Do Enterprise Zones Work?

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Abstract

Prior studies of Enterprise Zones (EZs) have found conflicting evidence as to their economic impact. In contrast to studies that focus on a limited number of states, we examine all EZs nationally over a 20-year time frame. We examine the impact of Enterprise Zone policies by comparing economic activity at the EZ borders. Our data consist of information on census tracts pre and post designation as enterprise zones as well as information on census tracts that border the enterprise zones. Our results indicate that pre-designation EZs performed significantly worse in several economic dimensions compared to the census tracts neighboring them. However, there is a dramatic reversal after designation with respect to some of the economic indicators, where EZs perform significantly better than their surrounding areas.

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Do Enterprise Zones Work?

Many enterprise zones (EZ) emerged in the early 1980s to encourage economic growth in areas that lagged behind state expectations. These policies attempted to revive depressed urban areas by offering tax breaks and other business incentives to specific geographic areas.[1] Although job creation is usually the explicit goal of these policies, policy makers often hope that the tax incentives aimed at encouraging businesses to locate or remain in these depressed areas would raise property values and expand the tax base. Varied incentives are offered for firms to locate or increase investment in such areas. The most prevalent incentives are tax credits on state income tax returns for increased hiring, increased investment in property and equipment, or tax credit as a percent of overall taxes.[2] Driven by the objective to create jobs, the majority of the states have labor-related tax credits. Other states have tax credits for both labor and capital, and three states have credits based on total taxes paid.[3]

The size of tax incentives for locating in an EZ varies widely across states.[4] States also differ on eligibility requirements for business tax credits. In California, for example, establishments belonging to any SIC code may qualify for EZ credits. In other states, eligible activities are restricted to manufacturing, transportation and distribution centers. With respect to labor-related tax credits, EZ policies in California encourage hiring of less skilled individuals even if they are not residents of an EZ. In Indiana, however, firms are required to hire EZ residents to be qualified for EZ tax credits.[5]

Virtually all states approve EZs on a case-by-case basis, establishing individual EZ coordinators who validate credit eligibility requirements for firms within their EZs. For the most part, states approve EZs for a limited time. In many states, minimum thresholds concerning unemployment rates, income, education levels, percent of vacant building and decreases in population have to be met by local communities for them to be

[1] Exceptions are Arkansas, Georgia, Kansas, North Carolina, and South Carolina where the entire state is an EZ. Counties in these two states are given EZ status in proportion to lack of economic activity.

[2] Other incentives include property tax abatements, sales/use tax exclusions, workforce training grants, and others. These benefits are less common, and are often given as a result of special negotiations. Accordingly they are not discussed further in this paper.

[3] A summary of these benefits, by type, and the starting date for EZs across states are shown in Table A1 of the appendix. For comparison, the table also shows tax incentives for business expansion given for all firms, regardless of EZ or non-EZ location.

[4] While it is not easy to quantify such differences precisely, a simple example may be useful. For example, imagine a transportation equipment manufacturer who has land, building and machinery and equipment investments worth of $20m, $100m, and $20m respectively. Suppose payroll is $20m for 1000 employees and sales and pre-tax income are $100m and $8m respectively. The reduction in the tax burden of such an enterprise varies from 70% in EZs in Arizona, Arkansas, California and New Mexico to 10% in Colorado, Delaware and Idaho.

[5] Qualified employees in California were required to fall under one of the following categories before 1997: Receiving services under the federal Job Training Partnership Act (JTPA); eligible to be a voluntary or mandatory registrant under the Greater Avenues for Independence (GAIN) act, or eligible, as determined by the California Employment Development Department, under the federal Targeted Jobs Tax Credit Program. In Indiana, a "qualified employee" is one who lives in the enterprise zone, works 50 percent of his or her time in the enterprise zone and has at least 90 percent of his or her services directly related to the employer's facility in the enterprise zone.

designated as an EZ. In our nationwide analysis, we do not focus on the precise rules or qualification differences across states.

Currently 39 states have enterprise zone programs as displayed in Figure 1. The annual cost of these programs varies across states. California alone reports to have provided $300 million in tax subsidies in 2003 to firms that locate in the 39 EZ programs.

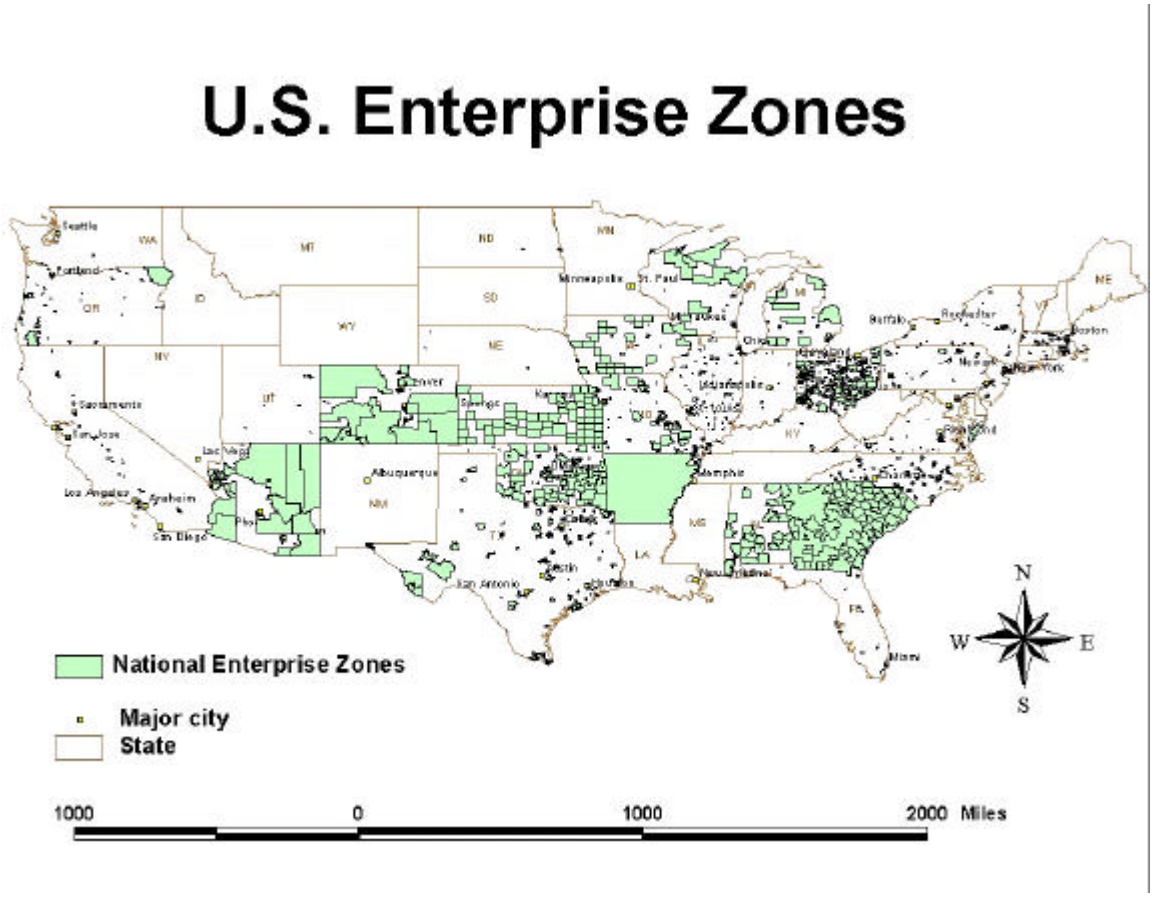


Figure 1: EZs Across the States

Whether EZ programs are successful in stimulating economic activity is controversial. Supporters of EZ programs often claim that they have been highly successful. A number of studies that have examined the effectiveness of EZs by surveying businesses or EZ coordinators in certain states have reached positive conclusions.[6] However, results of the few empirical papers in the academic literature have been mixed. Papke (1994) used precise micro data, as well as census tract data to examine Indiana's EZs in the 1980s and concluded that while there had been an increase in inventory investment and a reduction in unemployment claims, the economic well being of zone residents had not shown noticeable improvement. Bondonio and Engberg (1999) examined EZs in five states in the1980s. Their findings indicate no significant impact of EZ programs on local employment. Engberg and Greenbaum (1999) examined

[6] U.S. Department of Housing and Urban Development 1986, Erickson and Friedman 1990a, 1990b.

the impact of EZs on urban housing markets in Florida, Pennsylvania, and Virginia. Their results indicate that the zone programs do not raise property values and have been unsuccessful at raising employment or income in distressed areas. O'Keefe (2004) examined the impact of California EZ programs on employment growth and concluded that zone designation raises employment growth by 3% annually for six years after designation.

Assessing the impact of EZ programs on economic activity has been difficult for several reasons. First, there have been significant problems with gathering data on zones' exact location. In general, enterprise zones do not share boundaries with common geographic entities such as census tracts, ZIP Codes, municipalities or counties. However, most studies analyze the impact of enterprise zones at the US Postal ZIP Code or county level.[7] Such analysis has difficulty capturing the impact of zone policies on the official boundaries of the zone because the area immediately surrounding the zone is also included in their data. The discrepancy between the areas described by zip codes and an area designated as an EZ can be seen in Figure 2.

