The Effect of Revenue Loss from Enterprise Zone Tax Incentives on Economic Development

Anita Yadavalli

Senior Fiscal Analyst, Indiana Legislative Services Agency, USA

200 West Washington Avenue, Indianapolis, IN 46204

anita.yadavalli@iga.in.gov

Abstract

The designation of enterprise zones (EZ) within "distressed" areas across various parts of the United States has burgeoned considerably since its onset during the early 1980s. Used as an economic development tool, EZs have been utilized for the revitalization of traditional downtown areas or old industrial and manufacturing areas that have undergone a protracted period of decline. Firms within EZs often receive some combination of labor and capital tax incentives. This article examines various measures of economic development during the period 2006 to 2015 for firms receiving at least one tax incentive. The results suggest that, on average, employment tends to rise more significantly for firms receiving a modest amount in tax incentives than for those receiving above-average amounts. Additionally, the results suggest that fewer tax savings are being translated into higher wages as firms continue to receive incentives. Lastly, firms that receive much more in tax incentives do not invest any differently or experience any higher property values than firms that receive very little.

Keywords: enterprise zones; economic development, employment, property values, generalized propensity score

JEL: C21; H25

I. Introduction

The designation of enterprise zones (EZ) within "distressed" areas across various parts of the United States has burgeoned considerably since its onset during the early 1980s. Used as an economic development tool, EZs have been utilized for the revitalization of traditional downtown areas or old industrial and manufacturing areas that have gone through a protracted period of decline. Businesses within EZs, which are designated largely on the basis of high unemployment and poverty rates, often receive some combination of tax incentives such as property tax abatements, income tax deductions and credits for employment creation and capital investment.

Policymakers aim to know whether these types of tax breaks necessarily induce businesses to create new jobs. EZs are spatially targeted programs, as their primary goals are to reduce blight and spur economic development. Prior research finds inconclusive results with respect to the effectiveness of EZs on economic development. A cause for disparity could be the nature of the program itself. EZs in the U.S. date back to 1980, when individual states initiated policy rather than the federal government. There exist gross differences across state practices with respect to designation of EZs, since states focus their community revitalization efforts on needs and preferences.

This article aims to understand the impact of EZs on economic development, thereby motivating two research questions: 1) Does revenue loss to the state from labor and capital incentives offered to EZ businesses directly affect their economic growth? and 2) If so, is there a threshold beyond which revenue loss has no impact? To answer these questions, this article examines 23 designated EZs in the State of Indiana during the period 2006 to 2015. We aim to remove the potential endogeneity between tax savings to each EZ business (i.e., revenue loss to the state) and economic development with generalized propensity score (GPS) matching for continuous treatments.

We examine various measures of economic development including employment, wages, capital investment and property values at the block-group level during the period 2006 to 2015 for firms receiving at least one tax incentive for capital investment, employment expenses or loans. The results suggest that, on average, employment tends to rise more significantly for firms receiving a modest amount in tax incentives than for those receiving above-average amounts. Additionally, the results suggest that fewer tax savings are being translated into higher wages as firms continue to receive incentives. Lastly, firms that receive much more in tax incentives do not invest any differently or experience any higher property values than firms that receive very little.

The article is arranged as follows. Section II summarizes relevant literature on EZs. Section III describes the GPS method used to remove potential endogeneity. Section IV describes the data sample and relevant variable characteristics. Section V provides a discussion of empirical results, and section VI provides the conclusion.

II. Background

The idea of EZs evolved from British policy. While Britain has aimed for the betterment of the welfare of local residents through EZ policy, it has been less successful than the U.S. Rubin and Richards (1992) argue this is mainly due to Britain's lack of existing industrial and commercial activity and lack of formal organization and professional management of its zones as in the U.S. As of 2012, 43 states have EZ programs with over 3,000 EZs. Some states have designated particular areas of the state as zones while others have designated the entire state.

