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DO LOCATION-BASED TAX INCENTIVES IMPROVE QUALITY OF LIFE AND QUALITY OF BUSINESS ENVIRONMENT?*

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ABSTRACT. We examine how location-based tax incentives affect quality of life and business environment through changes in property values and equilibrium wages. Using the federal Empowerment Zone program, we determine whether offering tax incentives to firms improves the welfare of the citizens and attractiveness to firms. We demonstrate that quality of life methodologies can be applied using small geographically aggregated data, such as census block groups. We find that the tax incentives offered by the program notably enhances the quality of business environment for firms in the area while modestly improving the quality of life for the individuals living in the area.

1. INTRODUCTION

Faced with economically distressed areas, state and local governments often attempt to improve economic conditions by offering location-based tax incentives in an attempt to lure business activity to the declining areas. We study the effectiveness of these tax incentives at improving the quality of life and quality of business environment in these distressed areas by analyzing the federal Empowerment Zone (EZ) program, which is the largest tax incentive program focused on redevelopment with a value estimated by the U.S. Department of Housing and Urban Development of $11 billion. In a 2002 joint letter to President George W. Bush, Senator Rick Santorum and Congressman J.C. Watts, Jr. stated that the goal of the EZ program is

> "... to create an environment that enables distressed urban and rural communities to have hope for the future through economic and social renewal. Our belief is that when private industry flourishes in these communities, it directly, and positively, impacts peoples' lives." (p. 1)[1]

Because policy makers increasingly rely on location-based tax policy to revitalize and improve the lives of the residents in declining areas, one questions the effectiveness of these location-based policies at improving the areas for residents and businesses (see Glaeser and Gottlieb, 2008).

Identifying whether an area has improved following a policy intervention is often complicated due to the lack of a clearly defined outcome to measure such improvements.

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[1]See U.S. Department of Housing and Urban Development, "Questions and Answers on Renewal Community and Empowerment Zone Tax Incentives," at http://www.hud.gov/offices/cpd/economicdevelopment/programs/rc/index.cfm

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Typically, the literature has looked at specific outcomes that represent changes in the welfare of individuals or the profits or productivity of firms such as business activity (e.g., Elvery, 2009; Neumark and Kolko, 2010; Hanson and Rohlin, 2011; Busso, Gregory, and Kline, 2013), unemployment (e.g., Oakley and Tsao, 2006), and poverty rates (e.g., Hanson, 2009; Krupka and Noonan, 2009; Busso et al., 2013). We attempt to complement this literature by using the quality of life methodology to analyze changes in the measured quality of life and business environment.

Researchers have been interested in measuring the quality of life across areas for quite some time (e.g., Graves, 1976) and the theoretical and empirical framework for the quality of life methodology employed in this paper was originated by Roback (1982) and Blomquist, Berger, and Hoehn (1988). This research assumes that local quality of life is related to location-specific amenities, some of which may be unobserved or unmeasured by the researcher. Instead of direct measurement of an incomplete set of amenities, the methodology attempts to estimate how the value of the local amenities are captured in local wages and housing costs. This approach argues that individuals in locations with superior amenities must purchase these additional amenities by paying a larger proportion of income in housing expenses, net of the individual characteristics of workers and housing across locations. This work has been expanded by Gyourko and Tracy (1991) who argue that the set of location-specific amenities include not only pure amenities but also local fiscal policies.

More recently, Albouy (2008, 2010, 2011) has updated the methodology to account for a variety of factors not previously considered including federal taxes, nonwage income and the proportion of household income spent on housing. He demonstrates that failing to account for such factors produces implausible estimates of quality of life, for example, estimates suggesting that large cities have lower amenities. This literature has also been extended by Gabriel and Rosenthal (2004) to estimate location-specific business amenities. They argue that businesses would be willing to pay more in labor and capital costs to locate in areas with higher unobserved productivity, referred to as having a higher quality of the business environment.[2] Thus, these measures may capture changes in how individuals and businesses value a location that otherwise may not be fully captured using specific outcomes.

The difficulty with using the standard quality of life methodology in a spatial framework is the need to use individual-level data to estimate the wage and rent hedonic regressions. Due to confidentiality concerns, most publically available individual-level data release the geographic details only at large scale, such as at the level of the MSA.[3] Therefore, the standard quality of life approach can only be conducted on these large geographic units. In order to study the EZ program, which is defined by sets of census tracts within a city, we utilize an alternate data source. We demonstrate that using aggregated data, such as census block groups or tracts, yields similar findings in the quality of life framework as when using individual-level data.

After demonstrating that small geographically aggregated data can be used within the basic quality of life methodology we then apply the data and methodology to estimate how location-based tax policies affect average local quality of life and business environment. We utilize the federal EZ program as a quasi-natural experiment to compare how

[2]The quality of business environment methodology attempts to measure the productivity of local amenities of an area. Although studying area-specific productivity has been an important and growing area of research (i.e., Rauch, 1993; Ciccone and Hall, 1996; Partridge et al., 2010) finding productivity measures at small-geographic scales remains difficult.

[3]Geographically detailed individual-level census data are available at specific Census Research Data Centers but are restricted and can be difficult to obtain.

quality of life and quality of business environment changes between 1990 and 2000.[4] In our analysis of the program, we use as a comparison group those areas that applied and met the specific requirements for the program, but which did not receive EZ designation. These areas have been used previously in the EZ literature as comparison areas (e.g., Busso et al., 2013; Hanson, 2009; Hanson and Rohlin, 2011; Montgomery, 2011). We calculate the quality of life and business environment using 1990 and 2000 Census block group data across the areas and then use a difference-in-difference approach, using 1990 and 2000 Census block group data, to determine whether areas that received EZ status experienced different changes in quality of life and business environment than areas that applied and qualified for the program but did not receive the generous tax incentives. Recent research has questioned the validity of the comparison group because of observed differences between the areas. For example, Busso et al. (2013) use a propensity score reweighting scheme to account for differences between the areas that received EZ designation and those that did not. Our methodology provides an alternative way of controlling for these differences because the hedonic regressions used to calculate quality of life account for differences in observable characteristics between the treatment and comparison areas. As we will demonstrate later our approach produces similar estimates to the Busso et al. (2013) reweighting scheme.

This paper makes three contributions to the literature. First, we demonstrate that data aggregated over small areas can be used to analyze quality of life issues. This will allow researchers to estimate quality of life and business environment at a smaller geographic scale than previously estimated, such as within a city, without restricted-access data. Second, we add to the literature that studies policy interventions and quality of life by demonstrating a different approach for evaluating geographic-based policies. Lastly, by applying the quality of methodology to the EZ program we provide additional evidence about local effects of the program.

Using our methodology, we find evidence that residents in EZ areas on average experienced slight quality of life improvements relative to the comparison areas and the rest of their city. We discover that the EZ redevelopment policy considerably improves the quality of the business environment of the areas on average. Because we are concerned about preexisting trends we conduct a robustness check using the decade before the program began. We find evidence of both overall downward trends in those areas later selected for the EZ program as well as downward trends relative to those areas that also applied but were not selected for the program. These trends suggest that any estimates that do not account for these preexisting trends will be negatively biased and any positive effects of the program will be underestimated. We also conduct a sensitivity analysis to identify how much of the changes in quality of life and business environment are likely due to increases in pure amenities instead of the fiscal amenity in the form of the wage credit. While there is some heterogeneity in program implementation and variation in outcomes across EZ cities, we find evidence that support the idea that location-based tax incentives tied to land improves the area's quality of life and business environment in the form of pure amenities. These results are suggestive that, beyond the simple monetary value that individuals and firms receive directly from the policy intervention, the EZ program

[4]There has been additional analysis using state EZ programs (e.g., Papke, 1994; Boarnet and Bogart, 1996; O'Keefe, 2004; Bondonio and Greenbaum, 2007; and Neumark and Kolko, 2010) with some recent evidence suggesting that the effects of the federal EZ program could be larger than the state programs (Ham et al., 2011). The approach that we demonstrate could be used to study state EZ programs. For a recent review of this literature, organized by empirical methodology, see Arauzo-Carod, Liviano-Solis, and Manjon-Antolin (2010).

actually changes the underlying amenities of the EZ areas which could be important for the long-term success of the program.

The remainder of the paper begins with a more detailed discussion of the quality of life methodology and the use of aggregated data relative to individual-level data in the quality of life framework. Section 3 begins with a discussion of the EZ program and its advantages as a redevelopment policy and then presents our estimates of the program impacts on local quality of life and quality of business environment. The final section concludes.

2. MEASURING QUALITY OF LIFE AND OF BUSINESS ENVIRONMENT

We propose using the quality of life methodology to construct outcomes that can be used to evaluate location-specific policy interventions, in our case the federal EZ program. We begin by describing the basic methodology used in the quality of life literature before contrasting it with the approach that we undertake. We present a simple model that is broadly consistent with the previous literature (see Blomquist et al., 1988; Gabriel and Rosenthal, 2004; and Albouy, 2008, 2010, 2011) and assumes that the geography is populated by identical workers and firms who are perfectly mobile. Workers are assumed to supply a single unit of labor and are paid a local wage w_j that varies across locations ($j = 1, \ldots, J$). The rental rate of land (r_j) also varies across locations. Both w_j and r_j are normalized relative to a reference location. Locations also vary in their quality of life, Q_j^L, and quality of business environment, Q_j^B, which is a function of a vector of local amenities A_j. Such amenities may include climate or cultural attractions for individuals and access to natural resources or distance to consumer markets for firms. Additionally, this vector may include local fiscal policies (Gyourko and Tracy, 1991), an amenity that we consider explicitly in our application in this paper. Importantly, instead of attempting to measure each potential amenity, many of which are unobserved by the researcher, the approach that follows attempts to capture all of the possible local amenities as they are reflected in equilibrium wages and housing costs.

A spatial equilibrium occurs when workers and firms sort themselves across locations until utility (u) and profits (π) are equalized as

$$\bar{u} = u(w_j, r_j | A_j), \tag{1}$$

$$\bar{\pi} = \pi(w_j, r_j | A_j), \tag{2}$$

and the population across geographic areas sums to the total population. We can assess the value that individuals place on amenities in location j by totally differentiating the indirect utility function of individuals. Rearranging terms produces the standard quality of life measure

$$Q_j^L = r_j - w_j, \tag{3}$$

which is interpreted as the amount of real income that individuals would be willing to pay in housing costs to live in location j, relative to some reference location (typically the hypothetical average location). Alternatively, Q_j^L can be interpreted as the value of the local amenities purchased by households out of wage income, thus higher values of Q_j^L reflect higher local amenities.

