However, prosperity at the local level is often overlooked. Local governments are challenged to promise sound infrastructure and safe communities for their residents with tight funding and various social challenges in the way. To look at prosperity on a local level, one cannot apply the same thought as when examining national or international economics. Given the complexity of city dynamics, it is impossible to accurately gauge the effects of an independent variable on economic success by regressing against income per capita, as is usually done in simple economic analysis. City dynamics are based on feedback loops that economists have struggled to disentangle. At the local level, a city's prosperity fluctuates much more in tune with worker migration and changes in housing prices. The construction of new schools or better freeways can set into motion an influx of population, flooding the labor market, allowing businesses to lower wages or encouraging higher productivity. Overall, a single change sets into motion a series of events, many of which change with the results of another, and often with simultaneous causality (Storper 2010). The combined effects of all of these factors result in what we may call economic success.

The spatial equilibrium model and the developments by Rosen (1979) and Roback (1982) deliver a way to estimate the tangible effects of a single variable on observable outcomes despite the complicated systems involved. Research on "agglomeration economies" has helped us understand why and how increases in productivity or population occur in dense cities. Agglomeration economies form when business choose to "agglomerate" to collect the benefits of increased returns to scale and the positive externalities of tight networks on innovation and productivity (Rosenthal and Strange 2004). Although little of the research provides final answers for policymakers hoping to direct growth, the discussion can help us understand and dissect the findings of this paper. It seems that if local governments could understand the forces underlying agglomeration better, they could use its causes to affect growth. However, finding a jumping off point is difficult because of the tangled relationships in cities' feedback loops, as I mentioned before. For example, an improvement in local amenities can draw workers to live in a certain

city, but also make the cost of living higher due to high demand for housing, therefore driving demand for higher wages, and in turn, affecting a variety of facets of businesses' and workers' operations. Then, are workers drawn to the amenities or the higher wages? Which should local governments target in attempts to pass constructive policy? Most of the existing literature fails to answer such questions. Doing so would require a way to isolate the effects of a single change on variables of growth.

The most advanced work in explaining these dynamics is that of Glaeser and Gottlieb on which my study of California cities is based. Their work on the spatial equilibrium model allows for simultaneous causality that is multi-directional and constantly interactive. The spatial equilibrium model is the most elegant description of these complicated systems to date (Storper 2010). The remarkable aspect of this model is its result in "deep effects" equations. They provide rather concrete results relating to economic success. The central ideas of the spatial equilibrium model tie in with agglomeration because the model is based on disentangling the many forces at play within agglomeration economies. Through literature on agglomeration, we can set forth the causes and benefits of agglomeration, but only the model can reveal the tangible results of altering a single variable from city to city.

After solving the model for deep effects equations, we can use the results from simple linear regressions to produce easy-to-understand values that represent changes in non-traded goods productivity, traded goods productivity, and local amenities. I will elaborate on these areas later in this paper. The regressions involve regressing wage, population, and price levels against the chosen independent variable, in this case, the Kosmont Cost of Doing Business Cost Rating. Since most of the tax measures collected by the Kosmont Survey vary from city to city, my results could shed significant light on the impact of individual municipalities' choices. Significant results could alter how local government officials should think of tax policy. The interaction between government and economics on a local level may therefore become clearer and local policy can become more informed and influential.

Data Summary

The central source for data for the independent variable, the cost of doing business, is the Kosmont Cost of Doing Business Survey. The survey collects data on close to 350 cities, of which 246 cities are in California. Cities surveyed in California are chosen based on available information out of the 481 cities and towns in California. This means that the Survey is slightly biased toward larger cities. However, exclusion of small cities without data will slant our analysis of observed agglomeration forces toward larger cities rather than tiny towns, which serves the purpose of examining largely aggregated communities.

Table 1 below gives an overview of the characteristics of the basic data sets for 2005 and 2012. Housing prices, earnings, and populations all vary widely throughout the data set, showing the diversity of the selected cities. For the purposes of this study, I choose to focus on the cost of doing business according to the Total Index, which is a continuous index by which cities are then ranked into quintiles by costliness. Though we could use the Cost Rating (as in, 1 for a city with a "$" cost rating, as seen in Figures 1 and 2 of the Appendix), the data is unreliable, and showed significant differences from the results of the Total Index regressions. The reason for this discrepancy is likely that the Cost Rating gives a ranking based on quintiles, but the full data set from the Kosmont Cost of Doing Business Survey includes cities in and out of California. Therefore, many cities that were included in the construction of the quintiles were omitted from

this study, skewing the data for the Cost Rating variable. From now on, I will only discuss the results of the regressions on the Total Index.