State EZs function on the basis set by state law. Each state's program is different and specifies criteria for its areas to meet in order to be designated an EZ. While many EZs are generally designated on the basis of high unemployment and poverty rate, some are designated by low income, population decline, high building vacancy rate or high proportion of aging buildings. A business located within a zone or one that relocates to a zone is often required to create new jobs (sometimes by zone residents) or invest capital in the zone in order to receive tax incentives, also considered entitlement subsidies since any business that meets a state's criteria can collect those incentives.

These types of government subsidies are often offered to firms with the intention of attracting subsequent firms. It is also possible that firms themselves identify attractive locations and request abatements (Reese, 2006). As firms begin to relocate to an area based on lower taxes, other firms may follow, thereby leading to the agglomeration of an industry (Coulson et al., 2013). Additionally, as He and Romanos (2015) find, vertical and horizontal linkages between suppliers and the market tend to influence the movement of a firm to an area with industrially similar firms. That is, sector-specific firms tend to move to areas where they can harness the resources and knowledge already available. As a result, lower tax rates may not necessarily attract firms in search of operational support (Gerritse, 2014) but may instead provide a breeding ground for leading firms.

Mauer and Ott (1999) discuss states' propensity to implement EZs as a function of competition for businesses to locate within their borders. However, the subsidy packages that states offer may not be enough to incentivize firm relocation. As a result, firms that are already located within the zone get subsidized. Furthermore, the authors argue that more flexible firms receiving incentives may end up moving locations instead. As such, the optimal subsidy package depends on whether a firm is already inside a zone or aims to relocate within a zone. The government aims to maximize the social benefits from the operation of a firm in a zone, which may include the hiring of and subsequent wages paid to zone residents, construction of new plants in the zone and overall increased business to firms already in the zone. Of course, a primary hindrance to zone entry is a firm's initial cost of relocating to and operating within the zone. These costs are maximized for a firm that is unable to enjoy the benefits of agglomeration. Additionally, the nonrefundability of certain tax credits and the stipulation of employment by zone residents could be impeding the usage of local incentives (e.g., Brashares, 2000).

While many would argue that a positive association between EZs and a given measure of economic development would suggest the success of the program, that is not always the case. Some measures capture the effect better than others. For example, researchers tend to find that

property values, in particular, are positively affected by local economic development programs. Engberg and Greenbaum (1999) argue that any wealth created by EZ programs should be capitalized into the housing market. But as properties tend to experience naturally occurring growth in assessed values over time, it is difficult to assess whether property values would have risen in the absence of EZs. The success of EZs is dependent upon the expansion of existing firms and/or the stimulation of new development. Of course, either of those may occur even in the absence of the program, thereby creating a zero-sum effect resulting from the transfer of investment from one area to another (Rubin and Richards, 1992). This dilemma refers to the "but for" question discussed above and contributes to another distinct feature of EZ studies, the methodology. Generally, studies that scrutinize the "but for" question tend to estimate more robust results as a result of their careful consideration of characteristic differences between EZ and non-EZ areas.

In addition to “but for”, Landers (2006) considers rent-seeking as an unfortunate consequence of an area's designation as an EZ. The author estimates a hedonic housing price model and finds that EZ property values rise with EZ designation but that any increase in firm profitability may be diminished by a shift of resources from businesses to landowners. Engberg and Greenbaum (1999) differentiate zone designation by the fraction of the decade during which designation was in effect and by designation of zone at any time during the study period. The authors find that zones generally do not increase housing values. After examining the impact of EZs in six states, Greenbaum and Engberg (2000) find similar results. Hanson (2009) estimates the effect of the federal empowerment zone program on property values, employment and poverty and finds mixed results. Specifically, Hanson finds that using the ordinary least squares estimator produces positive and significant effects of the program on employment and poverty and that using the instrumental variables estimator produces a positive effect on property values. Similarly, Krupka and Noonan (2009) find that property values significantly respond to the federal empowerment zone program. The authors conclude the significant effect may be explained by the breadth of the federal program and the improved measurement of program status due to close matching of EZ boundaries with census geographies, which is more difficult with state EZs.