Similarly, Gabriel and Rosenthal (2004) consider how the value of local productivity-enhancing amenities to firms are reflected in the prices of input markets, what they call the quality of business environment. The authors derive the value that firms place on the amenities in location j by totally differentiating the profit function of the representative firm and rearranging to get

$$Q_j^B = r_j + w_j, \tag{4}$$

which represents a measure of the local quality of business environment. Equation (4) is interpreted as the additional costs that a firm is willing to incur to purchase the amenities in location j relative to some reference location. In a spatial equilibrium, if an area has a high level of productivity-enhancing amenities then firms would be willing to pay higher costs to locate in that area.

To produce estimates of these measures, the previous literature estimates hedonic wage and housing cost regressions separately given by

$$\log(w_{ij}) = \alpha^w + \beta^w X_i^w + \phi_j^w + \varepsilon_{ij}^w, \tag{5}$$

$$\log(r_{ij}) = \alpha^r + \beta^r X_i^r + \phi_j^r + \varepsilon_{ij}^r, \tag{6}$$

where w_{ij} is the annual wage or salary income and r_{ij} is the annual housing cost of worker i in location j, X_i^w is a vector of individual characteristics of the worker, X_i^r is a vector of characteristics of housing units, and ϕ_j^w and ϕ_j^r are location fixed effects. In this specification, ϕ_j^w is interpreted as the causal effect of living in location j on wage income of worker i. Similarly, ϕ_j^r is interpreted as the causal effect of living in location j on housing costs of worker i. Albouy (2008) argues that the housing cost and wage fixed effects used to construct the quality of life estimate need to be weighted to produce accurate estimates across locations.[5] We follow Albouy in constructing the quality of life estimate as

$$\hat{Q}_j^L = 0.33\hat{\phi}_j^r - 0.51\hat{\phi}_j^w. \tag{7}$$

The weight on the housing cost fixed effect reflects the fact that housing costs account for only a portion of the total expenditures associated with living in a location. Similarly, the weight on the wage fixed effect reflects the fact that wage income is only a portion of total household income, as well as further accounting for the role of federal income taxes, since households spend housing costs out of after tax income.[6]

As in Gabriel and Rosenthal (2004), the location fixed-effects in equations (5) and (6) can also be used to measure the quality of business environment as

$$\hat{Q}_j^B = \hat{\phi}_j^r + \hat{\phi}_j^w. \tag{8}$$

Note that, as in the previous literature (Gabriel and Rosenthal, 2004; Chen and Rosenthal, 2008), $\hat{Q}_j^B$ is estimated using the fixed effects from the housing hedonic (equation (6)). As discussed in Gabriel and Rosenthal (2004), business rents are often

[5] Albouy and Lue (2011) propose further adjusting the quality of life measure to account for differences in commuting costs. We do not make such an adjustment in our analysis primarily because commuting costs and times, particularly in urban areas, depend on access to public transportation and highways which can be viewed as local amenities and therefore we do not want to explicitly control for them. Directly controlling for commuting times does not substantively affect the results.

[6] The EZ areas, which are relatively poor, generally have both a lower federal tax burden but also pay relatively higher proportions of income into housing than the rest of the United States. To the extent that this is true, Albouy's weighting scheme may underweight both housing costs and wage income in equation (7) for EZ areas. We use these weights for similarity to the previous literature and because we incorporate non-EZ/non-EC areas in our analysis. Estimates suggest that the use of these weights may cause us to slightly underestimate increases in quality of life in EZ areas but the magnitude of the changes are not large.

not available in datasets so residential rates are frequently used as a proxy. We face the same data limitation and therefore we follow the previous literature and use residential rental rates as a proxy for business rents in equation (8).

Traditionally in the literature, equations (5) and (6) are estimated with individual data such as the decennial Census (Blomquist et al., 1988; Albouy, 2008, 2010, 2011) or Current Population Survey (Roback, 1982; Gabriel and Rosenthal, 2004) and American Housing Survey (Gabriel and Rosenthal, 2004). However, in many of these large individual-level datasets, small geographic areas are not identified in public-use samples to protect confidentiality. For example, the decennial Census does not identify any geographic area with fewer than 100,000 individuals in public-use data (referred to as Public-use Microdata Areas [PUMAs]).[7] This large-geographic scale identification limits the usefulness of the quality of life methodology for studying the effect of policy interventions on quality of life. Unfortunately, policy interventions that occur at the subcity level are not typically identifiable without access to restricted data sources.

We propose to overcome this limitation by using small area aggregations from individual data, in particular census tract and block group data which can be mapped to other geographic units using either Census-provided geographic data or using geographic information system software. Block groups are the smallest level of geography at which the selected individual and household characteristics necessary for estimating equations (5) and (6) are aggregated in public-use data from the Census and will be our main source of data in our policy application.[8] The obvious advantage of using these data is that researchers can estimate traditional measures of quality of life in small geographic areas not identifiable in public-use individual data, including intra-city areas where policy interventions may occur or small cities not previously considered.[9]

Block group data have not been used previously in the quality of life methodology and whether such data can be utilized is not *ex ante* clear, for example, because changing the unit of observation necessitates changes in the sample selections and model specifications typically used individual data.[10] Therefore, we first demonstrate that small-area aggregate data replicate city quality of life and quality of business results produced from individual data. We estimate four sets of quality of life and quality of business environment measures as well as the associated city rankings for the cities that are part of

[7]Recent work by Albouy and Lue (2011) uses census data to calculate the quality of life at the PUMA level, the smallest area quality of life estimates to date but block group data would be able to produce estimates at smaller levels of geography.

[8]Block groups represent very small areas of aggregation. In 2000, we calculate that the average block group had 1,352 individuals in 557 households within 0.033 square kilometers (0.016 square miles). As a comparison, the average census tract had 4,317 individuals in 1,778 households within 0.14 square kilometers (0.054 square miles). An alternative way of comparing the relative size of the areas is that in the 2000 Census data there are approximately 208,000 block groups in the United States compared to approximately 65,000 census tracts representing populated areas.

[9]An additional advantage of using small-area aggregate data is that researchers can consider the possibility of disequilibria in local labor and housing markets. While the quality of life methodology assumes that workers sort until the equilibrium conditions are satisfied, at any point in time in the cross-section some areas may be experiencing temporary disequilibria characterized by slackness or tightness in the local labor or housing markets. Using individual data, such effects would potentially be priced into the location fixed effects thereby confounding the measurement of the local amenities. Using block group data, one could incorporate unemployment rates or occupancy rates in the census block to control for these effects. In our application we find that inclusion of these variables does not substantively affect the results but they could be important in other applications.

[10]While we demonstrate that the aggregate data successfully replicates results from individual data, we provide a discussion in Appendix A about *ex ante* concerns with using small-area aggregate data in the quality of life context.

the sample we use for our EZ analysis. In particular, we estimate equations (5) and (6) in both 1990 and 2000 using individual data from the Integrated Public Use Microdata Series (IPUMS) census sample (Ruggles et al., 2010), census tract data, and block group data. We first construct variables that allow us to estimate the same specification of the hedonic regressions on each of the three datasets. Comparing the estimated $\hat{Q}_j^L$ and $\hat{Q}_j^B$ from each data source provides information about whether the aggregated data replicates the estimates from individual data. We also estimate a fourth model on the individual data including a wider range of interactions between variables and some common sample restrictions, such as estimating equation (5) only for full-time workers, similar to those in Albouy (2008, 2010, 2011). This will allow us to further compare the data and specification that we use to the methods used previously.

We construct our base model with variables similar to those used previously in the literature. We calculated wage and salary income from the previous year for the individual data and average wage and salary income of workers within aggregation areas as dependent variables for equation (5). Following the literature (see Blomquist et al., 1988; Gabriel and Rosenthal, 2004; Albouy, 2008, 2010, 2011), we constructed housing costs for households in individual data as annual gross rent for renters and annualized housing costs of homeowners constructed by discounting the house value by 7.85 percent (Peiser and Smith, 1985) and adding utility costs. In the aggregate data, we construct average housing costs as the weighted average of each of these measures for renters and owners where the weights are the proportion of owned and rented housing units within the aggregation geography.[11] We also calculate demographic and housing variables typically used in the hedonic regressions estimated in the literature. For parsimony, we do not include a full discussion at this point but we provide a complete discussion of the data construction and regression specifications in Appendix. Also included in the hedonic regressions are measures of sex, race, age, immigration status, education, occupation, industry, and hours and weeks worked in equation (5). For equation (6), we include measures of the number of rooms, bedrooms, kitchen facilities, plumbing, building age, and building type.[12]

Table 1 presents correlations of the estimates of $\hat{Q}_j^L$ and $\hat{Q}_j^B$ across datasets and specifications for 1990 in the top panel, for 2000 in the middle panel, and the correlations of the changes from 1990 to 2000 in the bottom panel. The results show that the aggregated data produces estimates of $\hat{Q}_j^L$ that are highly correlated to the estimates from both specifications of equations (5) and (6) estimated using individual data. For example in 1990, the correlation of $\hat{Q}_j^L$ between the block group data and the basic specification using individual data is 0.967 while the correlation from the more complicated specification is 0.962. We find a similarly high correlation in 2000 and between the block group estimates of $\hat{Q}_j^B$ and those produced from individual data in both years. Additionally, there appears to be strong correlation in the changes in both measures over time across data sources and specifications. There is some suggestion that the small level of aggregation in the block group data is important as the estimates of $\hat{Q}_j^L$ from tract-level data are slightly less correlated with the estimates using individual data.[13] Furthermore, the rankings of

[11]Utility costs for homeowners are not available in the aggregate data so we impute utilities based on housing values calculated for each city from the IPUMS data.

[12]Throughout this paper, equations (5) and (6) use sampling weights for individuals and households when estimated using individual data and use weights constructed from worker counts and housing unit counts when estimated using aggregate data.