Progress in this literature is hampered also by the difficulty of distinguishing the effects of EZ policies from the effects of EZ characteristics that are unrelated to policy. By definition, enterprise zones perform poorly along many economic indicators. Thus, simply examining the performance of these zones along some economic indicators may be misleading. To overcome these problems, researchers attempt to identify non-zone areas that are similar in certain characteristics to zone areas. It is also difficult for researchers to distinguish the effects of EZ policies from the effects of zone characteristics that have nothing to do with EZ policies. For example, Jones and Manson (1982) argue that as transportation costs decline and the ease of transport becomes greater, economic activities and residences will become more dispersed within metropolitan regions. EZ policies seem to focus on reversing this trend by aiming at increasing economic activity in these designated centers. If the general tendency is for economic activity to flow away from the urban centers, the EZ zones may display dismal economic performance whether or not those policies are "effective." Thus, it is particularly difficult to assess whether EZ policies play a positive role in the economic activity of these designated zones.

In this paper we use a fresh approach a-la-Holmes (1998) that considers what happens to economic activity when one crosses the EZ border. This framework recognizes the possibility that EZ policies may simply result in a movement from the areas near the EZs to the EZs. Therefore it is important to identify the EZ areas and their surrounding communities separately. To accomplish this goal, we use household level data provided by the Census Bureau that exists at census tract level.[8] The primary advantage to using household level data is that it allows us to be precise about the area that makes up an EZ and its surrounding communities in all the states that have EZ programs. Household level data also make for a more interesting analysis since the

[7] For example, Boarnet and Bogart (1996) use data at municipality level, Engberg and Greenbaum (1999), Bondonio and Engberg (1999) use data at the ZIP code level.

[8] Census tracts are statistical areas defined by the Census Bureau. In heavily populated areas, a census tract is smaller than a city and usually smaller than a zip code. For example, there are over 300 zip codes in the San Francisco Bay Area, and over 1,400 census tracts.

ultimate goal of EZ programs is to improve the economic well being of residents living in the zones. Our data also allow us to examine the economic conditions of census tracts within an EZ and those immediately next to an EZ. If EZ policies simply generate a movement from areas next to EZs to EZs, we would be able to capture that information. By using data from 1980, 1990 and 2000, we are able to observe the characteristics of census tracts before and after they have been designated as EZs. The one disadvantage of using the household level data, however, is that we are not able to examine changes in business behavior due to EZ policies.

Our results indicate that, the performance of EZs in terms of poverty and unemployment rates were significantly better than or as good as those in Near EZs post-establishment. Our examination suggests that while EZs displayed lower mobility rates to better economic conditions compared to bordering areas in the pre-establishment period, this trend reversed during the post establishment period with EZs displaying higher mobility rates to better economic conditions compared to their surrounding areas. This result is more pronounced for EZs in the lower tail of the distribution in terms of these economic indicators. Overall, the contribution of this paper is to establish facts governing the impact of EZ programs within the EZs and their surrounding communities. These facts may play a role in developing theories that may shed light on the future desirability of such programs.

Section 1 summarizes the data and the theoretical framework used in this paper. Section 2 summarizes the results, and Section 3 concludes.

1. Data and the Model

A. Characteristics of EZs

Our data, based on 2000 Census Tract definitions, consist of over 7,000 census tracts that belong in EZs nationwide from 1980 through 2000.[9] These areas account for 10.8% of all U.S. census tracts. Typically, EZ locations are not disclosed publicly (e.g., website information on locations), so our research involved communications with individual EZ coordinators. The data requested enable the geocoding of EZ locations. Most states designate EZ status to census tracts. However, some states, like California and Michigan, designate EZ status based on census block groups. Thus, depending on the state, the data set included census tract or block group data, but we also received major street boundaries and hard copies of maps. We translated all data into census tracts or block groups through G.I.S. technology. EZ boundaries often do not align exactly with census tract boundaries. So we created 0.5 mile "buffer zones" of census tracts that either fully or partly included EZs. Next, we created a database of all census tracts bordering all EZ census tracts, which we call Near-EZs (NEZs) and of all other census tracts (Rest) in

[9] Census tracts are designed to be relatively homogeneous units with respect to population characteristics, economic status and living conditions at the time of establishment. They average about 4000 inhabitants. Some states, like California and Michigan designate EZ status based on Census block groups. In such cases our data for the EZs and its surrounding areas consist of block groups. A block group is the smallest geographic unit for which the Census Bureau tabulates sample data. It consists of all the blocks within a census tract with the same beginning number.

the U.S. The purpose of creating data for these last two groups of census tracts is discussed in the next section.

After EZ boundaries were digitized, every 2000 census tract nationally was coded as to whether it was entirely within an EZ, partially within an EZ, or bordering an EZ. We then matched this database of EZ block groups to Bureau of Census data for 1980, 1990, and 2000. The census data contains detailed demographic information on the unemployment rate, poverty rate, income, vacancy rates, etc., at the census tract level.[10] Technical details of this process are reported in Appendix B. To get a closer look at the data, we select one EZ and depict it, as well as its surrounding areas. Figure 2 shows the area of the Los Angeles Central City EZ in California where EZs are designated based on block groups. As can be seen, the zone that is the dark shaded area is irregularly shaped, typical of most zones. We also highlight the bordering census tracts, which constitute the NEZs. This variation allows for a rich data set including the census tracts adjacent to the zone. Each of these adjacent areas also becomes a part of our data set.

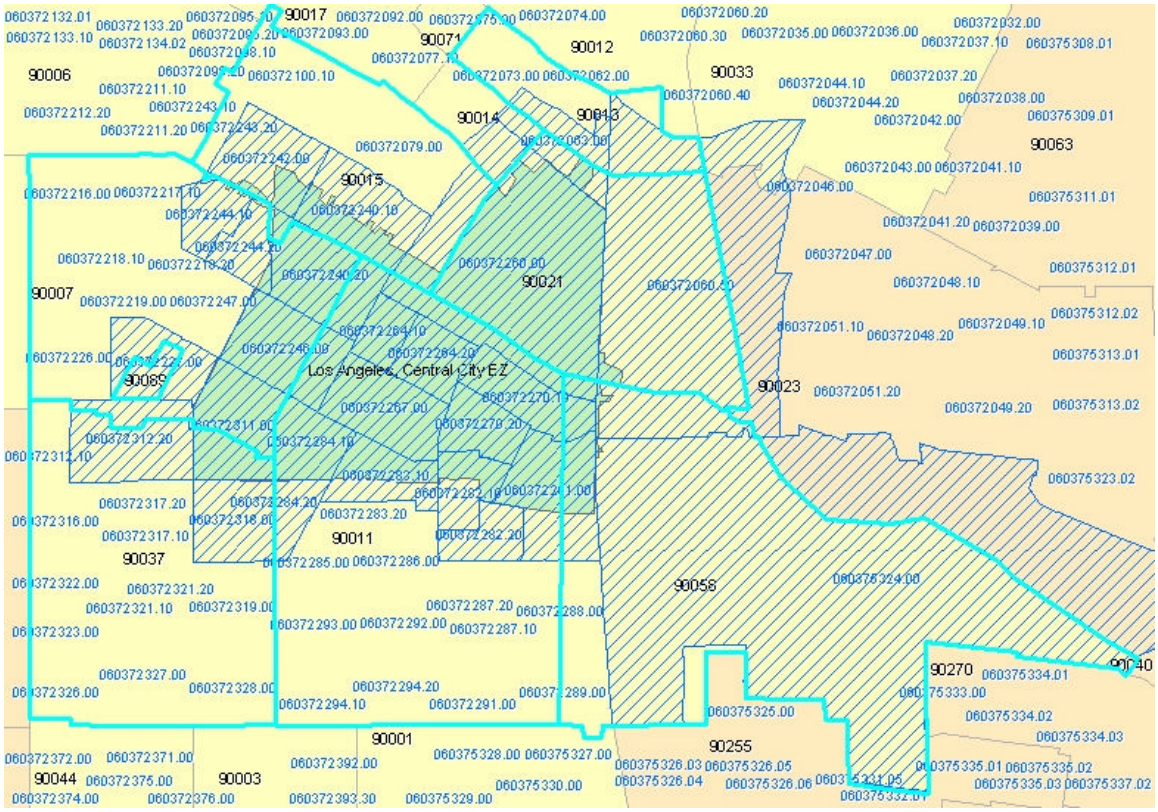


Figure 2: Zip versus Census Tracts

Legend: Thicker lines represent ZIP boundaries; thin lines represent census tract boundaries. Heavily shaded area is the Enterprise Zone.

[10] It would have been desirable to have data on the number of establishments in each census tract to conduct our study. However, such information is not available at the census tract level.

B. Theoretical Background

One of the complications in examining the effect of zone designation is the non-random assignment of zone designation. Comparing growth in zone versus non-zone areas does not control for prior differences between these areas, so some of the earlier research focused on controlling for prior differences by conditioning on the propensity score, which is the estimated probability of zone designation as a function of many area characteristics observed prior to the time of designation.[11] However, in general, it is difficult to distinguish the effects of zone policies from the effects of zone characteristics that have nothing to do with zone policies. For example, EZ areas are often located in urban centers, which may be experiencing lower growth due to urban flight. EZ policies that are aimed at trying to reverse this trend may look unsuccessful in an absolute sense but may be relatively successful for those particular locations. To resolve this identification problem, we follow Holmes (1998) and examine the impact of EZ policies at the EZ border. Holmes (1998) examined whether pro-business policies pursued by some states attract manufacturing to those states by considering what happens to manufacturing activity when one crosses the state borders. This approach circumvents the identification problem that makes it difficult to distinguish the effects of state policies from the effects of other state characteristics that are unrelated to policy. His findings indicate that manufacturing activity increases abruptly when one crosses the border from an anti-business state to a pro-business state, giving rise to sharp differences in growth rates of employment at the borders where there is policy change. His theoretical setup is quite useful. We will adapt parts of his set up as they may be applied to our framework.