Recognizing the limitation of property values as an outcome measures, many studies have examined the effect of EZs on employment. For example, Couch et al. (2005) study the effect of EZs on the percent of manufacturing jobs created annually in Mississippi and find that manufacturing job opportunities were created due to EZ legislation. O'Keefe (2004) categorizes EZ status by year of designation and finds that the first six years of designation contribute to employment growth but that the effect does not persist past year six. Ham et al. (2011) study the impacts of state EZs, federal empowerment zones and federal enterprise community programs on local labor markets measuring unemployment, poverty, wage and salary income and employment. The authors find that all three programs significantly impact labor markets but particularly that federal programs have larger effects than the state program. Contrarily, Boarnet and Bogart (1996) find the EZ program does not affect municipal employment at any year of zone existence. Similarly, Elvery (2008) and Neumark and Kolko (2010) find that EZs do not significantly affect the employment of zone residents. More recently, Whitacre et al. (2015) find that Oklahoma's Quality Jobs program does not affect the economic growth of businesses participating in the program.

Employment naturally lends itself to a discussion of wages. Jobs are often filled by unemployed individuals within a region, individuals who change jobs within a region (causing worker displacement) or employees from outside a region. EZ jobs, in particular, tend to function differently. As the area is, by function, distressed, there may not be a sufficient skilled labor force to employ. As a result, some zone businesses hire from outside the region and receive a government subsidy for a fraction of the wages paid to those employees. Contrarily, some zone business are required by state law to hire from inside the region, which has consequences for wages offered. In fact, Bondonio and Greenbaum (2007) find that EZ policies tend to reduce payroll per employee as a result of new jobs created. Furthermore, employers that replace unsubsidized workers with subsidized workers do more harm than good if they do not use government subsidies to increase their overall employment (Burtless, 1985). This displacement of workers influences a community's wealth, and the higher it is, the more economically well-off a community is. Bostic and Prohofsky (2006) find that EZ designation positively impacts the wages and adjusted gross income (specifically taxpayers with low initial income compared to those with higher income) of EZ participants. However, Lynch and Zax (2008) conduct extensive analyses of the effects of EZs interacted with previous period monthly employment and find that EZs have no significant effects on current monthly payroll per worker in establishments with greater than 10 employees, implying that positive labor effects tend to accrue to very small firms.

While propensity score matching has been used widely to tackle issues related to economic development outcomes, its use has been limited to model specifications with binary treatments. We follow Bia and Mattei (2012), who examine the effect of financial aid on local firms in Italy in the context of a continuous treatment. They apply GPS methods to remove biases across differing amounts of financial aid and find the amount of financial aid positively influences firms' employment policies, thereby providing insight into the optimal level of incentives.

III. Method

We use the generalized propensity score or GPS method (Hirano and Imbens, 2004) to eliminate any biases associated with EZ tax incentive claim amounts and employment. GPS generalizes the binary propensity score matching technique (Rosenbaum and Rubin, 1983; Imbens, 2000) by permitting the treatment group to have non-discrete values. The continuous nature of claim amounts makes GPS suitable for this research.

We follow Hirano and Imbens' primary assumption of weak unconfoundedness, which does not require joint independence of all potential outcomes (i.e., employment, wages, capital investment and property values) but instead requires conditional independence of each value (i.e., firms indexed by $i = 1, \ldots, N$) of the treatment (i.e., tax savings to each EZ business) given the vector of covariates X_i (i.e., Census block group characteristics). This assumption implies that all variables which affect both tax incentives and various measures of economic development are observed.