[13]In estimates using data aggregated at the ZIP Code level, we find lower correlations among quality of life measures. For example, in 1990 the quality of life using ZIP Code data has a 0.900 correlation with the individual data in the basic specification and a 0.908 correlation with the fully interacted specifications using individual data. We find even smaller correlations among the rankings with a 0.811 correlation

TABLE 1: The Correlations Across All Three Datasets for the Measures of both the Quality of Life and Quality of Business Environment in 1990, 2000 and the Changes from 1990–2000

	Quality of Life Measure				Quality of Business Environment Measure			
	Block Group	Tract	IPUMS	IPUMS (alt.)	Block Group	Tract	IPUMS	IPUMS (alt.)
1990								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.992	1.000	–	–	0.997	1.000	–	–
IPUMS	0.967	0.944	1.000	–	0.969	0.952	1.000	–
IPUMS (alt.)	0.962	0.947	0.978	1.000	0.963	0.944	0.996	1.000
2000								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.986	1.000	–	–	0.995	1.000	–	–
IPUMS	0.912	0.861	1.000	–	0.942	0.912	1.000	–
IPUMS (alt.)	0.931	0.886	0.957	1.000	0.938	0.908	0.992	1.000
Change 1990–2000								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.980	1.000	–	–	0.995	1.000	–	–
IPUMS	0.821	0.837	1.000	–	0.967	0.960	1.000	–
IPUMS (alt.)	0.839	0.836	0.924	1.000	0.957	0.943	0.986	1.000

Notes: a) The quality of life measure is calculated following equation (7) and quality of business environment is calculated following equation (8). The quality of life and quality of business environment rankings are constructed from the appropriate measure. There is one observation for each city.

b) The measures and rankings from using block group, tract, and IPUMS data are estimated from the same specification of equations (5) and (6). IPUMS (alt.) are measures and rankings from IPUMS data using models of equations (5) and (6) with more sample restrictions and variable interactions similar to Albouy (2008, 2010, 2011).

cities based on $\hat{Q}_j^L$ and $\hat{Q}_j^B$ are also highly correlated as seen in Table A2, despite the fact that we would expect less correlation among the rankings because there may be cities for which the difference in $\hat{Q}_j^L$ is small enough that even small changes in the estimated quality of life would switch the rankings of the cities.[14] Overall, the results in Table 1 demonstrate that using small geographically aggregated data, like census block group data, preserve both the cardinality and ordinality of quality of life and quality of business environment estimates produced using individual data. We now use block group data to apply the quality of life methodology to investigate the effects of a policy intervention.

3. THE IMPACT OF THE EZ PROGRAM ON QUALITY OF LIFE AND BUSIENSS ENVIRONMENT

The Federal EZ Program

The federal EZ program offers a wide range of benefits to firms that locate in designated areas. The most generous and widely utilized incentive is the 20 percent tax credit

between the ZIP Code-based rankings and the rankings from the basic individual specification and a 0.838 correlation with the fully interacted specification.

[14]The quality of life and quality of business measures and their associated rankings calculated from the block group data are presented in Table A3. While it is difficult to compare to previous estimates because of differences in the time period and sample of cities considered, the results generally conform to previous estimates.

on employee wages which is applied to the first $15,000 in paid wages to an employee for a maximum of $3,000 per employee. What makes this incentive particularly generous is the fact that, other than requiring an employee to live in the zone, there are no restrictions on which employees can be claimed including no requirement that an employee be a new hire. Additionally, EZ status provided $100 million for urban areas and $40 million for rural areas in Social Service Block Grant funds. These grants allowed cities to invest in a wide variety of services including counseling, day care for children, education, employment services, legal services, substance abuse recovery, and transportation. There were also smaller capital incentives such as allowing firms who locate in EZs to expense a wider range of capital investments as well as postpone capital gains made on assets in the zone. Furthermore, firms could finance capital purchases using bonds issued by localities on their behalf. An important feature of these incentives is that they are exclusively tied to the land and do not require a new entity for tax purposes. Therefore, firms should only respond by physically relocating, which should impact local amenities and attributes, rather than changing their tax filing behavior.

The federal EZ program provides an opportunity to study small area quality of life and quality of business environment for several reasons. First, the EZ program is a national policy that provides generous and geographically uniform tax incentives for firms, in the form of the wage tax credit, to locate in clearly designated areas based on census tracts, with the caveat that the firms must hire residents in the designated areas. Thus, this policy has the opportunity to improve individuals' quality of life and the quality of business environment of firms simultaneously. Additionally, the EZ incentives were designated in 1994 in parts of six cities (Atlanta, Baltimore, Chicago, Detroit, New York, and Philadelphia/Camden) providing ample time for firms and workers to take advantage of these benefits and their effects to be capitalized in quality of life and business environment measures by 2000, the year we use for our post-treatment measures.[15]

Although the EZ literature can been classified as mixed, there seems to be some evidence that the program did improve specific outcomes in the area, particularly in local property values.[16] However, the impact of the program on workers, particularly their wages, have been mixed. For instance, Busso et al. (2013) find job availability for zone residents increased as much as 19 percent and wages increased by approximately 10 percent while other papers find little evidence of wage effects (Hanson, 2009). Likewise, some studies find a reduction in poverty and unemployment rates in EZ areas (see Oakley and Tsao, 2006) while others, such as Hanson (2009), find no measurable effect on the employment or poverty rate of zone residents. While these outcomes provide information about how the EZ program impacted the selected areas, these specific outcomes may not capture the variety of ways in which the local amenities could have improved, particularly with regards to the social service block grants and capital incentives. Each city used the service block grants and capital incentives differently and these choices could affect specific outcomes differently or may not be captured by the previously considered outcomes at all (U.S. General Accounting Office, 2006). We contribute to the literature by taking a

[15]Although it would be ideal to study the impact of the EZ policy for longer than five years after implementation, particularly because we are analyzing more general equilibrium effects, we cannot because of data limitations associated with the decennial Census. Therefore, we follow other papers studying the federal EZ program (e.g., Busso et al., 2013; Hanson, 2009) and analyze the effect of the program after five years, which also allows us to compare our findings to the literature. Furthermore, Hanson and Rohlin (2011) present evidence that business relocation within one to five years of program implementation.

[16]Busso et al. (2013), Krupka and Noonan (2009), and Hanson (2009) find statistically significant positive effects of improvements in local property values ranging from 25 percent to 35 percent although Busso et al. (2013) find little evidence of an increase in rents.

different but complementary perspective by studying this issue using the quality of life and business environment measures which produces single measures for both households and businesses.

Empirical Methodology

To identify the effect of the reduction in tax liability due to the EZ program we use a differencing strategy to create a counterfactual for what would have happened without the program. We utilize the fact that many areas applied to the program but not all received the EZ designation, and with it the generous tax incentives. Those areas that qualified for the program but did not receive EZ status were instead granted "Enterprise Community" (EC) status. This designation gave these areas a $3 million allotment of the Social Service Block Grants and the ability to utilize some of the capital incentives. However, EC areas did not receive the generous wage credit which was the most widely used benefit (Hanson, 2011). We use 57 EC areas, all which were located in cities that were not select for the EZ program, as a control group because they all initially qualified for the EZ program and the department of Housing and Urban Development maintains a record of their geographic border.[17]

While the EC areas are utilized as a control group in a number of papers in the literature (see Busso et al., 2013; Hanson, 2009; and Hanson and Rohlin, 2011) the EC areas themselves are not perfect counterfactuals for the EZ areas. Table 2 presents summary statistics for the EZ and EC areas in 1990 using block group data and demonstrates that the EZ areas are less advantaged on a number of measurable characteristics than EC areas. For example, while all areas qualify for the EZ program, the EZ areas have a higher unemployment and poverty rate than the EC areas. These differences extend to the population of each area, for which EZ areas have higher proportion of minorities, lower educational attainment and marriage rates, as well as the housing market, for which EZ areas are less likely to be owner-occupied and more likely to live in older housing units. Busso et al. (2013) account for these differences using a difference-in-difference procedure based on propensity score matching to produce a more representative counterfactual area. Importantly, the quality of life methodology also accounts for these differences through the wage and housing hedonics and we will demonstrate that using a propensity score matching framework does not further aid in producing counterfactuals. Thus, the methodology we employ implicitly accounts for differences in observable characteristics of the treated and untreated areas.

Our primary identification strategy is to use the EZ and EC areas in a simple differencing framework that incorporates the quality of life and quality of business environment methodology. We first estimate equations (5) and (6) separately for 1990 and 2000 using census block data for the EZ and EC areas.[18] From these regressions we construct quality of life and quality of business environment measures in each time period according to

[17]We dropped two EC areas, Orange, NY and Burlington, VT, because they are not fully contained within an identified MSA/PMSA and therefore we could not impute annual utility costs to generate annual housing costs. Given that we have the remaining 57 EC areas, this restriction is unlikely to affect our results.

[18]The small geographic scale of block groups provides many observations within these small geographic EZ/EC areas so that we can estimate the fixed effects. The average EZ/EC area in our sample has 70 block groups and while the smallest area has only 11 block groups, only 5 areas have less than 20 block groups and all are ECs. The smallest EZ area was in Atlanta and has 86 block groups. Census tracts and block groups change over time. We corrected for the changes in these areas by utilizing GIS software to map 2000 block groups into 1990 geography. See Appendix for details.

TABLE 2: Selected Summary Statistics for EZ and EC Areas in 1990

	EZ		EC	
	Mean	St. Dev.	Mean	St. Dev.
Unemployment rate	0.230	0.138	0.170	0.101
Poverty rate	0.466	0.171	0.407	0.168
Population characteristics				
Wage income ($1,000)	18.653	6.494	17.315	6.510
Household income ($1,000)	24.949	10.603	27.070	10.922
Male	0.468	0.082	0.482	0.080
Married	0.214	0.117	0.285	0.128
White	0.088	0.173	0.192	0.253
Black	0.659	0.380	0.510	0.368
Hispanic	0.241	0.331	0.258	0.306
Immigrant	0.120	0.181	0.150	0.183
Less than high school	0.545	0.136	0.495	0.165
High school	0.248	0.086	0.253	0.096
Some college	0.145	0.076	0.178	0.090
BA or higher	0.063	0.084	0.073	0.090
Housing characteristics				
Housing cost ($1,000)	4.884	1.503	5.881	2.413
Owner	0.182	0.210	0.327	0.224
Detached single-family	0.097	0.183	0.379	0.297
Attached single-family	0.137	0.258	0.081	0.119
Multi-family	0.748	0.308	0.516	0.303
Rooms	4.369	0.997	4.393	0.951
Bedrooms	2.041	0.550	2.022	0.534
Building age 0–5	0.028	0.062	0.046	0.077
Building age 6–10	0.047	0.096	0.051	0.086
Building age 11–20	0.081	0.124	0.115	0.133
Building age 21–30	0.127	0.171	0.136	0.126
Building age 31–40	0.143	0.159	0.164	0.131
Building age 41–50	0.131	0.119	0.158	0.125
Building age 51+	0.444	0.248	0.330	0.251

Notes: All calculations are produced using 1990 Census block group data.

equations (7) and (8) using the fixed effects ($\hat{\phi}_j$) where j indexes the EZ or EC areas in 63 cities that applied to the program. We then calculate the change in each measure between 1990, pretreatment, and 2000, post-treatment, for each area

$$\Delta \hat{Q}_j^L = \hat{Q}_{j,2000}^L - \hat{Q}_{j,1990}^L, \tag{9}$$

$$\Delta \hat{Q}_j^B = \hat{Q}_{j,2000}^B - \hat{Q}_{j,1990}^B. \tag{10}$$

Differencing within each geographic area will remove any time-invariant factors that affect quality of life or quality of business environment. Importantly, this will remove factors such as climate and distance to the coast that may make EZ or EC areas in sunny, coastal areas appear to have higher quality of life than other areas.[19] By further

[19]Table A3 shows that this issue could be important as the top our quality of life rankings are dominated by coastal cities while the bottom of the rankings is generally interior cities. These results are consistent with evidence in Albouy (2008).

differencing the average change in $\hat{Q}_j^L$ and $\hat{Q}_j^B$ in the EC areas from the EZ areas we will remove any changes over time associated with qualifying for the EZ program in 1994.