Table 1. Summary Statistics for 2005 and 2012 Data Sets

2012 Obs.: 247	Median	Min	Max
Earnings	$35,453.35	$14,768 (San Luis Obispo)	$94,381 (Los Altos)
Housing Price	$372,721.34	$67,000 (Danville)	$2,050,000 (Beverly Hills)
Population	112,644	64 (Vernon)	3,857,786 (Los Angeles)
2005 Obs.: 114			
Earnings	$31,853.22	$16,734 (Chico)	$61,286 (Newport Beach)
Housing Price	$478,776.32	$207,000 (Glendale)	$1,095,000 (Newport Beach)
Population	182,631	61,408 (Folsom)	3,731,437 (Los Angeles)

Basic Methodology Overview

Glaeser and Gottlieb (2009) use three simple regressions that give the relationship between endogenous outcomes (population, wages, and price levels) and the cost of doing business to direct their analysis. They are simple linear regressions of population, wages, and price levels on the Total Index, which for our purposes is the single independent variable. We use these regressions to find the regression coefficients $\hat{b}_N$,$\hat{b}_W$, and $\hat{b}_P$ used in the "deep effects" equations given in (1), (2), and (3). I will explain these equations in more detail later. The regression coefficients are very basic representations of the effect of the cost of doing business (as defined by the Total Index) on population, wages, and prices, respectively. These basic representations might appear to give us an idea of what a high cost does to population levels, but in fact are too simple to give any real insight beyond in which *direction* high cost affects population, wages, and prices. We gain real insight from including the regression coefficients in our "deep effects" equations listed below.

The impacts of the cost of doing business on traded-sector production, non-traded production, and amenities are denoted δ_A, δ_H, and δ_θ, respectively. By using linear combinations of the coefficients from the regressions equations of population, wages, and price on the independent variable we can estimate the following equations:

$$\delta_A = \alpha\gamma\hat{b}_N + (1 - \alpha + \alpha\gamma)\hat{b}_W \quad (1)$$

$$\delta_H = \mu\eta\hat{b}_N + (1 - \mu + \mu\eta)\hat{b}_W - \hat{b}_P \quad (2)$$

$$\delta_\theta = (1 - \beta)\hat{b}_P - \hat{b}_W \quad (3)$$

This is the major contribution that Glaeser and Gottlieb take from the work of Rosen and

Roback. Earlier work had only looked at prices to infer the effects of location-specific characteristics, but the newer interpretations take into account the complex systems at work within cities, for example, accounting for the impact that amenities may have on income. The parameters alpha, gamma, mu and nu are given in the paper by Glaeser and Gottlieb, and are discussed in more detail below.

I applied the same analysis to the study over time. After taking the growth regressions, for which I measure the period from 2005-2012, the deep effects equations estimate the marginal impact of the cost of doing business on the change in productivity and amenities. The regressions are likewise simple growth regressions where the cost of doing business is the single independent variable upon which the growth rates of population, wages, and prices are regressed. There are two options in deciding how to represent the cost of doing business when analyzing change over the given time period. One option is to regress the growth rates of our observable outcomes against the initial Total Index in 2005, and see whether high costs in 2005 had resonant effects throughout the following seven years. The other option is to use the average Total Index over the timespan as the independent variable, which gives us a more balanced look at the effect of the cost of doing business on cities' growth.