Imagine the economy as a line segment where locations are indexed by y?[-1,1]. Two city blocks differ from each other with respect to tax policies faced by businesses operating in those blocks. Let the area of the EZ be indexed by y?[-1,0] where y=0 is the boundary between a block that is in an EZ area and a block that is not. The locations with $y>0$ are in the city blocks outside an EZ. At each location, entrepreneurs are uniformly located or distributed throughout the economy. An entrepreneur who is initially located at a point y chooses whether to set up an establishment in that location. It is also possible for some entrepreneurs to set up an establishment in a new location. Let q denote the productivity of an entrepreneur. Initially, we will assume q to be uniformly distributed on the unit interval and that the distribution of q is independent of location. The competitive wage w is constant across locations and workers may or may not be mobile across locations depending on the eligibility requirements of the EZ program.

If an establishment locates in an EZ area, profits of the entrepreneur will equal productivity q minus the wage paid to the employee minus any moving costs that may be incurred. If they locate in the blocks outside an EZ area, they will have to pay an additional cost c that will represent higher taxes that will have to be paid in that area. Unlike the analysis in Holmes (1998), we assume that there are no additional moving

[11] See for example, Engberg and Greenbaum (1999). In section 2.C we report results based on propensity score for our data set.

costs within an EZ zone, because most EZ areas are surrounded by city blocks that are not designated as EZs. Thus, we will assume that the cost of moving from y to y' is $t(y-(1))$, that is *t* dollars per unit of the distance moved into an EZ area regardless of the exact location within the EZ. Consequently, entrepreneurs who are initially located closer to the EZ border will face smaller costs of moving to an EZ than those who are initially located farther from the border. In this set up, we can calculate the critical distance y^* such that the cost of moving to an EZ exactly equals the higher cost of doing business in the non-EZ zone. It would not be worth the cost for entrepreneurs at locations $y > y^*$ to relocate to the EZ.

Let $M(y)$ be the measure of establishments located in a given y. This measure is equal to the measure of entrepreneurs who are initially located at y and those who move to y. Suppose that there are no EZ programs and all locations pursue the same tax policies, and assume that the location of an establishment coincides with the residence of the entrepreneur. Given our assumption about the uniform distribution of entrepreneurs, the number of establishments in each location will be identical and given by the dashed line m^0 in Figure 3a. Now suppose the area $y \in [-1,0]$ gets designated as an enterprise zone. In this zone, the measure of entrepreneurs who are in business increases to m' since the productivity threshold above which they would conduct business is now w instead of $w+c$. In addition, some entrepreneurs will move from the non-EZ zone contributing to the higher m'. Notice that in the non-EZ zone, the number of establishments shows a discrete decrease at the border and this effect fizzles out and disappears at y^*. As one moves further away from the EZ area, the pool of entrepreneurs who are willing to pay the moving costs shrinks and it is not worth paying the moving costs for entrepreneurs who were initially located beyond y^*.

Depending on the size of the moving costs and the tax benefits offered by an EZ program, we can imagine different possibilities. Panel b in Figure 3, displays the case where moving costs are zero and the tax benefits offered by the EZ zone are very small. In this case, the policy has no effect on the total number of establishments in the EZ plus non-EZ areas. All the increase in the number of establishments in the EZ zone are simply due to the full re-allocation of entrepreneurs from non-EZ to EZ zones.[12]

These graphs illustrate several points. First, it is crucial to identify the exact location of an EZ and its bordering areas in order to examine the effectiveness of EZ programs. Suppose the data consist of areas identified by zip codes and suppose that while the area $y \in [-1,0]$ gets designated as an EZ, the entire $y \in [-1, y^*]$ belongs to one zip code. Clearly, the effect of the EZ program will be difficult to assess correctly. Second, it will be impossible to draw welfare conclusions from this analysis. It is difficult to assess whether EZ designation stimulates new activity or causes relocation of business from non-EZ zones to the EZ zone. As far as EZ policies are concerned, both of these examples may be defined as success because reallocation within a state may be one of the

[12] Moving costs between census tracts in big rural states may be more significant. However, EZs are less prevalent in such states.

goals of an EZ program; however, it will be impossible to make welfare conclusions based on these findings.[13]

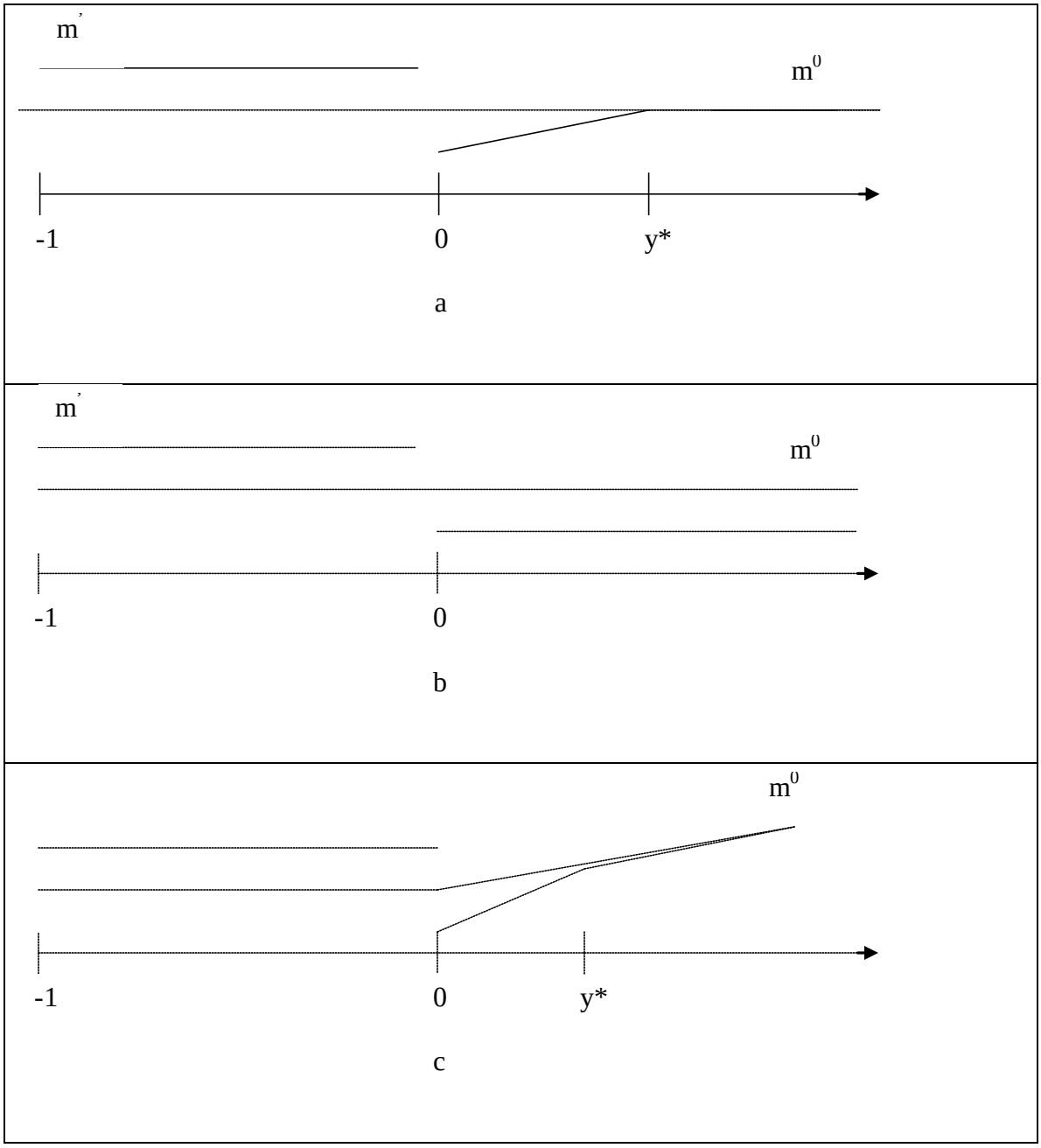


Figure 3: Effects of Policy at the Border

[13] Often a goal of an EZ program is to give individuals employment opportunities that may enhance their future marketability. There may also be efficiency gains if reductions in unemployment produce positive externalities.

In Figure 3c, we drop the assumption that entrepreneurs are uniformly distributed across the economy. We instead assume that if tax policies were the same across a given region, the area $y \in [-1,0]$ would have a lower number of establishments than the rest of the region. Indeed, enterprise zones are established in areas that are designated as distressed based on several characteristics, including low employment rates. In this case, the dotted line that represents the measure of establishments in both areas is lower in the EZ zone and increases gradually as one moves into the non-EZ area. Similar to Figure 3a, in a case with moving costs, establishment of EZ policies in $y \in [-1,0]$ causes an increase in the number of establishments in the EZ and a discrete decrease in the number of establishments at the border. If moving costs are negligible, then we will simply observe an overall decrease in employment in the area $y \in [0,1]$.

An additional complication arises if we allow the location of the enterprise to be different from the location of the residence for a given entrepreneur. Businesses may be able to hire workers from areas surrounding EZs. In general, the rules concerning eligibility for labor tax credits mandate certain conditions. In some states, to be eligible for tax credits, firms operating in EZ areas need to hire residents of that area. Some states have other eligibility requirements based on income, veteran status, eligibility for public assistance, etc. The areas that are designated as EZs appear to have a larger fraction of their population fulfilling these requirements compared to non-EZ areas. Nevertheless, this possibility may cause EZ policies to cause an increase in employment in the EZ areas as well as the surrounding area. However, their effect would decline as we get further away from the EZ areas.

Note that since our data set only consists of three areas—EZ, NEZ, and Rest--we will not be able to fully utilize the framework described above. In particular, we will not be able to analyze what happens to differences between two adjacent areas as one moves further in the non-EZ zone. We will, however, be able to examine the changes that take place in these three zones before and after the establishment of EZ policies.