We also conduct a series of robustness checks to control for confounding factors that are not removed in our differencing strategy. First, we attempt to isolate the changes in quality of life and business environment in the EZ and EC areas from any city-wide trends between 1990 and 2000. While the tax incentives are targeted to a particular subset of city geography, housing costs and wages in these areas may be influenced by the overall housing and labor market within the entire city. Additionally, there could be time-varying city trends, such as state and local fiscal policies, that could influence household and business location decisions. Thus, one might be concerned that changes in the $\hat{Q}_j^L$ and $\hat{Q}_j^B$ in equations (9) and (10) are confounded by city-level changes in the prices of housing and labor.

To account for this possibility, we include observations from the entire city but expand the specifications of each of the hedonic regressions to include two fixed effects for each city j: the first is a fixed effect for the EZ/EC area (E) in the city ($\pi_{j,E}$) and the second is a fixed effect for the non-EZ/EC area in the city ($\pi_{j,\sim E}$). Thus we will be incorporating data on the non-EZ/EC part of each city but separately identifying the causal impact on wages and housing costs of living in each part of the city. By calculating the change in the estimated quality of life and business environment within each unique geographic area and comparing the changes in the EZ areas from the rest of the EZ cities we will account for any time-varying unobserved city characteristics such as local fiscal policies or changes in city-wide amenities.

One potential problem with this approach is that the EZ and EC areas are geographically small within each city and are, by definition, distressed. Therefore, much of the rest of each city may be a poor comparison to the EZ and EC areas. To account for this we employ a propensity score matching procedure to identify the comparable parts of each city outside of the EZ and EC area. In particular, within each city we estimate a logit of an indicator that equals one if the block group is in an EZ or EC area and zero otherwise on a quadratic in both wages and housing costs.[20] From this regression, we calculate the probability that a block group is in the EZ or EC area within the city given the covariates, referred to as the propensity score. We then use a caliper matching algorithm to select all block groups in each city that have a propensity score within a bandwidth of 0.003 of the propensity score of each block group in the EZ or EC area.[21] We then use only these matched block groups from each city when estimating equations (5) and (6) to remove trends within each city affecting only economically similar areas.[22]

Quality of Life and Business Environment

Table 3 presents our estimates of the effect of the EZ program on an area's quality of life in panel A and quality of business environment in panel B. Each value represents

[20]Note that we could also estimate the propensity scores using the set of covariates in each of the hedonic regressions but we have problems with missing cells when using this approach. However, all results are insensitive to the specification of the propensity score equation.

[21]The choice of bandwidth in propensity score matching is often somewhat arbitrary. We use 0.003 because it removes approximately half of the block groups in the remainder of each city. For robustness we checked other bandwidths and all results are insensitive to the choice of bandwidth.

[22]Controlling for trends in economically similar areas helps control for, but does not eliminate, the effects of time-varying subcity characteristics such as confounding subcity intervention programs. Note that for such policies to be driving our results they would need to be systematically placed in the same geographic area as the EZs, as well as not be placed in the EC areas. We do not know of such systematic policies and any subcity programs during our time period are unlikely to be targeted to the exact geographic area because the EZ areas were constructed to satisfy the specific prerequisites of the federal EZ program.

TABLE 3: The Changes in Quality of Life and Business Environment from 1990–2000 for EZs, ECs, and Their Respective Cities

		EZ/EC Areas with Entire City			EZ/EC Areas with Portion of City		
	Only EZ/EC Areas (1)	EZ/EC (2)	City (3)	Difference (4)	EZ/EC (5)	City (6)	Difference (7)
Panel A: Quality of Life							
EZ	0.011	0.002	−0.007***	0.009	0.001	-0.007***	0.008
	(0.012)	(0.016)	(0.001)	(0.016)	(0.017)	(0.001)	(0.017)
	[−0.010,0.030]	[−0.032,0.021]	[−0.011,−0.006]	[−0.023,0.030]	[−0.026,0.030]	[−0.010,−0.006]	[−0.018,0.039]
EC	−0.002	0.002	0.004***	−0.002	−0.005	0.008***	−0.013**
	(0.004)	(0.005)	(0.001)	(0.005)	(0.005)	(0.002)	(0.005)
	[−0.009,0.004]	[−0.010,0.006]	[0.004,0.007]	[−0.017,0.001]	[−0.013,0.003]	[0.003,0.011]	[−0.022,−0.004]
Difference	0.012	0.000	−0.011***	0.011	0.06	−0.015***	0.021
	(0.015)	(0.016)	(0.002)	(0.016)	(0.017)	(0.003)	(0.017)
	[−0.025,0.052]	[−0.030,0.024]	[−0.017,−0.010]	[−0.016,0.037]	[−0.020,0.036]	[−0.020,−0.010]	[−0.005,0.051]
Panel B: Quality of Business Environment							
EZ	0.064**	0.139***	−0.012***	0.151***	0.174***	−0.015***	0.189***
	(0.028)	(0.034)	(0.003)	(0.035)	(0.036)	(0.003)	(0.036)
	[0.016,0.107]	[0.077,0.190]	[−0.019,−0.008]	[0.091,0.205]	[0.108,0.229]	[−0.025,−0.014]	[0.126,0.249]
EC	−0.048***	0.035***	−0.005	0.040**	0.069***	0.017***	0.053***
	(0.009)	(0.012)	(0.002)	(0.013)	(0.0112)	(0.005)	(0.013)
	[−0.061,−0.033]	[0.017,0.046]	[−0.004,0.004]	[0.016,0.057]	[0.053,0.091]	[0.013,0.029]	[0.031,0.072]
Difference	0.112***	0.104***	−0.007***	0.111***	0.105***	−0.032***	0.136***
	(0.033)	(0.035)	(0.005)	(0.036)	(0.037)	(0.006)	(0.037)
	[0.056,0.164]	[0.038,0.156]	[−0.022,−0.006]	[0.053,0.168]	[0.033,0.155]	[−0.051,−0.030]	[0.075,0.196]
Observations	7,778		173,247			99,390	

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990–2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

c) Column (1) reports the estimates using only those block groups in an EZ or EC area. Columns (2)–(4) report estimates including the non-EZ or non-EC areas in each city as separate geography when calculating the quality of life and quality of business environment where the results in Column (3) represent the non-EZ/non-EC portions of each city. Columns (5)–(7) only include those non-EZ or non-EC areas in each city selected as matches to the EZ/EC block groups using propensity score matching with a caliper of 0.003.

the average change from 1990 to 2000 in quality of life or business environment for all areas or cities in the given geography (EZ, EC, or their city). Bootstrapped standard errors and 90 percent confidence intervals are presented for each estimate in parentheses and in brackets, respectively.[23] The first column displays the results of our base specification including only EZ or EC areas when estimating equations (5) and (6). The results show that the quality of life in EZ areas slightly improved from 1990 to 2000 while the quality of life in EC areas slightly declined. One can interpret the quality of life values in panel A as how much additional income households are willing to pay in housing expenditures to live in these areas. Therefore, the interpretation of column 1 is that people in EZ areas are willing to pay 1.1 percent more in housing costs relative to their income to live in these areas in 2000 compared to 1990 while residents are willing to pay 0.2 percent less in housing costs relative to their income to live in EC areas over the same time period. However, because neither measure is statistically different from zero, nor is the difference between the changes in EZ and EC areas statistically significant, we categorize these estimates as evidence that there was little to no effect of the EZ program on quality of life.[24]

The quality of life methodology provides a different approach, with some advantages, to examining the effects of the EZ program. As discussed, the EC areas are not perfect control areas as they appear more favorable on a number of observable characteristics. However, the hedonic regressions are accounting for these differences in observable characteristics. In fact, first using propensity score matching similar to Busso et al. (2013) to construct a comparison area with more balanced covariates before constructing the quality of life measures produces estimates that are nearly identical to those in Table 1 (see Table A4). Additionally, the quality of life methodology is specifically designed to look for differences across geography and could be used to look for heterogeneity in effects of programs. While we are interested in the average effect of the program, the results do suggest that there was some heterogeneity in the outcomes with quality of life increasing substantially in Detroit while not increasing much if at all in other areas, consistent with the overall modest effects we estimate (see Table A5).

Columns 2 through 7 include city trends in the analysis. On the one hand, as discussed, there could be bias in these results if the cities of EZ areas were trending differently than cities of EC areas between 1990 and 2000. However, on the other hand Hanson and Rohlin (2013) demonstrate that the federal EZ program caused negative spillover in neighboring and economically similar areas within the city. Therefore, we estimate results

[23]We calculate the standard errors using a block-bootstrap procedure where we draw a sample of block groups, with replacement, from each geographic area for which we are estimating quality of life and then calculate the change in the quality of life within each area as in the text. The number of block groups drawn in each iteration for each area j is equal to the number of block groups in the actual data so we are holding constant the distribution of geographic areas within the data across iterations. We replicate the procedure 1,000 times and calculate the standard deviation of the estimates and the nonparametric confidence intervals based on the empirical distribution of the estimates across iterations.

[24]These results are produced from the underlying changes in the quality adjusted wages (ϕ_j^w) and housing costs (ϕ_j^r) . The results suggest that relative to the EC areas, quality adjusted wages in EZ areas increased modestly by 0.029 (0.024) while quality adjusted housing costs, which is a combination of rent and discounted house values, increased by 0.082 (0.022). While these results are not necessarily directly comparable to other estimates of wage, rent and house values in the previous literature the relative magnitude of the wage and rent effects are roughly comparable with the existing literature discussed previously which has found mixed evidence on wages, little impact on rents and large impacts on house values.

both for EZ and EC areas as well as results controlling for various parts of the surrounding cities. As we will demonstrate the results are robust to these various specifications.[25]

Column 1 presents the estimates without controlling for city trends and columns 2 through 4 show results that remove city trends by separately estimating fixed effects for both the EZ or EC area and the non-EC/EC area within each city. Interestingly, column 3 of panel A shows that the quality of life in the non-EZ areas of EZ cities on average decline between 1990 and 2000 while the quality of life in non-EC areas of EC cities improve. Specifically, individuals living in the non-EZ areas of EZ cities are willing to pay 0.7 percent less of their income on housing than they did a decade prior while individuals in EC cities are paying 0.4 percent more of their income in housing to live in those cities. Despite accounting for the disparate trends in the cities, the findings still suggest little to no effect of the EZ program on individual's quality of life.