Parameter Estimates Detail

Glaeser and Gottlieb provide parameter estimates for the deep effects equations (4) through (6). The parameter definitions are taken from Roback's original derivations. Under their assumption, $(1-\beta)$, which is the average share of household spending on housing is estimated to be 0.3. The parameter $\alpha\gamma$ is the share of non-traded capital in production. Its estimate is based on the assumption that labor's share in total output is about two-thirds. So, α, the share of capital in total output is presumably 1/3. The following given estimate for the share of non-traded capital in production is then about 0.1. Using estimations from Glaeser, Gyourko and Saks (2005), and Gyourko and Saiz (2006), Glaeser and Gottlieb conclude that μ is 0.6 and $\mu\eta$ is 0.3, where μ is the share of capital in the production of housing, and $\mu\eta$ is the share of non-traded capital. The parameter $\mu\eta$ reflects the share of non-traded capital used in the production of housing, and is estimated to be 0.3 based on an estimate taken from The parameter μ on its own is an estimator of the share of capital vs. labor in production.

Results

To understand the results of both the static regressions and the growth regressions from 2005 to 2012, it is simplest to look first at the results of the "deep effects" equations in each case.

Results for Growth Analysis, 2005-2012

The deep effects equations for the growth regressions did not show any statistically significant results. The results for the estimations of Δ_A, Δ_θ, and Δ_H (growth of traded goods productivity, amenities, and non-traded goods productivity, respectively) are shown in Table 2 below. Overall, trends show that an increase in the cost of doing business corresponds with slowed growth in productivity of both the traded and non-traded goods sectors. An increase in the cost of doing business also seems to correlate with an increased growth rate of local amenities. These results are directionally consistent with the results of the static regressions, as I

will explain later. However, the lack of statistically significant results implies that over the seven years for which data was available, higher costs of doing business showed no verifiable impact on the growth rates of wages, population, or prices, nor on growth of amenities or productivity. So, in the following discussion, we can assume that California cities stayed at a long-term equilibrium for the entire term in question.

To see the detailed results of the growth regressions used to calculate the deep effects below, please refer to Figure 3 of the Appendix.

Table 2. Results Predicting Effects on Amenities and Productivity

Growth Deep Effects Results	Δ_A	Δ_θ	Δ_H
Average Index	-0.000038	0.00031	-0.0011
St. Error	(0.0003)	(0.0005)	(0.001)
T-stat	-0.13	0.62	-1.10
Initial 2005 Index	-0.00004	0.00115	-0.00421
St. Error	(0.0008)	(0.0013)	(0.0028)
T-stat	-0.05	0.88	-1.50

Note: *** denotes statistically significant at the 1% level, ** denotes significant at 5%, and * significant at 10% level.

The growth regressions showed that a higher cost of doing business (whether average or initial) has no significant impact on the growth of amenities or productivity, implying that cities remained at equilibrium for the seven years in question. Note that traded goods productivity is denoted by the subscript A, non-traded goods productivity, by the subscript H, and local amenities, by θ.

Results for Individual Years 2005 and 2012

Table 3 below shows the calculated effects of the cost of doing business (Total Index) on δ_A, traded goods productivity, δ_θ, local amenities, and δ_H, non-traded goods productivity for 2005 and 2012. The results for 2012 were most significant and interesting: As the cost of doing business increased across cities, local amenities improved with a coefficient of 0.00221, statistically significant at the 1% level. This implies that when higher taxes were collected, the revenues went toward improvements in amenities. While this is an interesting effect, it may also simply be showing a trend in local government spending. The relationship between the improvement on amenities and the changes in productivity levels provides further insight.

Neither the exhibited decrease in traded goods productivity nor the increase in non-traded goods productivity was statistically significant and the magnitudes were almost four times smaller than that of the effect on local amenities. This signifies that increasing the cost of doing business, interpreted as higher taxes from city to city, improves local amenities, but has no significant impact on the productivity of businesses. This trend occurs despite the intuition that higher taxes would restrain production by raising costs for local businesses. To better understand this result we can refer to the original regression coefficients from Figure 4 in the Appendix, which shows the effects of the cost of doing business (both as a Total Index and as the discrete Cost Rating) on the log of wages, population and housing prices.