2. Results

In this section we present three sets of analysis. In part A we provide data on census tracts that belong to EZs versus census tracts that are located right next to EZs and examine the changes in their economic conditions pre and post establishment. In part B we utilize a version of the mobility index that is commonly used in examining changes in income or wealth distribution over time to examine the transition matrices for the unemployment rate, poverty rate, and the fraction of people with wage and salary income between 1980-1990 and 1990-2000. In part C we run additional tests and also use the propensity score method to examine further the conditions of EZs.

A. Comparing economic conditions at the border: EZs established in the 1990s

In this section, we first examine the economic conditions that prevailed in EZs and census tracts that are located right next to EZs (NEZ) in 1980 and 1990.[14] Next, we examine the growth rates that were observed in these areas during this time period. Later, we investigate if the differences documented in the following tables are statistically significant.

In Table 1, we report the economic conditions of census tracts that were designated as EZs in the 1990s as well as the conditions at the bordering census tracts and the rest of the economy (number of census tracts for each area appear in parentheses).

Table 1a: Economic Conditions -EZs Established in the 1990s

	Poverty Rate %			**Unemployment Rate%**			**Fraction with W&S Income**		
	EZ (1420)	**NEZ (1767)**	**Rest (28849)**	**EZ (1420)**	**NEZ (1799)**	**Rest (28483)**	**EZ (1462)**	**NEZ (1887)**	**Rest (31929)**
1980	16.8	12.5	10.3	8.1	7.2	6.6	73.47	77.49	79.22
1990	26.6	19.5	15.4	9.3	7.5	6.4	73.45	77.02	78.60
2000	18.7	14.4	11.7	8.1	7.3	6.4	74.83	77.08	78.32
? 80-90	9.8	7.0	5.0	1.2	0.30	-0.18	-0.01	-0.46	-0.62
? 90-00	-7.9	-5.1	-3.6	-1.1	-0.19	-0.03	1.37	0.06	-0.28

The data displayed in Table 1a suggest that areas that are designated as EZs suffer from high poverty and unemployment rates. The right hand side of Table 1a reports data on the fraction of households with wage and salary income in these areas. Given that EZ policies are aimed at increasing the fraction of individuals who work in these census tracts, this measure seems important to examine. Our results show that a smaller fraction of the households in EZs have wage and salary income compared to the rest of the economy. It is interesting to compare the economic conditions displayed for EZs with census tracts that are at the border of EZs. While the areas labeled Near EZs are generally poorer than the rest of the economy, they display lower unemployment and poverty rates compared to EZs. In addition, a larger fraction of households have wage and salary income in these areas.

The bottom two rows of Table 1a display the changes that took place in these census tracts over time. For all three measures we report the percentage point change in them between 1980-1990 and between 1990-2000. These are averages of changes observed in each census tract belonging to these areas weighted by the 1990 population numbers in these areas. According to the results displayed in Table 1a, EZs performed significantly worse than the Near EZs or the rest of the economy in the pre-establishment period of 1980-1990 in the changes in the poverty and unemployment rates. In particular,

[14] Areas that were designated as EZs in 1980s or in 2000 and census tracts that are near those EZs are deleted from the data set in order to generate this table. Numbers in parentheses under the EZ labels indicate the number of census tracts that made up our data for those variables.

poverty rates increased 9.8% in EZs and 7.0% in Near EZs resulting in a significantly higher poverty rate in EZs compared to the areas surrounding them in 1990. Similarly, the increase in the unemployment rate in EZs is 1.2 percentage points compared to the 0.30 percentage point in Near EZs. Perhaps partly due to these differences, these areas were designated as EZs in the 1990s. When we examine the performance of these areas in the 1990-2000 post establishment period, we notice a dramatic reversal in the unemployment and poverty rates, both declining faster than those in Near EZs. Data on the fraction of households with wage and salary income display significant improvements in EZs in the 1990-2000 period compared to the near EZs or the rest of the economy. However, the results in the pre-establishment period also indicate that the decline in the fraction of households with wage and salary income were smaller in the EZs compared to near EZs or the rest of the economy.

Table 1b provides data on vacancy rates, median rent, and the real average wage and salary income in these census tracts that were established as EZs in 1990s. In general, vacancy rates are higher and the median rents are lower in EZs compared to the near EZs or the rest of the economy. However, the differences between EZs and near EZs seem smaller compared to the results in Table 1a. In addition, residents of EZs are poorer than those in the surrounding areas, with an average wage and salary income of $39,000 in 1990. [15]

Table 1b Economic Conditions -EZs Established in the 1990s

	Median Rent			Vacancy Rate %			Wage and Salary Income		
	EZ	**NEZ**	**Rest**	**EZ**	**NEZ**	**Rest**	**EZ**	**NEZ**	**Rest**
1980	$459	$528	$572	6.5	6.0	6.4	$33,560	$38,302	$42,125
1990	$522	$563	$614	7.3	7.0	7.1	$39,329	$44,404	$48,714
2000	$616	$658	$738	6.9	7.2	6.9	$45,142	$51,229	$56,745
? 80-90	19.9%	17.1%	17.9%	0.81	0.96	0.70	17.6%	15.1%	14.5%
? 90-00	20.9%	21.0%	24.5%	-0.42	0.19	-0.23	15.2%	15.4%	16.7%

Examining the changes that took place in these variables over time, we observe a similar change in the vacancy rates in EZs and Near EZs, 0.81 percentage point (pp) versus 0.96 pp pre-establishment. Post designation, there is a small decline in vacancy rates in EZs while vacancy rates increase in Near EZs. Data on median rent, on the other hand, display faster growth for EZs compared to Near EZs in the pre-establishment period and the same change in the post-establishment period. For the wage and salary income, we report the growth rate that took place between these time periods.[16] These results indicate that the real wage and salary income grew faster in EZs in the pre-

[15] Real wage and salary income are in 2000 prices. Similar results are obtained for real household income, which includes other income sources such as interest income, social security income and public assistance income.

[16] In calculating the average growth rate over the census tracts, we again used the 1990 population numbers as weights. Similar results are obtained with equal weighting of each census tract to obtain the averages.

establishment period compared to the surrounding areas. In the post-establishment period, on the other hand, income growth was slower in the EZs compared to the surrounding areas.

In Table 2, we perform a series of t-tests of null hypothesis that EZs and near EZs (as well as EZs and the rest of the economy and Near EZs and the rest of the economy) are drawn from the same distribution. The p-values for these tests of the null hypothesis are given in the first set of parentheses for each variable. The results in general indicate that the changes observed in poverty rate, unemployment rate and the fraction of individuals with wage and salary income in EZs are significantly different from those observed in surrounding census tracts. The results for rent and vacancy rates are mixed, with lower significance overall. In general, the differences between EZs and the rest of the economy appear to be economically much larger than the difference between EZs and Near EZs. In addition, the differences between Near EZs and the rest of the economy appear to be smaller than the differences between EZs and near EZs.

Table 2: Differences Across Areas-EZs Established in 1990s
(p values in parentheses)

D**80-90**	**Poverty Rate %**	**Unemp. Rate %**	**Wage and Salary Income**	**Fraction with W&S Income**	**Vacancy Rates %**	**Median Rent**
EZ vs. NEZ	2.8	0.9	2.5	0.45	-0.15	2.8
	(0.01)	**(0.01)**	**(0.01)**	**(0.03)**	(0.27)	(0.35)
EZ vs. Rest	4.8	1.38	3.1	0.61	0.11	2
	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**	(0.87)	(0.78)
NEZ vs. Rest	2.0	0.48	0.6	0.16	0.26	-0.8
	(0.10)	**(0.01)**	(0.14)	(0.30)	(0.10)	(0.40)
D**90-00**						
EZ vs. NEZ	-2.8	-0.91	-0.2	1.31	-0.61	-0.1
	(0.01)	**(0.01)**	(0.73)	**(0.01)**	**(0.01)**	(0.78)
EZ vs. Rest	-4.3	-1.07	-1.5	1.65	-0.19	-3.6
	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**	**(0.03)**	**(0.01)**
NEZ vs. Rest	-1.5	-0.16	-1.3	0.34	0.42	-3.5
	(0.01)	(0.34)	**(0.01)**	**(0.02)**	**(0.01)**	**(0.01)**

These results suggest that the performance of EZs in terms of poverty and unemployment rates were either significantly better than or as good as those in Near EZs post-establishment.[17]

[17] At this point, a natural question to ask may be whether the performance of EZs versus Near EZs depends on the exact establishment date. We have also examined the performance of EZs based on the sub-years they have been established. In particular, we have made the following four groups: 87-89 indicating EZs that were formed during 1987-1989; 90-92 indicating EZs that were formed during 1990-1992; 93-95 indicating EZs that were formed during 1993-1995; and 96-98 indicating EZs that were formed during 1993-1995. The general patterns continue to be present in the analysis of sub-periods. For example, EZs established in all the sub-periods except 90-92 experienced higher increases in poverty and unemployment rates in the 1980-1990 periods compared to near EZs. This pattern on poverty and unemployment rates is

B. Mobility Index

One of the advantages of the approach used in the previous section is the geographical information present in the areas labeled as EZ and NEZ. Given the proximity of these areas to each other, the approach can control for the unobserved heterogeneity that may be due to geographic considerations. On the other hand, one of the shortcomings of the previous analysis is that the areas labeled as EZ and NEZ display significant differences in their economic characteristics. Thus, it is not possible to argue that the EZ designation approximated a random assignment experiment, and any post-designation differences between tracts, therefore, could be ascribed to the designation itself. To overcome this shortcoming we employ a different procedure in this section.