As a robustness check we repeat our analysis including only the portion of the city that is most similar to the EZ or EC areas as identified by our propensity score matching procedure described in Section 3.2 when determining the city trend. The results for this procedure, reported in columns 5 through 7 of Table 3, show that this alternative approach has little effect on our findings. The estimates suggest a slightly larger positive effect for the non-EC portion of EC cities leading to a slightly larger effect of the EZ program relative on quality of life but the effect is still not statistically different from zero. Interestingly, the estimate for EZ cities does not change when using only those areas in the city that are most like EZ areas which Hanson and Rohlin (2013) find are most susceptible to negative spillovers. In fact, throughout the paper we find that using the entire city versus using a portion of the city with a propensity score to control for city trends tends to yield similar results, which belies our concerns about which is the correct geography to measure city trends.

Panel B of Table 3 displays the results of the EZ program on the quality of business environment. The results show that the tax incentives offered to firms had a measurable impact on the quality of business environment of the EZ areas compared to the EC areas. The estimates can be interpreted as how much additional costs firms are willing to incur to operate in the area in 2000 compared to 1990. Specifically, we find that businesses are willing to endure 6.4 percent more costs to operate in the EZ areas while requiring a 4.8 percent decrease in costs to operate in EC areas for an average difference between the two areas of 11.2 percent. Unlike the quality of life estimates, the impacts on quality of business environment are statistically significant.

Estimates controlling for city trends show the EZ program having similarly large positive effects on the quality of business environment with an 11.1 percent difference using the whole city and 13.6 percent difference using only the portion of the city most similar to EZ/EC areas. These findings seem plausible since the mechanism by which the EZ program had hoped to improve the areas was by enticing firms to move there through generous tax incentives. This supports the evidence from the existing literature that EZs did impact business location decisions (see Hanson and Rohlin, 2011). It seems that the EZ program was successful in improving the location's business environment in the form of productivity-enhancing business amenities, for example, due to agglomeration economies. Another notable result in panel B, in columns 3 and 6, is that the cities in which EZs are located decline considerably during the time period in quality of business environment compared to the EC cities making the improvement in business environment all the more remarkable.

[25] Hanson and Rohlin (2013) find negative spillovers in neighboring census tracts therefore we re-estimate results that control for city trends without neighboring census tracts and find no substantive changes in the results. These estimates are presented in Table A6.

Testing for Preexisting Trends

Another major concern in the EZ literature is preexisting trends in the EZ and EC areas. The bias due to preexisting trends could be either positive or negative. For example, suppose that the congress members selecting the areas for the EZ program were attempting to help those areas that were the most distressed or experiencing the greatest decline. In this case, even if the EZ program changed the trajectory of the designated areas, the quality of life and quality of business environment could appear to have improved little relative to the EC areas. This negative bias would cause us to underestimate the program effect. Likewise, if the goal of the members of congress selecting the areas was to maximize the likelihood of demonstrable program success then they would have selected those areas trending upwards already. In this case, comparing 1990 to 2000 will cause us to overestimate the program impacts and the true effect would smaller.

To test for preexisting trends in the EZ and EC areas we conduct the same analysis as before but from 1980 to 1990. Because the program was initiated in 1994 and implemented in 1995, conducting the analysis before the program started would test whether EZ areas were trending differently than EC areas. Panel A of Table 4 displays the changes in quality of life in EZ and EC areas from 1980 to 1990 in quality of life while panel B presents the changes in quality of business environment. Column 1 of panel A shows that EZ areas were slightly declining in quality of life in the 1980s while there was no measurable trend in EC areas. Results including city trends show that overall the individuals were willing to pay 2.6 to 3.4 percent more of their income toward housing in 1990 compared to 1980 in EC areas while only willing to pay 0.6 to 1 percent more of their income toward housing in EZ areas. This results in a difference of roughly 2 to 2.4 percent between EC and EZ areas suggesting the areas selected for the EZ program were trending downward prior to their selection. This preexisting tread suggests that our quality of life findings in Table 3 may be downward biased and underestimated.

Similarly, panel B shows that the quality of business environment in the EZ areas was also declining relative to the EC areas. Controlling for city trends, we see that this result is being driven by EZ areas declining worse in quality of business environment relative to their cities than the EC areas were relative to their cities. Specifically, it seems that areas that received EZ status in 1994 were declining while the remainder of their cities were actually improving. This causes a large negative difference of roughly 14 percent meaning that our finding that the EZ area improved the quality of business environment is actually underestimated and that the true effect is even larger. Overall, Table 4 shows that EZ areas were declining more than EC areas relative to their cities prior to the EZ designation. Thus our findings in Table 3 may be underestimated suggesting even larger increases in the quality of business environment. The results of this exercise also suggest that papers on the EZ program that do not account for preexisting trends may underestimate the program effects.

The Role of Pure and Fiscal Amenities

One additional concern is that the interpretation of our previous results is complicated because the EZ program could have induced an increase in pure location amenities but the program itself represents a local fiscal amenity, particularly in the form of the wage credit. Gyourko and Tracy (1991) argue that fiscal amenities need to be included in the estimation of quality of life to properly uncover the role of pure local amenities. In this context, we could adjust equations (5) and (6) to include measures of federal fiscal policies (τ_F), state fiscal policies (τ_S), and local fiscal policies (τ_L) as

$$\log(w_{ij}) = \alpha^w + \beta^w X_i^w + \delta_F^r \tau_F + \delta_S^r \tau_s + \delta_L^r \tau_L + \phi_j^w + \varepsilon_{ij}^w, \tag{11}$$

TABLE 4: The Changes in Quality of Life and Business Environment from 1980 to 1990 for EZs, ECs, and Their Respective Cities

		EZ/EC Areas with Entire City			EZ/EC Areas with Portion of City		
	Only EZ/EC Areas (1)	EZ/EC (2)	City (3)	Difference (4)	EZ/EC (5)	City (6)	Difference (7)
Panel A: Quality of Life							
EZ	−0.004	0.012	0.006***	0.006	0.015	0.005***	0.010
	(0.011)	(0.014)	(0.001)	(0.014)	(0.015)	(0.001)	(0.015)
	[−0.025,0.012]	[−0.023,0.023]	[0.004,0.009]	[−0.029,0.017]	[−0.020,0.030]	[0.005,0.009]	[−0.027,0.023]
EC	−0.000	0.011*	−0.014***	0.026***	0.009*	−0.025***	0.034***
	(0.004)	(0.005)	(0.001)	(0.005)	(0.005)	(0.003)	(0.006)
	[−0.006,0.006]	[0.001,0.017]	[−0.016,−0.012]	[0.015,0.032]	[0.001,0.016]	[−0.031,−0.020]	[0.024,0.044]
Difference	−0.003	0.002	0.021***	−0.020**	0.006	0.030***	−0.024**
	(0.014)	(0.015)	(0.002)	(0.014)	(0.016)	(0.004)	(0.016)
	[−0.029,0.017]	[−0.033,0.014]	[0.017,0.024]	[−0.054,−0.007]	[−0.030,0.022]	[0.026,0.038]	[−0.062,−0.010]
Panel B: Quality of Business Environment							
EZ	−0.029	−0.065**	0.040***	−0.106***	−0.066**	0.052***	−0.118***
	(0.028)	(0.030)	(0.003)	(0.030)	(0.032)	(0.004)	(0.033)
	[−0.072,0.018]	[−0.114,−0.013]	[0.046,0.057]	[−0.164,−0.065]	[−0.117,−0.011]	[0.050,0.062]	[−0.174,−0.066]
EC	−0.008	−0.049***	−0.076***	0.034**	−0.070***	−0.096***	0.027*
	(0.009)	(0.012)	(0.003)	(0.013)	(0.011)	(0.006)	(0.013)
	[−0.024,0.005]	[−0.077,−0.037]	[−0.085,−0.076]	[0.009,0.052]	[−0.095,−0.060]	[−0.110,−0.089]	[0.003,0.044]
Difference	−0.021	−0.016	0.116**	−0.140***	0.003	0.148	−0.145***
	(0.033)	(0.031)	(0.005)	(0.031)	(0.034)	(0.008)	(0.035)
	[−0.071,0.037]	[−0.060,0.046]	[0.123,0.140]	[−0.198,−0.093]	[−0.044,0.067]	[0.143,0.169]	[−0.202,−0.087]
Observations	6,583		130,541			73,925	

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990 to 2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

c) Column (1) reports the estimates using only those block groups in an EZ or EC area. Columns (2)–(4) report estimates including the non-EZ or non-EC areas in each city as separate geography when calculating the quality of life and quality of business environment where the results in Column (3) represent the non-EZ/non-EC portions of each city. Columns (5)–(7) only include those non-EZ or non-EC areas in each city selected as matches to the EZ/EC block groups using propensity score matching with a caliper of 0.003.

(12) $$\log(r_{ij}) = \alpha^r + \beta^r X_i^r + \delta_F^r \tau_F + \delta_S^r \tau_s + \delta_L^r \tau_L + \phi_j^r + \varepsilon_{ij}^r.$$

If these fiscal variables are not included in the regression, the contribution of these factors to wages and housing costs would be captured in the location fixed effects which are used to construct the quality of life and quality of business environment measures. However, as discussed previously, differencing the changes in the estimates of quality of life and quality of business environment in EZ and EC areas would remove any role for nonlocation-specific federal fiscal policies as these would vary over time equally across locations. Additionally, further differencing against the city or economically similar portion of the city would remove the time-varying state and local fiscal policies since these policies would affect both the EZ/EC part of each city as well as the non-EC/EC part of each city.

In contrast, the wage credit provided to employers only in EZ areas would represent a location-specific federal fiscal amenity that does vary over time. This is because it is a wage credit that applies to only the EZ cities, and only in the EZ portion of each city, and does not exist in 1990. This confounds the interpretation of the previous set of results. For example, it is possible that the improvement in quality of business environment that we identify is due to agglomeration effects associated with firms moving into the area (see Rosenthal and Strange, 2004). However, it is also possible that the effect is due simply to the fiscal amenity, the reduction in labor costs associated with operating in the EZ area. The distinction is important from a policy perspective. In the former, there is an improvement in local productivity which could continue beyond the lifetime of the policy. In the latter, there is no improvement in local productivity and the "amenities" we identify are due simply to paying companies to relocate.

We attempt to understand how much of our previous results may be driven by changes in fiscal, as opposed to the pure, amenities by explicitly removing the value of the wage credit from the estimation of the wage hedonic regression.[26] The basic idea is that the wage credit will distort the labor market such that individual workers could receive higher wages while businesses see lower after-credit labor costs. If wages increase due to the credit then it would tend to lower the estimated quality of life according to equation (3), despite any increases in local pure amenities. Thus, our previous results may underestimate the change in pure amenities for households. Alternatively, as discussed above, if the after-credit wage costs of firms actually decrease then our previous estimates are overestimating the local pure amenities for businesses since higher wage costs are not realized post-credit.