Table 3. Results Predicting Effects on Amenities and Productivity

Static Deep Effects Results	δ_A	δ_θ	δ_H
2005	0.0003	0.0033*	0.005*
St. Error	(0.002)	(0.002)	(0.0029)
T-stat	-1.50	1.65	1.72
2012	-0.0007	0.00221***	0.0006
St. Error	(0.0006)	(0.0008)	(0.0013)
T-stat	-1.17	2.76	0.46
2012 Truncated	0.00	0.0007	0.0013
St. Error	(0.0007)	(0.0014)	(0.0009)
T-stat	0.00	0.50	1.44

The deep effects equations show that contrary to my hypothesis, all of these forces do not drive down productivity, but rather improve amenities without significantly disturbing the spatial equilibrium. More people appear to live in more costly cities, despite higher taxes. We can look to the 2012 regressions of wage, population, and prices on the Total Index, which can be found in Figure 4 in the Appendix, to further analyze these results. As the Total Index increases, wages decrease by 0.2%. Additionally, as the Total Index increases, population increases by 0.9%. These results are statistically significant. From these results, we expect that the taxes levied on businesses push business owners to lower wages, and somehow simultaneously draw people to live in the surrounding areas. Housing prices also appear to be higher in high cost cities, though the respective coefficient is not statistically significant. These results support the idea that in agglomeration economies, people accept higher costs to draw benefit from positive effects of agglomeration, and in this case, specifically from improved amenities.

While higher taxes might be expected to hurt businesses' welfare, the deep effects equations suggest that despite increased taxes, productivity remains stable, and while wages are lower, workers and businesses do not leave. From the business side, this suggests that businesses can afford to offer lower wages in higher cost cities because by paying the increase in taxes, they are essentially buying the life satisfaction of their workers by improving local amenities through government. Businesses lower wages to cover the increased costs. This could be how businesses are able to maintain the same levels of productivity – by the external satisfaction of their workers and by mitigating increased costs.

In 2005, similar directional effects were observed in the data. The static regressions for 2005 showed results similar to the 2012 results, all found in Figure 4. Wages decreased by 0.3% with an increase in the Total Index, although not statistically significant, and population increased by 2.7% at the 1% significance level. Housing prices increased by 0.1% but not at a statistically significant level. These similar effects suggest that the patterns found in the 2012 static regressions can be applied to the results for 2005.

We find that in the 2005 data, the coefficient on traded sector productivity shown in Table 3 above is positive instead of negative, but again, it is not statistically significant, so we can disregard it. The coefficient on local amenities, which was so strong in the 2012 data, is only 0.0033 in the 2005 data, but still significant at the 1% level. The coefficient on non-traded goods

production is statistically significant at the 10% level here, where it was not statistically significant before. The coefficient on non-traded goods productivity is 0.005, and the coefficient on amenities is 0.0033. It appears that for 2005, an increasing cost of doing business meant improvements in local amenities, similar in magnitude to the improvements in non-traded goods production. Generally, this means that levying higher taxes on businesses in 2005 corresponded with better amenities and growth in non-traded goods. Non-traded goods in this case could include businesses in the service industry or goods that are physically not tradable. This adds another layer of discussion to the previous findings for the year 2012. Supposing that the positive increase in non-traded goods production had been statistically significant in 2012, we could say that increases in amenities go hand in hand with increases in productivity in the non-traded sector when higher taxes are levied on businesses.

To better understand this potential relationship, we can assume for argument's sake that the correlation does exist overall and that the rise in amenities and non-traded goods productivity are in fact connected. A generalization might be that for non-traded goods, which mostly consist of services, improved amenities contribute to more appealing store fronts or more draw to "tourist" consumers. This works for drawing prospective residents into homes, which are considered non-traded goods, but does not work for electricity generation or concrete manufacturing, both of which are examples of non-traded goods that do not obviously benefit from improvements in amenities. Supposing that housing makes up a significant portion of a given city's non-traded goods sector, as could potentially have been the case for a number of cities in 2005, the improvements in amenities could have inspired population migration into town and thus spurred construction of homes, bringing a rise in non-traded goods production.

However, the lack of statistical significance of the coefficient on non-traded goods productivity for 2012 signifies that the only sure relationship in the results of the static regressions is the correlation between higher taxes and better amenities. The variation in results between the 2005 and 2012 non-traded goods coefficients could be related to the fact that the 2005 data set only contains data on cities larger than 65,000. To be certain of the validity of the use of the entire 2012 data set, we can test the results of regressions on a truncated 2012 data set for similarities. In Figure 4, we see the results of a static regression on 2012 cities with populations greater than 65,000, therefore excluding cities unaccounted for in the 2005 data set. The results of the static regressions on the truncated data set show the same directional effects as the full set. The coefficient showing a 0.8% increase in population is significant at the 1% level. Similar to the results of the 2005 static regressions, the coefficients on changes in housing prices or wages show no statistical significance. However, directionally, all results reflect the same changes as the regressions on the full 2012 data set. The deep effects equations' results, as shown in Table 5, have no statistical significance, though they reflect the directional implications of the results of the deep effects equations for the full data set. Therefore, we find that the use of the full 2012 data set is in fact appropriate for increased statistical significance.