GPS further requires the balancing property, which ensures the mean differences of the covariates in one treatment level do not statistically significantly differ from the mean differences of the covariates across the other treatment levels. The balancing property, in

combination with unconfoundedness, implies that assignment to treatment is unconfounded given the GPS. Note that the assignment to treatment interval is user-specified and used to verify the balancing property of the GPS (we provide details of the treatment intervals in the Results section).

Hirano and Imbens (2004) use two steps to prove that GPS can be used to eliminate any biases associated with differences in the covariates. First, they estimate the conditional expectation of the outcome as a function of the treatment level and the GPS. Second, they average that conditional expectation over the GPS at a particular level of the treatment to estimate the dose-response function.

IV. Data

The United States Census Bureau provides shapefiles at the block group level, which provide a rich source of socioeconomic and demographic data. Additionally, we use quarterly employment reports filed for the purposes of unemployment compensation taxes and EZ business registration (EZB-R) reports filed by businesses. Table 1 presents variables and descriptive statistics. Discussed below are the outcome, treatment and control variables.

[Table 1 about here]

IV.I. Outcome Variables

Economic development is often measured by job creation, and several papers have examined the effect of monetary aid on this outcome (e.g., Bia and Mattei, 2012). Using quarterly employment reports, we examine the effect of tax savings on average annual employment for those businesses that have claimed at least one tax incentive. Among those businesses, we differentiate between small businesses, those with fewer than 50 employees and large businesses, those with greater than or equal to 50 employees. Approximately 68% of the businesses from 2006 to 2015 employed fewer than 50 employees.

Based on recently available quarterly employer reports filed during 2015, approximately 6,500 establishments are located within Indiana EZs. As the EZs are restricted in size and scope, this represents approximately 4% of businesses in the state. The average wage across all non-EZ establishments is approximately 11% higher than that across all EZ establishments. Similarly, the average monthly employment across all non-EZ establishments is approximately 13% higher.

Economic development may also be measured by capital investment. The average small firm received approximately $14,000 in tax incentives and invested $162,000 annually (see Table 1). Contrastingly, the average large firm received approximately $61,000 and invested $1.3 million. Businesses that claim a tax incentive must show the reinvestment of their tax savings back into their business. As a result, a larger capital investment-to-tax savings ratio would imply greater economic development than a smaller ratio. Of course, since the level of capital investment

provided by businesses on EZB-R filings is self-reported, it may not be entirely reliable. Nevertheless, this exercise provides an understanding of whether the state's return on investment makes its loss of tax revenue worthwhile.

IV.II. Treatment Variable

Indiana's EZ program was established in 1983 and allows EZs to be located in municipalities or on closed military bases. There are currently 22 EZs, and among the first EZs to be designated were Evansville, Fort Wayne, Michigan City, Richmond and South Bend in 1984. The most recently designated EZs were Frankfort and Salem in 2003. An EZ expires 10 years after the day on which it is designated by the board of the IEDC. The fiscal body of a municipality may renew an EZ for up to two five-year periods and may extend the expiration of an EZ by an additional year under certain stipulations.

EZ shapefiles are provided by 39 Degrees North, a private firm of GIS developers. These shapefiles contain Census block group identifiers, which are matched to Census characteristics. Additionally, we geocoded establishments by their geographical coordinates and physical addresses and matched them to the EZ shapefiles to identify establishments located within EZs. The establishments were geocoded in three waves: the first wave geocoded all establishments that came with geographic coordinates (Bureau of Labor Statistics provided these identifiers beginning in 2003 and sporadically included them across time); the second wave geocoded some establishments by their unique place address since they had no coordinates; the final wave geocoded any remaining establishments that were found to have the wrong address, in which case the correct address was manually entered.