The extent to which the wage credit is passed-through to workers in the form of higher wages depends on the relative elasticities of local labor demand and supply. Previous research shows that the incidence of wage taxes often falls heavily on workers through changes in equilibrium wages (e.g., see Anderson and Meyer, 1997, 2000). Since we do not know the exact incidence in this application, we instead attempt to directly remove the wage increase due to the tax. Hanson (2011) estimates that 24 percent of those individuals working in the EZ areas are claimed for the wage credit. Combining this estimate with the maximum possible deduction of $3,000 suggests that average wages would have increased by approximately $720 if the credit was fully passed through to workers. We subtract this amount from the observed average wages in 2000 in the EZ areas and then re-estimate the effects of EZ designation on quality of life and business environment. Note that this exercise likely overstates the value of the wage credit as a fiscal amenity because the wage

[26]While it is also possible that the wage credit could be included in the housing hedonic as well (equation (12)), evidence in Gyourko and Tracy (1991) suggests that taxes on income have no effect in their housing hedonic regression.

TABLE 5: The Changes in Quality of Life and Business Environment from 1990 to 2000 for EZs, ECs, and Their Respective Cities, Net of Wage Credit Distortions

	Only EZ/EC Areas	EZ/EC Areas with Entire City			EZ/EC Areas with Portion of City		
		EZ/EC	City	Difference	EZ/EC	City	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Quality of Life							
EZ	0.030**	0.026	−0.007***	0.0033	0.024	−0.007***	0.032*
	(0.012)	(0. 015)	(0.001)	(0.016)	(0.016)	(0.001)	(0.016)
	[0.008,0.048]	[−0.008,0.042]	[−0.011,−0.006]	[−0.000,0.051]	[−0.004,0.047]	[−0.010,−0.006]	[0.004,0.055]
EC	−0.006	0.002	0.004***	−0.002	−0.006	0.008***	−0.013**
	(0.004)	(0.005)	(0.001)	(0.005)	(0.005)	(0.002)	(0.006)
	[−0.014,0.000]	[−0.010,0.006]	[0.003,0.007]	[−0.017,0.001]	[−0.014,0.002]	[0.003,0.010]	[−0.022,−0.004]
Difference	0.036**	0.024	−0.011***	0.035**	0.030*	−0.015***	0.045**
	(0.015)	(0.016)	(0.002)	(0.016)	(0.017)	(0.003)	(0.017)
	[0.011,0.059]	[−0.007,0.045]	[−0.017,−0.010]	[0.007,0.059]	[0.001,0.055]	[−0.020,−0.010]	[0.014,0.070]
Panel B: Quality of Business Environment							
EZ	0.026	0.092***	−0.011***	0.103***	0.128***	−0.014***	0.143***
	(0.028)	(0.034)	(0.003)	(0.034)	(0.034)	(0.003)	(0.034)
	[−0.020,0.072]	[0.036,0.148]	[−0.019,−0.008]	[0.091,0.205]	[0.074,0.186]	[−0.024,−0.014]	[0.093,0.206]
EC	−0.039***	0.036***	−0.004	0.040**	0.070***	0.017***	0.053***
	(0.009)	(0.012)	(0.002)	(0.013)	(0.011)	(0.005)	(0.012)
	[−0.054,−0.025]	[0.018,0.057]	[−0.003,0.005]	[0.016,0.057]	[0.056,0.094]	[0.014,0.029]	[0.033,0.074]
Difference	0.065*	0.056	−0.007***	0.064*	0.058	−0.032***	0.089***
	(0.033)	(0.035)	(0.005)	(0.035)	(0.036)	(0.006)	(0.036)
	[0.010,0.121]	[−0.004,0.110]	[−0.022,−0.006]	[0.011,0.127]	[−0.003,0.114]	[−0.050,−0.031]	[0.036,0.154]
Observations	7,774		173,245			99,394	

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990 to 2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

c) Column (1) reports the estimates using only those block groups in an EZ or EC area. Columns (2)–(4) report estimates including the non-EZ or non-EC areas in each city as separate geography when calculating the quality of life and quality of business environment where the results in column (3) represent the non-EZ/non-EC portions of each city. Columns (5)–(7) only include those non-EZ or non-EC areas in each city selected as matches to the EZ/EC block groups using propensity score matching with a caliper of 0.003.

credit may not be completely passed through to workers and because not all workers who live in the EZ area actually work there. Thus, the average effect of the wage credit on area wages would be smaller than we are assuming.[27]

The results in Table 5 present little evidence that the direct effect of price distortions due the wage credit is driving the quality of life and business environment improvements that we previously estimated. Column 1 displays the results without controlling for city trends while columns 2 through 7 show the results with city trends. Analysis without city trends shows that in the absence of the wage increase, individuals are willing to pay 3 percent more in housing costs to live in the EZ areas in 2000 compared to 1990. There is no change in the quality of life measure in EC areas resulting in a statistically significant net difference of positive 3.6 percent. Likewise, we find that individuals in EZ areas are willing to pay between 3.5 to 4.5 percent more in housing costs in the absence of a wage increase compared to EC areas after controlling for city trends. With the pre-1990 trend results in Table 4, these result suggests that the EZ program may have modestly improved the pure amenities valued by individuals living in EZ areas.

The results for quality of business environment after adjusting for possible wage credit distortions demonstrate a slightly more moderate impact from the EZ program. Controlling for city trends we find that firms in EZ areas are willing to pay 10.3 to 14.3 percent more in costs to operate in the area while EC areas require only a 4 to 5.3 percent premium. Similar to our previous findings, the large positive results from the EZ areas are in sharp contrast to the small negative EZ city trend. This suggests that the improvements in quality of business environment not only compare well to their EC counterparts but also relative to the general city trend that is occurring in the city. Overall, we find strong evidence that offering tax incentives to businesses attract business activity does improve the quality of business environment. The results from this exercise are consistent with the modest increase in wages and substantial increase in housing costs previously estimated.

4. CONCLUSION

Policymakers have an interest in understanding how effective location-based tax incentives for businesses are in improving the quality of life and business environment in distressed areas. Unfortunately, the typical quality of life methodology previously used is not able to evaluate these policies because the individual data typically utilized does not identify small enough geographic areas in public-use data. This paper demonstrates that small area aggregate data such as census block groups can be used in place of individual data to estimate quality of life or business environment across geographic areas. We find that estimates of quality of life and business environment using block group data are highly correlated with estimates from various specifications using individual data. This result allows future researchers to measure the quality of life in smaller geographic areas than previously estimated.

Furthermore, we demonstrate how the quality of life and quality of business environment methodologies can be adapted to measure the average impact of local area policy interventions. We use the quality of life and quality of business environment methodology with block group data to estimate the average effects of the federal EZ program. Overall, we find slight increases in the average quality of life in the EZ areas relative to comparison areas which raises concerns about whether the $11 billion cost of the program

[27]In fact, Hanson (2011) estimates that only 6–7 percent of the working age population of EZ areas was claimed under the tax credit. We prefer our calculation because it more closely matches the costs associated with firms and because it represents a stricter test of the direct effect of the wage credit.

(Department of Housing and Urban Development) was worth the investment. However, we do find some variation in the effect of the program on quality of life across the EZ cities and this outcome heterogeneity is an important area for future research to develop stronger policy conclusions about the EZ program.

We do discover substantial evidence that the quality of the business environment improved following the adoption of the program with businesses willing to incur higher costs to operate in the EZ areas. Finding that input costs have risen to offset productivity increases may help to explain why some of the previous literature (e.g., Hanson and Rohlin, 2011) estimate small effects on new business formation. Replicating the analysis between 1980 and 1990 evidence indicates negative preexisting trends in EZ areas suggesting that our analysis between 1990 and 2000 may underestimate the program effects. Finally, we present evidence that the increase in quality of business environment is due to an improvement in local business amenities and not simply due to the direct fiscal benefit of the program.

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APPENDIX: DATA CONSTRUCTION

Individual versus Aggregate Data

The results in Table 1 suggest that small-area aggregate data successfully replicate quality of life results from individual data. However, there are some *ex ante* potential concerns with using aggregated data instead of individual data when estimating quality of life. There is an extensive literature on the use of aggregate data in place of individual data (e.g., see Geronimus, Bound, and Neidert, 1996; Hanushek, Rivkin, and Taylor, 1996). In general, this literature finds that there are multiple potential biases depending on the context and that the direction of the bias is typically not known *a priori*. However, this literature has focused primarily on the potential bias associated with identifying the slope coefficients while the parameters of interest in equations (5) and (6) are the location fixed effects. How these fixed-effects are affected by the use of aggregated data instead of individual data is an empirical question but the results in Table 1 suggests that aggregation bias does not appear to affect quality of life estimates, possibly because of the small level of aggregation at the block group level.

Another concern is that variable availability in the aggregated data could exacerbate problems associated with data aggregation. For example, equation (5) will only be identified in individual data for workers, those people with a nonzero wage, and therefore the distribution of X in that data will represent the distribution of workers. Unfortunately, the variables available in tract or block group data may not be identifiable only for workers. Instead, characteristics of individuals often can only be constructed for the entire population within the area of aggregation. This will produce biased estimates of $\hat{\beta}$ as suggested in the aggregation literature because population characteristics are poor proxies for individual data, although, again, the direction of the bias is unknown. The effect of using population characteristics on $\hat{\phi}$, our primary variables of interest, is unclear *ex ante* and is also therefore an empirical question.

There are reasons to suppose that the aggregated data could replicate the results of individual data. Importantly, the aggregation described above applies primarily to the vector of covariates used to estimate the wage hedonic (equation (5)). We will demonstrate that the same problem does not occur for the covariates in the housing hedonic regression (equation (6)). Thus, there may be little bias associated with estimating $\hat{\phi}^r$, which contributes more to the variation across cities in quality of life and quality of business environment, than $\hat{\phi}^w$.[28] This could help minimize problems associated with aggregation. Additionally, the problems of data construction described above apply to X but not to the dependent variables; we are able to construct average wages for workers as well as average housing costs.[29]

Variables

We constructed a number of variables to be used as the covariates in the wage and housing hedonic regressions. While these variables are largely consistent with those used in the previous literature, in this section we explain the exact set of variables that we use. As we state in the text, the dependent variable for equation (5) is annual wage and salary income from the previous year for the individual data and average wage and salary income of workers within aggregation areas. The primary difference between our base specification using individual data and those previously used is that previous papers often restricted the wage regression to some definition of full-time workers (Gabriel and Rosenthal, 2004; Albouy, 2008, 2010, 2011). Since we can only identify average wages for all workers in the aggregate data we include all workers in our base specification but with a flexible set of controls for hours and weeks worked.

In our base specification for equation (5) using we included:

[28]For example, Albouy (2008, 2011) presents graphs showing more variation in housing costs than wages across cities. Additionally, in our sample of cities in the1990 IPUMS data we find that the correlation between and is 0.587 while the correlation with is 0.898.