We utilize a version of the mobility index that is commonly used in examining changes in income or wealth distribution over time.[18] In particular, we examine the transition matrices for the unemployment rate, poverty rate, and the fraction of people with wage and salary income between 1980-1990 and 1990-2000. Unlike the mobility index used in examining wealth distributions, we keep the sizes of different bins constant and examine the fraction of census tracts that move from one bin to another. This approach allows us to examine the changes in economic conditions in census tracts that were very similar pre-designation.

In Table 3, we summarize the results on the fraction of census tracts that move from five different unemployment rate clusters between 1980 and 1990 for our entire data set. The first row and the first column of Table 3 reports that 80% percent of census tracts in the 0-6% unemployment rate in1980 stayed in the same bin in 1990. There were 124 census tracts that had unemployment rates between 24% and 30% in 1980 and twenty nine percent of them remained in the same bin. The rest moved to a lower unemployment rate. Using this information, we could conclude that the chances of a census tract that was in the 24-30% unemployment rate in 1980 to move to a lower unemployment rate in 1990 was 71%.

Table 3: Unemployment Rate Mobility

1980		1990 u-rate				
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	20216	80%	19%	1%	0%	0%
6-12%	14020	41%	47%	10%	2%	0%
12-18%	2657	9%	39%	35%	13%	4%
18-24%	646	4%	19%	36%	28%	14%
24-30%	124	6%	8%	26%	31%	29%

reversed in the 1990-2000 period which is post establishment for all the EZs where they experienced a lower increase (or a higher decrease) in these rates.

[18] See for example, Díaz-Giménez, Quadrini and Ríos-Rull. (1997).

Pre-Establishment

In Table 4, we break the data set for census tracts that belong to EZs, NEZs and the rest of the economy and examine the changes in the unemployment rates for these sub-groups between 1980 and 1990, which represents the **pre-establishment** period for the areas that we call EZs of the 90s.[19] An advantage of this approach is its ability to compare across EZs and NEZs that are geographically and economically similar. In addition, the rest of the economy represents census tracts that are similar to the EZ and NEZ areas in terms of the particular economic variable being examined.

Table 4 presents the mobility index for these three areas. First, notice that most of the census tracts that belong to EZs and NEZs are distributed in the 0-12% unemployment rate range. The data suggest that of the 596 census tracts that were later designated as EZs that were in the 0-6% unemployment rate range in 1980, 52% of them stayed in the same unemployment range in 1990. The rest of the census tracts, 48% in this category, experienced an increase in their unemployment rates. On the other hand, 65% of the areas that are designated as NEZs that also were in the 0-6% unemployment range in 1980 stayed in the same unemployment range. Only 35% of that category experienced an increase in unemployment rates.

Table 4: Pre-Establishment Economic Mobility -Unemployment Rate

1980	1990 u-rate - EZs					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	496	52%	42%	6%	0%	0%
6-12%	738	22%	51%	21%	4%	1%
12-18%	173	2%	40%	41%	14%	2%
18-24%	49	2%	14%	35%	29%	20%
24-30%	14	7%	0%	36%	36%	21%

1980	1990 u-rate – NEZs					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	745	65%	33%	2%	0%	0%
6-12%	883	37%	52%	10%	1%	0%
12-18%	212	7%	51%	31%	8%	3%
18-24%	72	6%	26%	33%	24%	11%
24-30%	28	7%	14%	29%	25%	25%

1980	1990 u-rate - Rest					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	18317	82%	17%	1%	0%	0%
6-12%	11764	44%	46%	9%	1%	0%
12-18%	2095	9%	39%	35%	13%	4%
18-24%	502	5%	18%	36%	28%	13%
24-30%	98	5%	7%	26%	30%	33%

[19] All of these areas were designated as EZs in 1990s.

To test the significance of the differences in mobility in terms of unemployment rates of EZs from the NEZs or the rest of the economy, we compute the value of the c^2 statistic for each starting unemployment rate in 1980. This statistic tests whether each row of the transition matrix of EZs is statistically different from the corresponding row of the transition matrix for NEs (or the Rest). The statistic is distributed as a c^2 with 4 degrees of freedom. For all the rows of the matrix specified in Table 4, the hypothesis of independence between EZs and NEZs (and EZs and Rest) can be rejected at 1% significance level.[20]

Overall, these results indicate that during the pre-establishment periods, EZ areas performed significantly worse than the NEZ areas with similar unemployment characteristics.

Post-Establishment

In Table 5, we conduct the same exercise between 1990 and 2000 the post-establishment period for the EZs. We can examine the same unemployment bins as we did before and study the fraction of census tracts that have improved in these three areas. For example, 78% of the EZs that were in the 0-6% unemployment range in 1990 stayed in the same bin. The corresponding value for NEZs was 82%. In the 6-12% unemployment range, EZ and NEZ changes are similar. Compared to the pre-establishment period, the improvement observed in these three areas seems more similar to each other.

According to the c^2 tests for Table 6 the hypothesis of independence between EZs and NEZs can be rejected at 1% significance level for starting unemployment rates of 12-30%. However, notice that in this range, EZs perform better than NEZs between 1990 and 2000. For the starting unemployment rate of 6-12%, EZ and NEZ areas are no longer significantly different from each other, and for the unemployment rate of 0-6% the significance goes down to 10%. These results indicate that mobility characteristics of EZs are either very similar to NEZs or better than the NEZs in the post-establishment period.

[20] The precise values of the c^2 can be obtained from the authors.

Table 5: Post-Establishment Economic Mobility-Unemployment Rate

1990	2000 u-rate - EZs					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	429	78%	18%	2%	1%	0%
6-12%	661	44%	45%	10%	1%	1%
12-18%	277	8%	48%	34%	7%	2%
18-24%	77	1%	32%	39%	19%	8%
24-30%	26	0%	8%	58%	19%	15%

1990	2000 u-rate - NEZs					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	830	82%	17%	1%	0%	0%
6-12%	835	43%	45%	10%	2%	0%
12-18%	199	10%	43%	32%	13%	2%
18-24%	53	2%	13%	36%	34%	15%
24-30%	23	0%	13%	17%	39%	30%

1990	2000 u-rate - Rest					
u-rate	N	0-6%	6-12%	12-18%	18-24%	24-30%
0-6%	20334	85%	14%	1%	0%	0%
6-12%	9439	41%	47%	10%	2%	1%
12-18%	2152	9%	40%	33%	13%	4%
18-24%	626	6%	18%	32%	30%	15%
24-30%	225	5%	13%	26%	35%	21%

An easy way to summarize the findings in these tables is to generate summary statistics which indicates the percentages of census tracts in each unemployment bin that moved to a better unemployment rate between these time periods. Table 6 presents these summary statistics.

Table 6: Percentage of census tracts that improved: Unemployment

U-rate	Pre-establishment: 1980-1990				
in 1980	EZ	NEZ	REST	EZ-NEZ	NEZ-REST
6-12%	22	37	44	-15	-7
12-18%	43	58	48	-15	9
18-24%	51	65	59	-14	7
24-30%	79	75	67	4	8

U-rate	Post-establishment: 1990-2000				
in 1990	EZ	NEZ	REST	EZ-NEZ	NEZ-REST
6-12%	44	43	41	1	2
12-18%	56	53	50	4	3
18-24%	73	51	55	22	-4
24-30%	85	70	79	15	-10

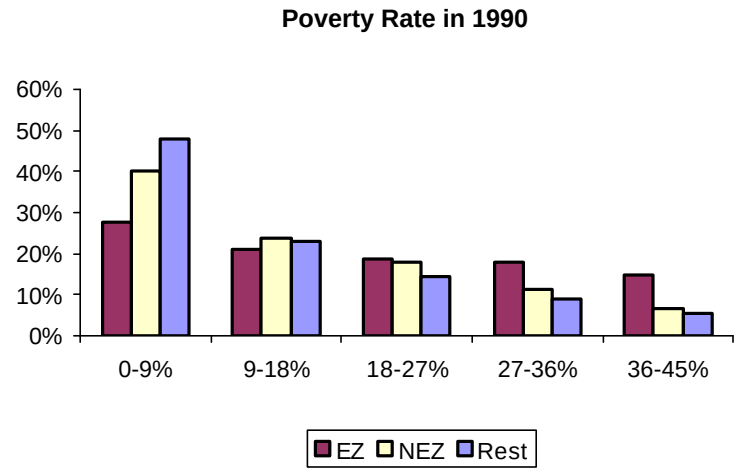
The first three columns of Table 6 present the fraction of census tracts that have shown an improvement in their unemployment rates for EZs, NEZs and the rest of the economy. Except for the few census tracts that were in the highest unemployment bin, all the census tracts that belong to EZs performed worse between 1980 and 1990 relative to near EZs or the rest of the census tracts in the economy. For example, only 22% of EZs that were in the 6%-12% unemployment rate experienced an improvement in the unemployment rate in 1990 as opposed to 37% for NEZs and 44% for the rest of the census tracts. The last two columns summarize the differences between the EZs and NEZs as well as the differences between NEZs and the REST. Notice that in the pre-establishment period, the fraction of census tracts that experience an improvement in their unemployment rates are lower in EZs compared to NEZs for all unemployment rates up to 24%.

The second part of Table 6 summarizes the fraction of census tracts that have shown post-establishment improvement for EZs, NEZs and the rest of the economy. The results indicate that the fraction of census tracts that experienced an improvement in their unemployment rates was higher for EZs for almost all the unemployment bins. According to these findings, the rest of the census tracts that had high unemployment rates did not experience as big an improvement as the areas that were designated as EZs. In particular, EZs that were in very high unemployment bins seem to have improved significantly better than the NEZs while NEZs performed worse than the rest of the census tracts with high unemployment rates.