Conclusion

My results showed that although higher taxes did not harm productivity as expected, the pursuant effects adhered to the theories supporting the existence of agglomeration economies. While California cities appeared to stay at equilibrium for the years 2005-2012, increases in the cost of doing business showed improvements in amenities and sustenance of productivity. Given the results of the 2005 regressions, it is also possible that improved amenities accompany

increased productivity in the non-traded goods sector; however the results were not conclusive.

Interpretation and Context

This is an interesting finding for California's local governments since a majority of the taxes for which information is collected in the Kosmont Cost of Doing Business Survey vary from city to city. My results suggest that governments can afford to raise taxes on businesses (if the government spending goes to improved amenities) without stifling productivity or population growth. Additionally, increases in taxes should result in no significant perturbations of the spatial equilibrium over time for a period of less than or equal to seven years. The condition specifying spending on amenities exists only because, according to my data, this has been the trend in the past seven years, and such behavior would produce the apparently stable effects seen in my analysis.

On a consumer side, the high population levels and high housing prices in high cost cities under equilibrium are interesting. Despite higher taxes, these two effects are strong. One would expect that consumers must show some signs of reacting to higher taxes. These signs may be reflected in the lack of increased production in high cost cities. It is possible that the taxes levied on individuals are reflected in lower consumer demand for local goods, which would explain the slowdown in local production. Productivity does not increase, as would be expected in an agglomeration economy with increasing returns to scale. Since these results do not adhere strictly to what the theory of agglomeration would dictate, the results of this study must have found the direct effects of higher taxes on productivity, without just picking up agglomeration effects. The effects of taxes on productivity, in this case, cannot be misattributed to agglomeration.

As a result of the observed effects of higher taxes, local governments should be prepared for increased taxes to directly create higher costs for businesses. Then, depending on the behavior of firms, this could result in lower wages or layoffs. Here we see the higher costs reflected in lower wages. Additionally, local government officials should note that although productivity seems not to suffer, it also does not improve.

In further work, this study would be improved by solving the underlying model for deep effects equations taking agglomeration forces into account. The parameter values to make this possible are given in Table 2 of Glaeser and Gottlieb, but the solution of the model is reserved for higher level work. Without the built-in agglomeration effects, we can try to estimate how much of the observed coefficients stem from agglomeration forces. Thus, the analysis relies on what we already know of agglomeration economies. With agglomeration built into the model, we could have a more direct understanding of the effects of the cost of doing business on economic success.

Threats to Validity

One major flaw partially in the model and partially in my selection of data could compromise the significance of my results: In urban areas like Los Angeles and San Francisco, cities are often clustered and share communal spaces between residents of all surrounding areas. Additionally, workers often commute across cities between their workplaces and their homes. I suspect that this is why the 2012 data set including many small cities did not negatively affect the validity of the study: Because the small cities in question may have been located between a number of other small cities in the suburbs of Los Angeles. One way to solve this problem would have been to choose cities across many states and further than some minimum distance apart

from one another. However, a study on that sample of cities would have had to take into account a wide variation of state income taxes and sales taxes, which would have added an entirely new element of analysis to my results. Additionally, data for taxes is only sparsely available for cities outside of California. More thorough data would have to be assembled manually by calling local government offices, as the extensive California data was collected. Such a study would be implausible and likely too far-reaching to reach conclusive results for answering questions about local businesses' interactions with government.