[29]Another concern using aggregate data is that averages within an aggregation unit could be skewed by extreme values. Comparing the variables for which both a mean and a median could be calculated, we find little evidence that the aggregate data are skewed by extreme values. For example, in the block group data in the sample of cities we analyze, the average absolute difference between the mean and median housing cost as a percentage of median housing cost is 7.0 percent with a median of 4.6 percent.

Variable	IPUMS	Aggregate data
Male	Indicator for male	Proportion of population male
Race	Indicators for Hispanic, black, Asian, and other minority (left out category is white)	Proportion of population Hispanic, black, Asian, and other minority (left out category is white)
Marriage	Indicator for married	Proportion of population married (age 15+)
Immigrant	Indicator for immigrant	Proportion of population immigrant
Age	Indicators for aged 20–24, 25–34, 35–44, 45–54, 55–64, 65+ (left out category is <20)	Proportion of population aged 20–24, 25–34, 35–44, 45–54, 55–64, 65+ (left out category is 16–20)
Education	Indicators for high school degree, some college, bachelor's degree, or graduate degree (left out category is less than high school degree)	Proportion of population aged 25+ with high school degree, some college, bachelor's degree, or graduate degree (left out category is less than high school degree)
Children	Number of children aged 0–6 in household, number of children aged 7–15 in household	Average number of children aged 0–6 in household, average number of children aged 7–15 in household
Occupation	Indicators for 9 occupational categories	Proportions of workers in 9 occupational categories
Industry	Indicators for 15 industry categories	Proportions of workers in 15 industry categories
Hours and weeks worked previous year	Indicators for 18 combinations of weeks worked (6 categories) and hours worked per week (3 categories) in previous year	Proportion of workers in each of 18 combinations of weeks worked (6 categories) and hours worked per week (3 categories) in previous year
Group quarters	Indicator for living in group quarters	Proportion of population living in group quarters

As we describe in the text, we follow the literature (see Blomquist et al., 1988; Gabriel and Rosenthal, 2004; Albouy, 2008, 2010, 2011) by constructing housing costs for households in individual data as annual gross rent for renters and annualized housing costs of homeowners constructed by discounting the house value by 7.85 percent (Peiser and Smith, 1985) and adding utilities. In the aggregate data, we construct average housing costs as the weighted average of each of these measures for renters and owners where the weights are the proportion of owners and renters within the aggregation geography. For the housing hedonic (equation (2)) we included the following variables:

Variable	IPUMS	Aggregate data
Rooms	Number of rooms	Average number of rooms per housing unit
Bedrooms	Number of bedrooms	Average number of bedrooms per housing unit
Kitchen	Indicator for complete kitchen facilities	Proportion of housing units with complete kitchen facilities
Plumbing	Indicator for complete plumbing facilities	Proportion of housing units with complete plumbing facilities
Building age	Indicators for building aged 6–10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51+ years (left out category is 0–5 years)	Proportion of housing units aged 6–10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51+ years (left out category is 0–5 years)
Building type	Indicators for detached single-household, attached single-household, multi-family household, and other housing type	Proportions of housing units detached single-household, attached single-household, multi-family household, and other housing type
Owner	Indicator for owner-occupied	Proportion of housing units owner-occupied

Our base specification allows us to construct similar specifications between individual and aggregate data. However, when investigating whether aggregate data can replicate quality of life estimates from individual data we also estimate a more complex specification of equations (5) and (6) based on the models estimated by Albouy (2008, 2010, 2011). In particular, we restrict the wage hedonic to those workers who worked at least 26 weeks in the previous year and worked at least 30 hours per week as well as being between the ages of 25 and 55. We then include:

- 5 indicators of marital status interacted by gender
- 5 indicators of race interacted by gender
- Indicator for immigrant interacted by gender
- Indicator for immigrant interacted by 5 indicators of race interacted by gender
- 3 indicators for English proficiency interacted by gender
- Indicator for veteran interacted by gender
- Indicator for veteran interacted by age interacted by gender
- 12 indicators for educational attainment interacted by gender
- A quartic function of potential experience interacted by gender
- 13 occupation indicators interacted by gender
- 17 industry indicators interacted by gender

For the housing hedonic, we restrict the sample to those households who had moved in the previous 10 years and included:

- 9 indicators for number of rooms
- 6 indicators for number of bedrooms
- Interactions of indicators for number of rooms and indicators for number of bedrooms
- Number of people per room
- Indicator for complete kitchen facilities
- Indicator for complete plumbing facilities

- Indicators for building aged 6–10 years, 11–20 years, 21–30 years, 31–40 years, 41–50 years, 51+ years (left out category is 0–5 years)
- Indicators for detached single-household, attached single-household, multi-family household, and other housing type
- Indicator for owner-occupied
- Indicator for condominium
- Indicator for commercial property
- Indicators for 0–9 acre and 10+ acre property

Table A1 presents the summary statistics for selected variables for the aggregated data in the first two columns, for the observations included in each regression from the individual data in column (3) and for the entire population from the individual data in column (4). In the wage regression, the annual wage income is similar across data sources although slightly higher (by roughly $800) in the aggregated data than the individual data. The differences in the population and worker distribution of characteristics in the wage hedonic regression can be clearly seen by comparing the aggregated data in columns (1) and (2) of the top panel to the regression sample in column (3). In particular, the regression sample of workers from the individual data in column (3) is more likely to be male, has a higher level of education and is younger as would be expected. Much of this is due to the inclusion of retirees in the aggregated data. The average proportion of the population above the age of 65 in the tract and block group data is approximately 11 percent while only 3.6 percent of the working population is above that age. The older population is less likely to be married and to be male because of differences in life expectancy, and have lower levels of education than the younger population. Comparing columns (1) and (2) to column (4) shows that the population-based characteristics from the aggregated data are very similar to the population data found within the full sample of individuals in the Census. Importantly, there is little difference among the variables used in the rent hedonic, including housing costs, so we have some confidence that the aggregated data could replicate the estimates from individual data in equation (6).

Geographic Consistency

The EZ program defined boundaries of both the EZ and EC areas based on 1990 tract topography but the boundaries of census tracts, as well as block groups, change over time. Therefore we create correspondences between the 1990 and 2000 versions of the census tract data, census block group. For the block group data, we map 2000 block groups into 1990 block groups using geographic information system (GIS) software. From this mapping, we calculate the percent of each 2000 block group that overlaps each 1990 block group. We then use these percentages to reweight the 2000 data to get 1990 geographically equivalent data. We conduct a similar exercise to construct a mapping between 1980 and 1990 block groups. Because we lack a 1980 block group GIS map, we instead map 1980 block group centroids into 1990 block groups.

TABLE A1: Summary Statistics for All Cities that Applied for Empowerment Zone Status Across Three Different Geographic Units

	1990 Census Tract (1)	1990 Census Block Groups (2)	1990 IPUMS (Regression Sample) (3)	1990 IPUMS (Population Sample) (4)
Individual Characteristics				
Annual Wage/Salary Income (1,000s)	32.756	32.778	31.984	31.984
Male (%)	0.486	0.486	0.530	0.485
Married (%)	0.512	0.513	0.544	0.415
White (%)	0.717	0.718	0.723	0.689
Hispanic (%)	0.105	0.104	0.101	0.116
Black (%)	0.136	0.135	0.135	0.152
Asian (%)	0.038	0.038	0.036	0.037
Other Minorities (%)	0.005	0.005	0.005	0.005
Less Than HS Edu. (%)	0.219	0.216	0.176	0.230
HS Edu. (%)	0.274	0.274	0.268	0.275
Some College Edu. (%)	0.262	0.263	0.305	0.257
BA Edu. (%)	0.157	0.158	0.166	0.152
Grad. Edu. (%)	0.088	0.089	0.085	0.086
Age 16–19 (%)	0.055	0.055	0.065	0.055
Age 20–24 (%)	0.078	0.079	0.121	0.076
Age 25–34 (%)	0.190	0.191	0.293	0.186
Age 35–44 (%)	0.158	0.159	0.240	0.156
Age 45–54 (%)	0.105	0.105	0.153	0.104
Age 55–64 (%)	0.082	0.082	0.093	0.082
Age 65+ (%)	0.113	0.111	0.036	0.116
# of Obs.	25,179	90,312	499,478	976,546
Housing Characteristics				
Annual Housing Costs (1,000s)	11.946	11.859	11.949	11.949
Rooms	5.351	5.380	5.297	5.297
Bedrooms	2.474	2.492	2.486	2.486
Kitchen	0.993	0.993	0.993	0.993
Plumbing	0.994	0.994	0.995	0.995
Building Age 0–5 years	0.104	0.105	0.100	0.100
Building Age 6–10 years	0.085	0.085	0.083	0.083
Building Age 11–20 years	0.193	0.193	0.191	0.191
Building Age 21–30 years	0.167	0.166	0.169	0.169
Building Age 31–40 years	0.163	0.163	0.166	0.166
Building Age 41–50 years	0.096	0.096	0.097	0.097
Building Age 51+ years	0.193	0.192	0.194	0.194
Attached	0.076	0.079	0.074	0.074
Detached	0.523	0.533	0.529	0.529
Other Housing	0.031	0.031	0.038	0.038
Multifamily	0.360	0.347	0.360	0.360
Owner	0.597	0.604	0.597	0.597
# of Obs.	25,179	90,312	354,179	354,179

Notes: a) Wage/Salary Income is annual income earned from wages and salaries. Housing Cost is annual gross rent for renters and imputed rental equivalence of house value plus utilities for homeowners (see text for details). All dollar values are in \$2,000.

b) The IPUMS regression sample in column (3) refers to the sample of workers who report wage or salary income and therefore are included in the wage regression.

c) Wage regressions also include controls for immigrant status, occupation, industry, and interactions of categories of weeks worked and usual hours worked.

TABLE A2: The Correlations Across All Three Datasets for the Rankings of both the Quality of Life and Quality of Business Environment in 1990, 2000 and the Changes from 1990–2000

	Quality of Life Ranking				Quality of Business Environment Ranking			
	Block Group	Tract	IPUMS	IPUMS (alt.)	Block Group	Tract	IPUMS	IPUMS (alt.)
1990								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.990	1.000	–	–	0.987	1.000	–	–
IPUMS	0.927	0.907	1.000	–	0.948	0.907	1.000	–
IPUMS (alt.)	0.923	0.916	0.967	1.000	0.947	0.905	0.993	1.000
2000								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.963	1.000	–	–	0.982	1.000	–	–
IPUMS	0.792	0.693	1.000	–	0.921	0.867	1.000	–
IPUMS (alt.)	0.838	0.743	0.885	1.000	0.920	0.866	0.986	1.000
Change 1990–2000								
Block group	1.000	–	–	–	1.000	–	–	–
Tract	0.932	1.000	–	–	0.975	1.000	–	–
IPUMS	0.718	0.667	1.000	–	0.895	0.877	1.000	–
IPUMS (alt.)	0.678	0.658	0.879	1.000	0.904	0.871	0.964	1.000

Notes: a) The quality of life measure is calculated following equation (7) and quality of business environment is calculated following equation (8). The quality of life and quality of business environment rankings are constructed from the appropriate measure. There is one observation for each city.

b) The measures and rankings from using block group, tract, and IPUMS data are estimated from the same specification of equations (5) and (6). IPUMS (alt.) are measures and rankings from IPUMS data using models of equations (5) and (6) with more sample restrictions and variable interactions similar to Albouy (2008, 2010, 2011).