In Figure 4, we display the poverty characteristics of EZs compared to the entire economy in 1990. In general, we can observe that a larger fraction of EZs display higher poverty rates compared to the entire economy or to the NEZs. For example, while about 50% of the census tracts in the economy (and 40% of the NEZs) are in the 0-9% poverty rate range, only 30% of the EZs fall into this range. Meanwhile, about 20% of EZs are in the 36-45% poverty rate while the corresponding fractions are 9 and 11 for the entire economy and the NEZs, respectively.[21]

[21] Similar to the analysis conducted for unemployment rates, we examine the c^2 statistics for each row of the transition matrix to test the hypothesis significance of the difference in mobility between EZs and NEZs. For the 1980-1990 period, the hypothesis of independence can be rejected at 1% significance level for starting poverty rates of 0-27% where EZs often move to higher poverty rates. In the 1990-2000 period the two areas become much more similar where the hypothesis of independence can only be rejected at 1% for the 0-9% poverty rate, and at 5% for the 18-27% poverty rate. For the rest of the starting poverty levels the c^2 values are insignificant.

Figure 4: Poverty Rates in EZ, NEZ and the Rest of the Economy



In Table 7, we summarize the information on mobility for the poverty rate by presenting the fraction of census tracts that experienced an improvement between 1980 and 1990 (pre-establishment) and 1990-2000 (post establishment) in the fraction of individuals under poverty in those tracts.

Table 7: Percentage of census tracts that improved: Poverty

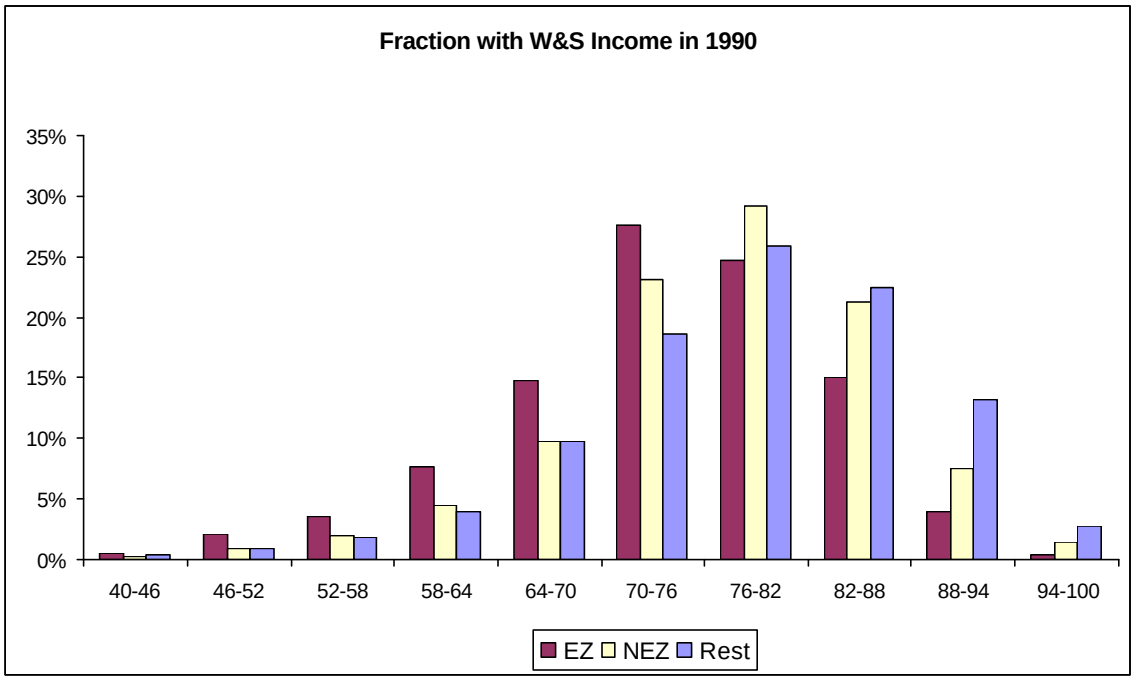
Poverty rate in 1980	EZ	NEZ	1980-1990 REST	EZ-NEZ	NEZ-REST
9-18%	16	17	22	-1	-5
18-27%	11	21	23	-10	-2
27-36%	24	28	36	-4	-8
36-45%	45	38	51	8	-14

Poverty rate in 1990	EZ	NEZ	1990-2000 REST	EZ-NEZ	NEZ-REST
9-18%	49	45	49	4	-4
18-27%	70	70	72	0	-2
27-36%	83	79	83	4	-4
36-45%	89	89	90	0	-1

Results in Table 7 indicate that mobility into lower poverty rates has increased for all areas. We also notice that EZ performance becomes similar to the rest of the census tracts with comparable poverty statistics. In fact, the gap between the EZs and the rest of the census tracts that have similar poverty characteristics in the fraction of census tracts that show an improvement practically closes between 1990 and 2000.

In Figure 5, we summarize the distribution of census tracts with respect to the fraction of the people with wage and salary income in the EZs, NEZs and the rest of the economy. We observe that a larger fraction of EZs fall into deciles that represent lower fractions of the population with wage and salary income.

Figure 5: Fraction of individuals with Wage and Salary Income



In Table 8, we summarize the results of the mobility index by presenting the fraction of the census tracts that showed improvement in the fraction of people with wage and salary income in EZs, NEZs and the rest of the census tracts that have similar characteristics with respect to this measure. The results for this variable are smaller than the previous results. We observe large differences between EZ-NEZs pre and post establishment for the lower tail of this distribution. For example, EZ census tracts in the 40-46% range show an improvement of 11% relative to NEZs in that range pre-establishment and a 20% improvement post establishment. However, the fraction of census tracts in this range for both areas is very small. The majority of census tracts for all areas lie in the 58-94% range. If we compare the fraction of census tracts that experience an improvement in the EZ versus NEZ areas for this range, we see small differences pre and post establishment.[22]

[22] The results of the c^2 tests for the hypothesis of independence between EZs and NEZs can be rejected at 1%-10% significance level for starting W&S income fractions of 40-52%, 70-76% and 82-100%. In the post-establishment period the hypothesis of independence between EZs and NEZs can be rejected at 1%-10% significance level for all starting W&S income fractions except the 64-76% range.

Table 8: Percentage of census tracts that improved: W&S Income

Fraction with W&S income	EZ	NEZ	1980-1990 REST	EZ-NEZ	NEZ-REST
40-46	86	75	68	11	7
46-52	57	76	73	-19	4
52-58	53	53	62	0	-9
58-64	60	57	59	3	-1
64-70	46	45	49	1	-4
70-76	30	35	38	-5	-3
76-82	22	22	24	0	-2
82-88	8	9	16	-1	-7
88-94	6	5	7	1	-2

Fraction with W&S income	EZ	NEZ	1990-2000 REST	EZ-NEZ	NEZ-REST
40-46	100	80	82	20	-2
46-52	73	53	71	20	-18
52-58	84	58	68	26	-10
58-64	63	55	59	8	-4
64-70	53	54	52	-1	2
70-76	40	41	40	-1	1
76-82	25	19	25	6	-6
82-88	9	12	12	-2	-1
88-94	4	5	6	-1	-1

Overall, our results in this section indicate that areas that were designated as EZs displayed lower mobility rates to better economic conditions compared to NEZs in the pre-establishment period, and higher mobility rates to better economic conditions compared to NEZs in the post-establishment period. This result is more pronounced for EZs that were in the lower tail of the distribution in terms of these economic indicators.

C. Additional Tests

In this sub-section we run several different regressions to examine the significance of our earlier findings:

Model 1:

$$Y_j = \sum_{i=1}^{N} b_i state_{i,j} + b_{ez} EZ_j + b_{nez} NEZ_j + e_j$$

where Y_j is the dependent variable that is equal to the change in the poverty rate, unemployment rate or the wage and salary income for census tract *j* for a given regression. $state_{i,j}$ is a dummy variable, which is 1 if the census tract *j* is in state *i* and

zero otherwise. EZ_j is a dummy variable that is equal to 1 if census tract *j* is an Enterprise Zone and zero otherwise and NEZ_j is a dummy variable that is equal to 1 if census tract *j* is a Near-EZ and zero otherwise. We run this regression for the 1980-1990 and 1990-2000 periods. The results in Table 9 are similar to the ones obtained in earlier tables. In terms of the poverty rate, there seems to be an economically and statistically important change post-establishment compared to pre-establishment. For unemployment rates, EZs display significant increases pre establishment and an insignificant change post establishment. The significance of the results for household income is more mixed. Table C1, in Appendix C, displays the full set of results for this regression.

Table 9: Differences Across Areas – EZs of 1990s

	Poverty Rate		**Unemployment Rate**		**Fraction with W&S Income**	
	?80-90	**?90-00**	**?80-90**	**?90-00**	**?80-90**	**?90-00**
b_{ez}	6.47*	-5.67*	0.71*	-0.11	0.79*	1.87
t-stats	(18.83)	(-17.38)	(6.70)	(-0.88)	(4.38)	(10.48)
b_{nez}	2.79*	-2.19*	0.06	0.19***	0.06	0.55*
t-stats	(9.75)	(-8.07)	(0.65)	(1.85)	(0.43)	(3.80)

* 1% significance; ** 5% significance; *** 10% significance.