However, considering the effects of this complication of the results, it is possible that the general conclusions are not compromised. Let us assume the cities do interlace with one another. Then the findings described earlier in my conclusion hold for a single city. We know that population is increasing and housing prices are similarly increasing (which I have tied to the improvement of amenities) but productivity remains the same. It is then possible that high cost cities with the characteristics mentioned above have high populations because of the following scenario: A worker may work in one city, but can choose to live in a number of cities neighboring the city where they work. Therefore, as workers adjust their locations to ideal amenity levels and make movements accordingly, they may keep the same job all along. Thus productivity may remain steady across varying cost levels because the real important choice for the worker is the place where they live, in addition to reasons already discussed. This idea further supports the theory of the benefits of agglomeration, since it assumes that workers will relocate for amenities and other positive agglomeration benefits rather than for wages. Therefore, the clustering of multiple cities may account for the steadiness in productivity.

An inherent problem in conducting a study like this one is the causality between the cost of doing business and the quality of amenities and productivity. As has been noted many times in this paper, causality is simultaneous and multi-directional in the spatial equilibrium model, and therefore will always be difficult to disentangle. It is possible that some endogenous relationships should be acknowledged between the cost of doing business and improvements leading to municipal growth. However, in any study of spatial dynamics of this kind, this causality problem is bound to exist. The only effective way to get around it is to discuss the possible occurrences of reverse causality or feedback loops, and acknowledge them in the construction of future models. For example, it may be important to note that cities with great amenities and prosperous production will likely impose higher costs because the economic success in the city allows for higher levels of taxation without negative effects. This would feed back into the results found here, giving the false appearance that taxes have seemingly no effect on productivity and only positive effects on amenities, when in reality, governments are simply responding to the ability to charge a higher premium of residents and businesses in their cities without economic change. The best that this discussion and my prior results can offer is a clear picture of the effects of instituting a change in the cost of doing business, despite the surrounding complicated dynamics at work. While the causes, as always, remain unclear, local governments may now have some agency in managing and understanding municipal growth.