TABLE A3: 1990 Quality of Life and Quality of Business Environment and Related Rankings for 63 Cities that Applied for the Federal Empowerment Zone Program Calculated from Block Group Data

MSA/PMSA Name	Q^L	Q^L Rank	Q^B	Q^B Rank
San Francisco-Oakland-Vallejo, CA	0.258	1	1.115	1
Oakland, CA	0.165	2	0.754	3
Los Angeles-Long Beach, CA	0.164	3	0.947	2
San Diego, CA	0.163	4	0.612	5
Boston-Salem-Gloucester, MA	0.103	5	0.497	7
New York, NY	0.090	6	0.667	4
New Haven-Meriden, CT	0.083	7	0.392	9
Bridgeport, CT	0.083	8	0.565	6
Providence-Fall River-Warwick, MA/RI	0.074	9	0.177	13
Springfield-Holyoke-Chicopee, MA	0.070	10	0.230	11
Seattle-Everett, WA	0.055	11	0.105	16
Washington, DC/MD/VA	0.054	12	0.216	12
Miami-Hialeah, FL	0.053	13	0.173	14
Albuquerque, NM	0.051	14	−0.265	30
Newark, NJ	0.045	15	0.445	8
Manchester, NH	0.043	16	0.172	15
Lowell, MA/NH	0.040	17	0.345	10
Little Rock-North Little Rock, AR	0.026	18	−0.431	43
Las Vegas, NV	0.010	19	0.047	17
Phoenix, AZ	0.008	20	−0.154	23
Charleston-N. Charleston, SC	0.007	21	−0.304	34
Tampa-St. Petersburg-Clearwater, FL	0.002	22	−0.420	42
Norfolk-VA Beach-Newport News, VA	0.002	23	−0.213	27
Jackson, MS	−0.003	24	−0.519	54
Charlotte-Gastonia-Rock Hill, SC	−0.005	25	−0.336	37
Philadelphia, PA/NJ	−0.006	26	0.039	18
Albany-Schenectady-Troy, NY	−0.007	27	−0.065	21
Nashville, TN	−0.011	28	−0.443	45
Dallas-Fort Worth, TX	−0.013	29	−0.158	24
Waco, TX	−0.018	30	−0.573	57
Baltimore, MD	−0.021	31	−0.100	22
Chicago, IL	−0.022	32	0.036	19
San Antonio, TX	−0.026	33	−0.407	41
Wilmington, DE/NJ/MD	−0.027	34	−0.035	20
Memphis, TN/AR/MS	−0.034	35	−0.528	55
Atlanta, GA	−0.036	36	−0.240	28
Rochester, NY	−0.036	37	−0.183	26
Oklahoma City, OK	−0.037	38	−0.487	50
Denver-Boulder-Longmont, CO	−0.039	39	−0.406	40
Portland-Vancouver, OR-WA	−0.039	40	−0.356	38
Milwaukee, WI	−0.048	41	−0.279	32
Des Moines, IA	−0.049	42	−0.613	60
Harrisburg-Lebanon-Carlisle, PA	−0.053	43	−0.322	35
Columbus, OH	−0.053	44	−0.472	47
Springfield, IL	−0.060	45	−0.516	53
St. Louis, MO-IL	−0.061	46	−0.324	36
Albany, GA	−0.067	47	−0.498	51
El Paso, TX	−0.068	48	−0.477	48
Houston-Brazoria, TX	−0.071	49	−0.263	29
Minneapolis-St. Paul, MN	−0.072	50	−0.296	33
Kansas City, MO-KS	−0.074	51	−0.513	52

Continued

TABLE A3: Continued

MSA/PMSA Name	Q^L	Q^L Rank	Q^B	Q^B Rank
Indianapolis, IN	−0.075	52	−0.451	46
Buffalo-Niagara Falls, NY	−0.075	53	−0.440	44
Omaha, NE/IA	−0.076	54	−0.710	63
Birmingham, AL	−0.081	55	−0.615	61
Salt Lake City-Ogden, UT	−0.085	56	−0.582	58
Louisville, KY/IN	−0.088	57	−0.610	59
Pittsburgh-Beaver Valley-Beaver County, PA	−0.097	58	−0.554	56
Akron, OH	−0.098	59	−0.477	49
Cleveland-Lorain-Elyria, OH	−0.098	60	−0.372	39
Huntington-Ashland, WV/KY/OH	−0.121	61	−0.700	62
Detroit, MI	−0.143	62	−0.177	25
Flint, MI	−0.207	63	−0.276	31

Notes: Quality of life and quality of business environment are calculated from block group data according to equations (7) and (8).

TABLE A4: Estimates of the Changes in Quality of Life and Quality of Business Environment in a Sample of Areas With Balanced Covariates Constructed Using Propensity Score Matching

	Quality of Life	Quality of Business Environment
EZ	0.002	0.063**
	(0.012)	(0.028)
	[−0.010,0.030]	[0.016,0.107]
EC	−0.008	−0.057***
	(0.004)	(0.009)
	[−0.009,0.004]	[−0.062,−0.033]
Difference	0.010	0.121***
	(0.015)	(0.033)
	[−0.011,0.036]	[0.055,0.164]

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990 to 2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

c) Bias correction is done by first estimating the propensity score, the probability that a block group is in an EZ area based on the observable characteristics, and then keeping for EZ block group only the 10 EC block groups that have the closest propensity score provided that the difference in propensity score is no greater than 0.01.

TABLE A5: Estimated Change in Quality of Life and Quality of Business Environment 1990–2000 by EZ Area

EZ Area	Quality of Life	Quality of Business Environment
Atlanta, GA	0.000	0.263**
	(0.054)	(0.119)
	[−0.081,0.089]	[0.063,0.461]
Baltimore, MD	−0.025	−0.200***
	(0.030)	(0.061)
	[−0.072,0.027]	[−0.303,−0.102]
Chicago, IL	−0.003	0.133***
	(0.017)	(0.039)
	[−0.033,0.026]	[0.069,0.197]
Detroit, MI	0.078***	0.125***
	(0.020)	(0.048)
	[0.041,0.109]	[0.043,0.199]
New York, NY	0.022	0.174***
	(0.023)	(0.057)
	[−0.018,0.059]	[0.083,0.265]
Philadelphia, PA/NJ	−0.009	−0.112
	(0.032)	(0.074)
	[−0.061,0.048]	[−0.239,0.007]

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990 to 2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

TABLE A6: The Changes in Quality of Life and Business Environment from 1990 to 2000 for EZs, ECs, and Their Respective Cities without Geographic Spillovers

	Only EZ/EC Areas	EZ/EC Areas with Entire City			EZ/EC Areas with Portion of City		
		EZ/EC	City	Difference	EZ/EC	City	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Quality of Life							
EZ	0.011	0.002	−0.007***	0.009	−0.004	−0.005**	0.002
	(0.012)	(0.016)	(0.001)	(0.016)	(0.016)	(0.001)	(0.017)
	[−0.010,0.030]	[−0.031,0.023]	[−0.011,−0.006]	[−0.023,0.031]	[−0.033,0.022]	[−0.009,−0.004]	[−0.027,0.028]
EC	−0.002	0.002	0.005***	−0.003	−0.003	0.005***	−0.009
	(0.004)	(0.005)	(0.001)	(0.006)	(0.005)	(0.002)	(0.006)
	[−0.009,0.004]	[−0.011,0.006]	[0.004,0.007]	[−0.017,0.001]	[−0.012,0.005]	[0.003,0.008]	[−0.019,0.000]
Difference	0.012	0.001	−0.012***	0.012	−0.000	−0.011**	0.010
	(0.015)	(0.017)	(0.002)	(0.017)	(0.017)	(0.002)	(0.017)
	[−0.025,0.052]	[−0.029,0.026]	[−0.017,−0.011]	[−0.014,0.040]	[−0.029,0.027]	[−0.016,−0.008]	[−0.018,0.039]
Panel B: Quality of Business Environment							
EZ	0.064**	0.139***	−0.015***	0.154***	0.162***	−0.021***	0.183***
	(0.028)	(0.036)	(0.003)	(0.036)	(0.036)	(0.003)	(0.036)
	[0.016,0.107]	[0.076,0.192]	[−0.022,−0.010]	[0.092,0.208]	[0.092,0.209]	[−0.028,−0.019]	[0.115,0.234]
EC	−0.048***	0.039***	0.001	0.038**	0.069***	0.011***	0.058***
	(0.009)	(0.013)	(0.003)	(0.013)	(0.012)	(0.004)	(0.013)
	[−0.061,−0.033]	[0.020,0.062]	[0.003,0.011]	[0.011,0.057]	[0.046,0.086]	[0.012,0.024]	[0.026,0.069]
Difference	0.112***	0.100***	−0.015***	0.115***	0.093**	−0.031***	0.124***
	(0.033)	(0.037)	(0.005)	(0.037)	(0.038)	(0.005)	(0.038)
	[0.056,0.164]	[0.027,0.153]	[−0.031,−0.015]	[0.050,0.176]	[0.023,0.148]	[−0.050,−0.033]	[0.064,0.192]
Observations	7,778		156,020			78,919	

Notes: a) Each estimate represents the change in either the quality of life or quality of business environment measure from 1990 to 2000 estimated from block group data using equations (7) and (8) in the text.

b) Standard errors and confidence intervals are calculated from 1,000 bootstrap replications. The standard deviation of the bootstrapped estimates are reported in parentheses while the 90 percent confidence intervals, calculated based on the percentiles of the distribution of bootstrapped estimates, are reported in square brackets. Asterisks denote statistical significance at the 10 percent (*), 5 percent (**), and 1 percent (***) levels.

c) Column (1) reports the estimates using only those block groups in an EZ or EC area. Columns (2–4) report estimates including the non-EZ or non-EC areas in each city as separate geography when calculating the quality of life and quality of business environment where the results in column (3) represent the non-EZ/non-EC portions of each city. Columns (5–7) only include those non-EZ or non-EC areas in each city selected as matches to the EZ/EC block groups using propensity score matching with a caliper of 0.003.