It is possible to question whether the observed decline in poverty or unemployment rates for EZs between 1990-2000 can simply be a function of the increased poverty and unemployment rates they had experienced between 1980-1990. To examine this issue further, we ran several other regressions that include the changes in poverty and unemployment rates between 1980-1990 as control variables. In particular, we have the following two specifications:

Model 2:

$$Y_j^{90-00} = \sum_{i=1}^{N} b_i state_{i,j} + b_{ez} EZ_j + b_{nez} NEZ_j + b_{80-90} Y_j^{80-90}$$

Model 3:

$$Y_j^{90-00} = \sum_{i=1}^{N} b_i state_{i,j} + b_{ez} EZ_j + b_{nez} NEZ_j + b_{80-90} Y_j^{80-90} + g_{ez}\left(Y_j^{80-90} EZ_j\right) + g_{nez}\left(Y_j^{80-90} NEZ_j\right) + e_j$$

where Model 2 simply examines the impact of having experienced increased poverty rates, for example, between 1980-1990, and Model 3 takes into account the interaction between the previous changes in poverty and unemployment rates and the EZ designation.

Table 10: Differences Across Areas – EZs of 1990s

	Poverty Rate		Unemployment Rate		Fraction with W&S Income	
	Model 2	**Model 3**	**Model 2**	**Model 3**	**Model 2**	**Model 3**
b_{ez}	-0.48*	-0.23	0.11	0.16	1.92*	1.92*
t-stats	(-2.72)	(-1.07)	(0.9)	(1.26)	(10.8)	(10.8)
b_{nez}	0.05	-0.26	0.21**	0.20**	0.56*	0.57*
t-stats	(0.33)	(-1.51)	(2.09)	(2.01)	(3.83)	(4.04)
b_{80-90}	-0.80*	-0.80*	-0.31*	-0.31*	-0.07*	-0.07*
t-stats	(-283.78)	(-266.61)	(-48.18)	(-44.88)	(-13.29)	(13.47)
g_{ez}		-0.03**		-0.06**		0.02
		(-2.13)		(-2.16)		(0.76)
g_{nez}		0.04*		0.02		0.07*
		(3.42)		(0.84)		(2.99)

* 1% significance; ** 5% significance; *** 10% significance.

Results for Model 2 presented in Table 10 show that census tracts that experienced worsening economic conditions in the 1980-1990 period experienced a statistically significant improvement in unemployment and poverty rates in the 1990-2000 period. However, b_{ez} is still significant for poverty rate and for the fraction of households with W&S income indicating the added role of being an EZ. Model 3 further examines if census tracts that were designated as EZs have experienced better economic conditions beyond those experienced on average by poorer areas. The interaction term g_{ez} shows the incremental effect of being in an EZ to be -0.03 for poverty rate. In Table 1, we document that the increase in the poverty rate in EZs between 1980 and 1990 was 9.8% on average as opposed to 5% in the rest of the census tracts. This data together with g_{ez} = - 0.03 imply that the decline in EZs in the 1990-2000 period will be 8.13% as opposed to areas that do not belong to EZs where the decline would be 4%. The actual declines observed in Table 1 for the 1990-2000 periods were 7.9% and 3.6%.

Propensity Score

To examine the impact of enterprise zone programs, previous studies have used a propensity score matching model.[23] The propensity score is the conditional probability that a census tract is chosen as an enterprise zone given the observed characteristics of the census tract in 1990. This probability is estimated as a function of economic and demographic characteristic using a logit regression. Next, a propensity matched pair sample is created using greedy matching techniques.[24]

[23] In particular, we follow the procedure used in O'Keefe (2004).

[24] This technique is explained in detail in Parsons, L.S. http://www2.sas.com/proceedings/sugi26/p214-26.pdf

The designation of a census tract as an enterprise zone depends on several economic conditions such as unemployment rates and poverty rates as well as demographic characteristics such as education. Table 11 presents the results of the logit regression which indicates that the probability of becoming an enterprise zone increases with unemployment, poverty, low per capita income and low education. All these variables are significant at 1%.

Table11: Logit Regression Results

Variable in 1990	Coefficient (st. error)
Unemployment	4.96 (0.74)
Fraction with HS degree only	4.97 (0.56)
Per capita income	-0.24 (0.07)
Poverty rate	1.32 (0.22)
Black-Hispanic	-0.97 (0.13)

Using the propensity scores obtained from the above procedure, EZ census tracts are matched with areas that are not EZs. Table 12 summarizes the economic characteristics of the EZs and their matches based on the characteristics that were summarized in tables 1a and 1b. In this sample there are 1429 census tracts that are EZs and 1429 matches. This table confirms that, except for the vacancy rate, the matches that were chosen using the propensity score method have similar characteristics as EZs.

Table 12: Summary Statistics

Economic characteristic in 1990	EZ	Match
Poverty	28.39	28.32
Unemployment	9.45	9.20
Fraction with W&S income	73.61	74.21
Median Rent	493.43	457.62
Vacancy Rate	7.50	8.79
Wage and Salary Income	38,789	37,741

The next step in the procedure is to provide estimates of the impact of the enterprise zone designation by running a regression with fixed effects for each matched census tract pair such as:

$$Y_j^{90-00} = a_i + b_{ez} + u_j$$

where *j* represents census tracts, and *i* indexes a matched pair composed of an EZ and a non-EZ census tract and the variable *Y* indicates changes in the economic variable of interest between 1990 and 2000. Table 13 presents the coefficients on enterprise zone status for the unemployment rate, poverty rate and the fraction of people with wage and salary income between 1990 and 2000. The impact on the unemployment rate is the only

one that is statistically significant in this regression with an R^2 of 0.58. These results suggest that unemployment in zones declined 0.64% faster than it would have without the program. [25]

Table 13: Impact of EZ designation on	
	Matched pair fixed effects: (st. error)
Poverty	0.61 (0.44)
Unemployment	-0.64 (0.17)*
Fraction with W&S income	0.09 (0.23)

3. Conclusions

In this paper, we use a national database and precise census tract matching to examine the performance of many states' enterprise zones that were established in the 1990s. Our data set allows us to compare economic characteristics of EZs relative to census tracts that are at the border of EZs, which we call NEZs. This geographic richness allows us to overcome some of the limitations in previous work regarding unobserved heterogeneity. [26] Using EZs nationally and examining a 20-year time frame also allow for a richer study than previous work that was limited to a few states or a shorter timeframe.

Our results suggest that census tracts that were designated as EZs experienced larger declines in unemployment and poverty rates compared to the areas surrounding them, or compared to the areas that had similar unemployment and poverty rates. The post-establishment experience was in marked contrast to the pre-establishment experience with respect to unemployment and poverty.

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[25] We have experimented with several different specifications of the propensity score matching model. In all the cases we find the coefficient on unemployment significant both economically and statistically.

[26] It would have been desirable to examine if we would detect similar facts about EZs if we were to use data at the zip code level similar to many other studies in this area. However, equating zip codes to census tracts is a bit of a challenge because as a rule they do not line up very well. Zip code boundaries routinely cut across census tracts and vice versa.

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Appendix A

Table A1: Enterprise Zone Starting Dates and Tax Credits by State

State	Starting Year	Payroll/Property Credit	State	Year	Payroll/Property Credit
Alaska		No/no	Missouri	1986	Yes/no
Alabama	1987	Yes/no	Montana		No/no
Arizona	1990	Yes/no	Nebraska	1994	Yes/yes
Arkansas	1993	Yes/no	Nevada		N/a-no tax
California	1986	Yes/no	New Hampshire		No/no
Colorado	1986	Yes/yes	New Jersey	1988	Yes/no
Connecticut	1990	No/yes*	New Mexico	2001	Yes/no
Delaware	1984	Yes/yes	New York	1994	Yes/yes
Florida	1995	Yes/no	North Carolina	1997	Yes/no
Georgia	1994	Yes/no	North Dakota		No/no
Hawaii	1994	No/yes*	Ohio	1983	Yes/no
Idaho		No/no	Oklahoma	1983	Yes/yes
Illinois	1983	Yes/yes	Oregon	1985	Yes/no
Indiana	1983	Yes/no	Pennsylvania	2001	Yes/no*
Iowa	1994	Yes/no	Rhode Island	1992	Yes/no
Kansas	1990	Yes/no	South Carolina	1994	Yes/no
Kentucky	1983	Yes/no	South Dakota		N/a-no tax
Louisiana	1981	Yes/no	Tennessee		No/no
Maine		No/no	Texas	1995	Yes/yes
Maryland	1992	Yes/no	Utah	1997	Yes/no
Massachusetts	1987	No/yes	Vermont		No/no
Michigan	1985	No/yes*	Washington		N/a-no inc. tax
Minnesota	1985	Yes/no	West Virginia	1984	No/yes
Mississippi		No/no	Wisconsin	1989	Yes/no
			Wyoming		N/a-no tax

Source: Commerce Clearing House *Multistate Tax Guide, 2003*; * indicate profits credit. Note:Pennsylvania and Minnesota changed to profits based credits after 2000. Maine initiated EZ program in 2004. Most of Kentucky EZs expired before 2004.

Appendix B

Developing a Time Series Decennial Census Database by Census Tract - Methodology

Data Sources

1980 Census -- Acquired from the historical census data archive at the Center for International Earth Science Information Network (CIESIN) at Columbia University.

1990-Census -- Applied Geographic Solutions (AGS) Thousand Oaks, CA. This was subsequently changed to CIESIN.

2000 Census -- Census 2000 Summary File 3 DVD in ASCII format from the U.S. Census Bureau.

Geographic Equivalency -- MABLE `98/Geocorr v.3.0 Geographic Correspondence Engine, Office of Social and Economic Data Analysis -- University of Missouri.

1990 Census Tract Boundaries -- Environmental Systems Research Institute (ESRI) Maps and Data CD. Census Tract boundaries in shapefile format were converted to Atlas GIS format for processing.