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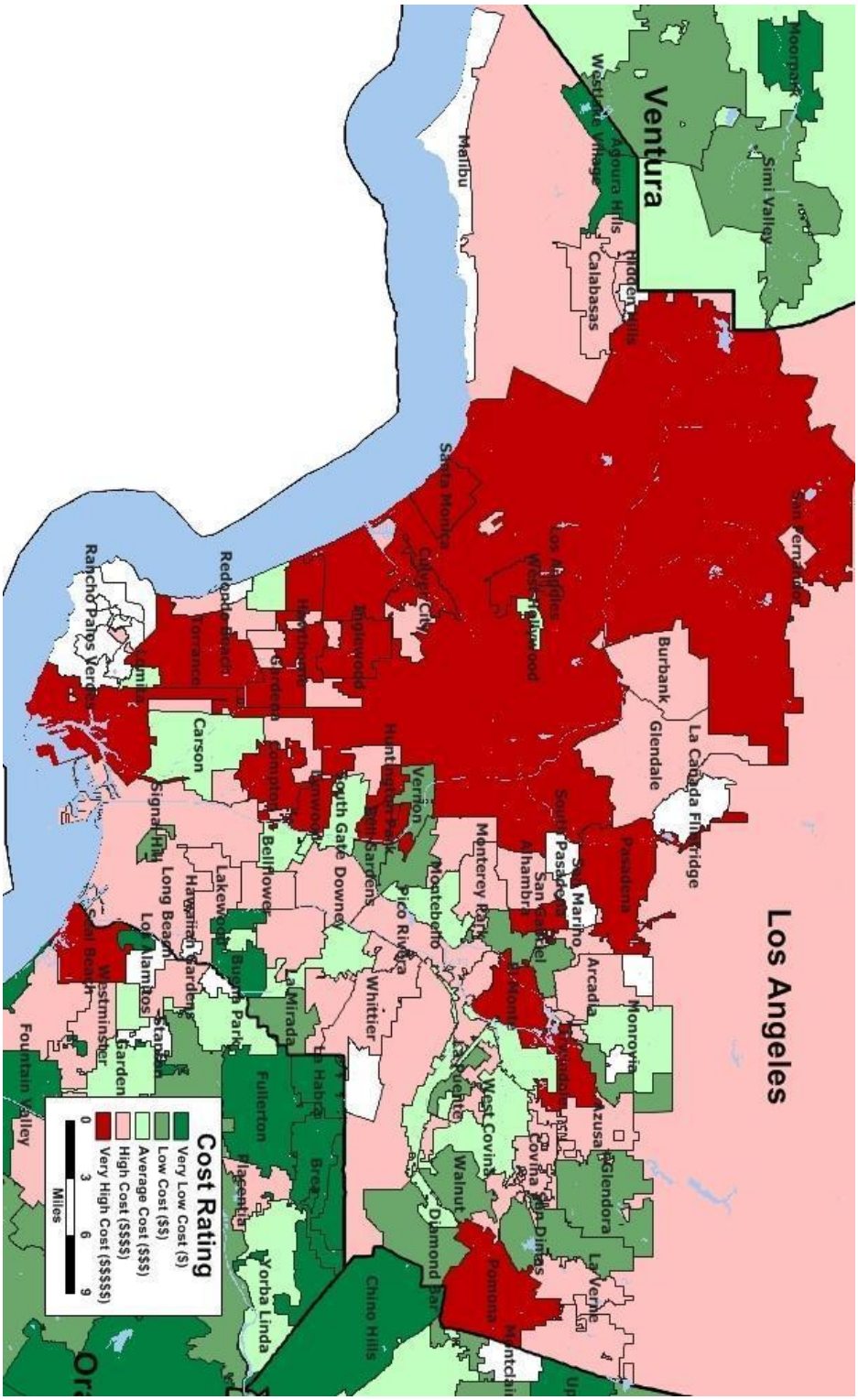
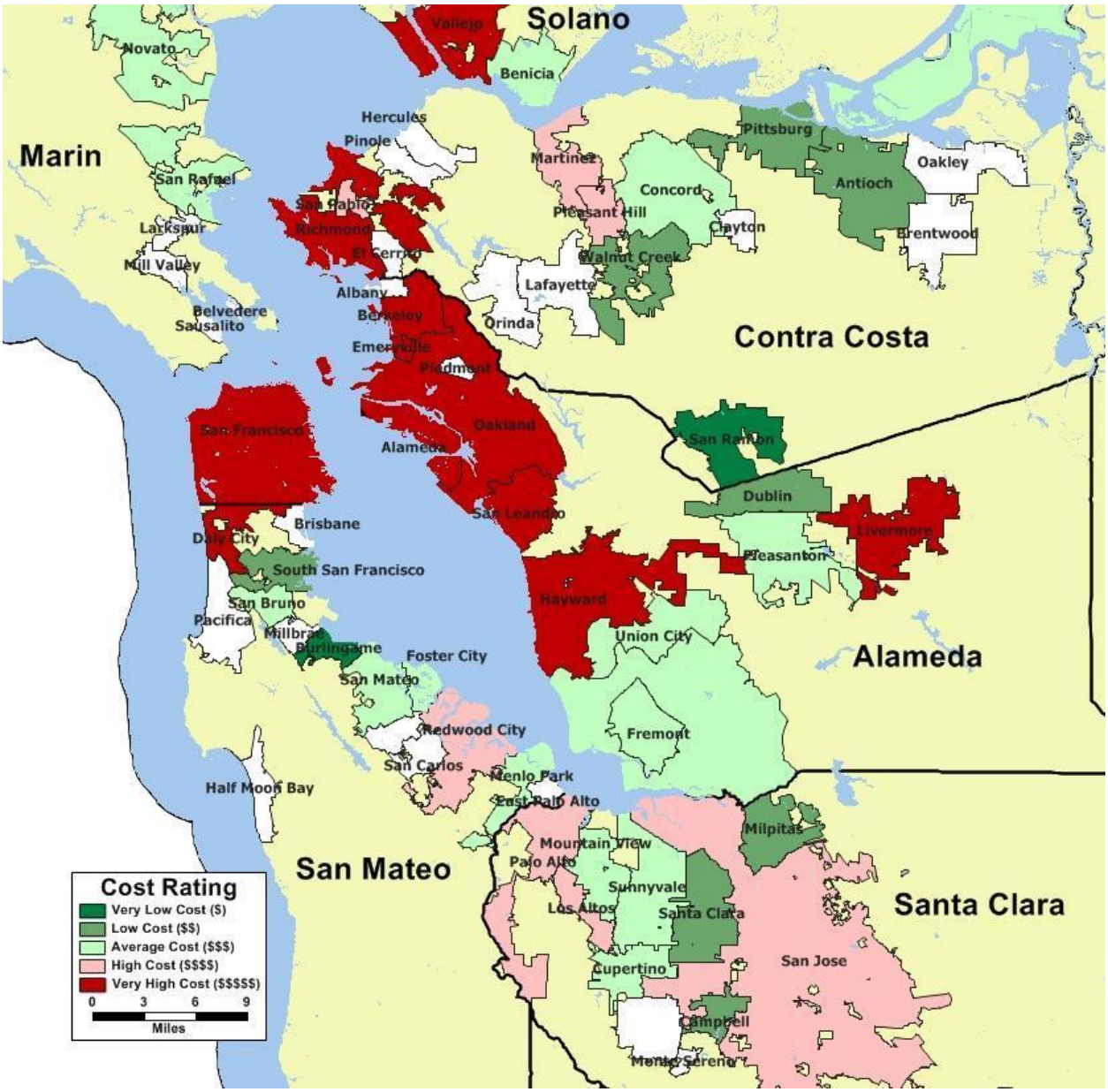
Appendices

Figure 1. Descriptive Map of Los Angeles County Cost Ratings for 2012



Source: Rose Institute of State and Local Government, Kosmont Cost of Doing Business Report

Figure 2. Descriptive Map of San Francisco Bay Area Cost Ratings for 2012



Source: Rose Institute of State and Local Government, Kosmont Cost of Doing Business Report

Figure 3. Six Regressions Measuring the Effect of the Average Total Index or the 2005 Total Index on Growth of Wages, Population and Prices

	Dependent Variable:	$\text{Log}(\frac{\text{Wage 2012}}{\text{Wage 2005}})$	$\text{Log}(\frac{\text{Pop 2012}}{\text{Pop 2005}})$	$\text{Log}(\frac{\text{Housing 2012}}{\text{Housing 2005}})$
Average Total Index	Coeff.	-0.00001	-0.0003	0.001
	Std. Err.	(0.0004)	(0.0003)	(0.001)
	Intercept	0.0387	0.104	-0.637
	R^2	0.00001	0.006	0.019
Initial Total Index '05	Coeff.	0.00005	-0.0008	0.004
	Std. Err.	(0.001)	(0.0008)	(0.0027)
	Intercept	0.031	0.159	-0.89
	R^2	0.00001	0.009	0.021

The growth regressions above show that as the average cost of doing business over 2005-2012 increases, the wage growth rate decreases, the population growth rate decreases, and the growth rate of housing prices increases, though none of the results are statistically significant. When regressing on the 2005 Total Index rather than the average, the results are slightly altered, but within the standard error of the coefficients on the Average Total Index. This discrepancy is resolved in the analysis of the deep effects equations found in Table 5.The lack of statistical significance relies minimal change over time and adherence to a long-term equilibrium.

Figure 4. Nine Linear Regressions Measuring the Effect of the Cost of Doing Business Total Index or the Discrete Cost Rating Variable on Wages, Population, and Prices

2005

	Dependent Variable:	Log(Wage)	Log(Population)	Log(Housing Price)
Total Index '05	Coeff.	-0.003	0.027***	0.001
(continuous)	Std. Err.	(0.002)	(0.005)	(0.002)
	Intercept	10.71	8.68	5.95
	R^2	0.016	0.173	0.003
				2012
Total Index '12	Coeff.	-0.002***	0.009***	0.0007
(continuous)	Std. Err.	(0.0007)	(0.002)	(0.001)
	Intercept	10.65	9.99	5.67
	R^2	0.028	0.059	0.001

2012 Truncated

Total Index '12	Coeff.	-0.001	0.008***	0.001
(continuous)	Std. Err.	(.0008)	(0.002)	(0.001)
	Intercept	10.54	10.74	5.55
	R^2	0.019	0.164	0.008

Note: *** denotes statistically significant at the 1% level

The Total Index regression results for 2005 show that wages decrease, population increases, and housing prices increase with increases in the cost of doing business, though only the coefficient on population is statistically significant. The 2012 regressions show significant results for the regressions on wages and population, with the same directional effects as the 2005 regressions. The regression omitting cities not found in the 2005 data set shows the same results as the full 2012 regression, so I find that it is appropriate to use the full 2012 data set for levels analysis.