2000 Census Tract Boundaries -- Environmental Systems Research Institute (ESRI) Maps and Data CD. Census Tract boundaries in shapefile format were converted to Atlas GIS format for processing.

Processing Procedures

Geographic Equivalency File -- A geographic equivalency file was created for purposes of relating 1990 Census Tracts to their equivalent 1980 Census Tracts. Files were created individually for each state using the MARBLE/Geocorr v.3.0 engine at the University of Missouri Office of Social and Economic Data Analysis (OSEDA). The equivalency file contains essentially three fields:

- 1990 Census Tract
- The equivalent 1980 Census Tract
- An allocation factor to be applied to the 1980 Census Tract

In cases where the 1980 tract definition is exactly the same as the 1990 definition, the allocation factor is 1.0. In cases where a tract was split in 1990, the allocation factor contains the percent of the 1980 area to be allocated to the equivalent 1990 definition. Once downloaded, the 50 state files were combined into a single national file and the numbers of unique tracts for 1990 and 1980 were counted to validate that all tracts had been accounted for.

1980 Dataset

- ·Historical archive files were downloaded for each of the 50 states from CIESIN FTP site.
- Since the archive file includes records for every level of geography for each state, census tract level records were identified and extracted based on a SUMMARY LEVEL value of "14" (Census Tracts/BNAs) for the required fields.
- The extracted records were converted from the SAS Transport format to DBF format.

- All of the state files were then combined into a single national file and the numbers of census tract records were validated to ensure no missing or duplicate records.
- Once the national file was created, it was re-aggregated to 1990 tract definitions using the geographic equivalency file created with the MARBLE/Geocorr engine.
- The number of 1990 tract definition records was then verified to ensure no missing or duplicate records.
- ·The national file based on the 1990 tract definitions was then converted to 2000 census tract definitions using Atlas GIS together with 1990 and 2000 Census Tract boundary files. Geospatial processing was performed to allocate demographic attributes from 1990 tract definitions to 2000 tract definitions based on the square mileage of the layered tracts. This approach is similar to that used to convert from 1980 to 1990 but without the use of an equivalency file.

1990 Dataset

- A single national file was created containing the census tract level records for all states in the U.S. for the required fields on 2000 Census Tract definitions.
- The number of census tract records in the dataset was validated to confirm no missing or duplicate records.

2000 Dataset

- Since the SF3 DVD includes records for every level of geography for each state, census tract level records were identified and extracted based on a SUMMARY LEVEL value of "140" (Census Tract/BNAs) for the required fields.
- Tract level records were extracted from the required fields and converted to DBF files on a state-by-state basis.
- Individual state files were then merged into a single national file containing records for all census tracts in the U.S.
- All of the state files were then combined into a single national file and the number of census tract records was validated to ensure no missing or duplicate records.

Combined Time Series Dataset

- To produce the combined file, the 1980, 1990, and 2000 files were matched using the common 2000 census tract to create a single flat file.
- The combined flat file was then loaded into Atlas GIS as an attribute table for 2000 census tract boundaries and overlaid with enterprise zone and TEA boundaries. Based on whether the centroid (geographic center) of each tract polygon was within an EZ , the appropriate EZ identifier was added to each census tract record.

Holes in the 1980 Tract Boundaries

One of the major limitations to the 1980 Census was that only urbanized areas were assigned census tracts. Although the census equally covered the entire nation, small area aggregations are only available for the areas which were assigned census tract/BNA boundaries. Consequently, when 1980 census tracts data are converted to 2000 definitions, a number of 2000 tract records have no corresponding data values for 1980 due to the lack of reporting.

Although the combined file contains records for every 2000 census tract definition, EZs and TEAs containing tracts with missing 1980 values are discarded from the analysis since they will show artificially high population growth for many tracts that contain population values for 2000 but not for 1980. The total database contains 1,212 unique EZ definitions, of which 304 have one or more census tracts missing data for 1980.

Appendix C

Table C1: Model 1 Regression Results
(standard errors in parentheses)

	Change in Poverty Rate%		Change in Unemployment Rate%		Change in Fraction of HH's w/ W&S %	
	80-90	**90-00**	**80-90**	**90-00**	**80-90**	**90-00**
$ß_{EZ}$	6.47*	-5.67*	0.71*	-0.11	0.79*	1.87*
	(0.34)	(0.33)	(0.11)	(0.13)	(0.18)	(0.18)
$ß_{NEZ}$	2.79*	-2.19*	0.06	0.19***	0.06	0.55*
	(0.29)	(0.27)	(0.09)	(0.10)	(0.15)	(0.15)
Alabama	6.04*	-5.86*	-0.61*	0.07	-0.30	-1.55*
	(0.48)	(0.45)	(0.15)	(0.18)	(0.49)	(0.49)
Arizona	11.01*	-7.13*	1.34*	-1.18*	0.57	-0.00
	(0.45)	(0.42)	(0.14)	(0.16)	(0.47)	(0.47)
California	4.35*	-1.80*	-0.05	0.44*	1.83*	-0.93**
	(0.15)	(0.15)	(0.05)	(0.06)	(0.43)	(0.44)
Colorado	8.32*	-7.56*	0.89*	-1.52*	-1.35*	-0.24
	(0.43)	(0.41)	(0.14)	(0.16)	(0.47)	(0.47)
Connecticut	2.10*	-1.57*	0.88*	0.05	0.89***	-1.81*
	(0.40)	(0.38)	(0.13)	(0.15)	(0.48)	(0.47)
Delaware	0.07	-2.45*	-2.36*	1.51*	0.37	-1.22**
	(0.83)	(0.79)	(0.26)	(0.31)	(0.61)	(0.60)
D.C.	2.10**	0.26	1.09*	3.83*	1.073***	-2.55*
	(0.86)	(0.82)	(0.27)	(0.32)	(0.62)	(0.62)
Florida	5.60*	-4.41*	0.77*	0.16***	3.17*	-0.21
	(0.24)	(0.23)	(0.08)	(0.09)	(0.44)	(0.43)
Hawaii	1.49**	-0.94	-1.54*	3.32*	-0.48	-4.50*
	(0.77)	(0.73)	(0.25)	(0.30)	(0.57)	(0.56)
Illinois	6.94*	-5.56*	0.49*	-0.41*	-0.46	0.89**
	(0.23)	(0.22)	(0.07)	(0.09)	(0.44)	(0.44)
Indiana	7.61*	-6.06*	-1.49*	-0.50*	-1.07**	0.37**
	(0.36)	(0.34)	(0.11)	(0.13)	(0.46)	(0.46)
Iowa	6.22*	-5.76*	-0.23	-0.12	-0.64	0.85
	(0.68)	(0.64)	(0.22)	(0.26)	(0.55)	(0.55)
Kentucky	9.61*	-8.80*	-0.94*	-0.92*	-0.66	0.29
	(0.50)	(0.48)	(0.16)	(0.19)	(0.50)	(0.49)
Maryland	2.44*	-1.78*	-1.03*	1.00*	0.42	-1.64*
	(0.35)	(0.33)	(0.11)	(0.14)	(0.46)	(0.46)
Massachusetts	0.57	-0.99*	1.59*	-2.27*	1.12**	-1.29*
	(0.36)	(0.34)	(0.11)	(0.14)	(0.47)	(0.46)
Minnesota	6.54*	-5.96*	0.44*	-1.06*	-0.06	0.80***
	(0.39)	(0.37)	(0.13)	(0.15)	(0.47)	(0.46)
Missouri	-6.90	4.06	-0.22***	-0.26***	-0.23	-0.05
	(8.02)	(7.62)	(0.12)	(0.15)	(0.47)	(0.46)
Nebraska	7.27*	-5.76*	-0.17	0.08	-0.29	-0.34
	(0.69)	(0.66)	(0.23)	(0.27)	(0.55)	(0.54)
New Jersey	1.54*	-1.96*	-0.95*	0.27*	2.31*	-0.84***
	(0.26)	(0.25)	(0.08)	(0.10)	(0.45)	(0.44)
New York	3.87*	-2.73*	-0.15*	0.25*	2.45*	-0.87**
	(0.17)	(0.16)	(0.05)	(0.06)	(0.43)	(0.43)
Ohio	8.83*	-7.08*	-0.71*	-1.65*	-2.32*	0.91**
	(0.24)	(0.23)	(0.07)	(0.09)	(0.44)	(0.44)
Oklahoma	12.10*	-8.36*	3.34*	-1.50*	-1.03**	-0.48
	(0.44)	(0.42)	(0.15)	(0.18)	(0.48)	(0.47)
Oregon	5.97*	-4.73*	-1.83*	0.28	-0.65504	0.57
	(0.48)	(0.46)	(0.15)	(0.18)	(0.49157)	(0.49)
Rhode Island	2.52*	-0.93	-0.42***	-0.99*	0.56	-1.35
	(0.75)	(0.72)	(0.23)	(0.28)	(0.58)	(0.58)
Virginia	3.07*	-3.71*	-0.11	-0.01	0.04	-1.41**
	(0.31)	(0.29)	(0.10)	(0.12)	(0.45)	(0.45)
Washington	6.28*	-5.16*	-1.56*	0.52*	0.21	0.51
	(0.35)	(0.33)	(0.11)	(0.13)	(0.46)	(0.45)
Wisconsin	8.86*	-6.29*	-0.13	-0.26***	-1.16**	2.25*
	(0.42)	(0.40)	(0.13)	(0.16)	(0.48)	(0.47)
R2	0.24	0.17	0.07	0.05	0.07	0.03

* 1% significance; ** 5% significance; *** 10% significance.