Figure 1 shows a large concentration of EZs along the northern, central and southern parts of the state. Most of the counties with EZs are considered urban based on a population over 100,000 and population density over 200 people per sq. mi. (see Ayres, Waldorf, and McKendree, 2012 for an explanation of the grouping of Indiana's 92 counties into urban, rural/mixed and rural categories). For example, the northernmost counties from Lake to Elkhart, all considered urban, contain 7 of the 22 EZs in the state. Several EZs are located in rural/mixed areas, which refers to those areas with a population of 40,000 to 100,000 and population density of 100 to 200 people per sq. mi. Interestingly, only one EZ is located in a rural county (Salem in Washington County). As EZs were originally created to combat blight, one would expect more TIF areas to be concentrated in rural and rural/mixed areas, which generally suffer from growing depopulation, greater poverty and slower economic recovery.

The average Indiana EZ is approximately 3.2 square miles in area, with approximately 68% of EZs smaller than that. The largest EZs are Hammond at 6.38 square miles and River Ridge at 12.75 square miles. While the relatively large EZs are concentrated along the northern and southern parts of the state, the smaller EZs, with areas of 2.7 square miles or less, are generally located around the central part of the state. Some of the largest EZs (e.g., Fort Wayne, Michigan City, Hammond) were also among the first to be designated in 1984 and 1985. However, none of

those EZs are geographically close to each other. Similarly, several small EZs (e.g., Marion, Bloomington, Lafayette) were designated in the early 1990s. None of those EZs are close to each other either, dispelling the notion of spatial spillover. The designation of EZs appears to have been largely case-by-case considerations by local units.

[Figure 1 about here]

Each business within an EZ is required to file a registration form with the state's economic development corporation annually, state their average level of employment, wages and salaries in the zone and tax savings from each of the tax deductions and credits available to them. Businesses in each zone are eligible for an investment deduction, an employment expense credit and a loan interest credit. Approximately 4% to 5% of all businesses in an EZ tend to claim tax incentives annually based on historical EZB-R filings. The following incentives are offered to zone businesses: 1) property tax investment deduction; 2) employment expense credit; and 3) loan interest credit.

IV.III. Control Variables

Three classes of determinants are often used to explain tax incentive claim amounts. The first class comprises business characteristics of the EZ, such as employment and wages. The second comprises characteristics of the population such as income, race, age and education. Lastly, the third class comprises other local economic development efforts.

During the period from 2006 to 2015, approximately 1,622 small firms (those with fewer than 50 employees) and 779 large firms received incentives based on EZB-R filings.[1] The average among small firms with fewer than 50 employees is approximately 20 employees. This is significantly smaller than the average among larger firms of 199 employees. Accordingly, total wages are significantly different. Interestingly, the average wage per employee is not very different, as the average employee in a large firm earns approximately $13,700, only $3,300 more than the average employee in a small firm. While the type of business does not vary much across small and large firms, it does vary within. Corporations comprise the largest proportion of firms in EZs, followed by sole proprietorships. Partnerships comprise a small proportion.

[Table 1 about here]

Of utmost interest is the industry. The following figure shows the percent of EZ establishments by industry. Real estate, technical services and management of companies (NAICS codes 53-55), comprise the largest percent of zone businesses. This is followed by retail trade (NAICS codes

[1] Note that due to some misidentified firms and some unverified EZ boundaries, these figures are not inclusive of the complete set of small and large firms that received incentives between 2006 and 2015.

44-45). The majority of EZ tax incentives tend to be claimed by manufacturing firms (NAICS codes 31-33). Yet, they only comprise about 9% of all zone establishments. Manufacturing firms also tend to employ about three times as many workers as other industries, suggesting that large, manufacturing firms are utilizing the tax incentives.

[Figure 2 about here]

Also of interest are demographic characteristics of the population. Income is captured through per capita income, which is slightly higher in areas which contain large firms than small firms. Felix and Hines (2013) find that communities with household incomes between $25,000 and $75,000 prefer to adopt economic development programs over those with household incomes below $25,000. This supports the authors' notion that although communities with relatively low incomes stand to benefit more from targeted programs, they are less likely to generate enough local tax revenue in order to retire the debt undertaken to finance economic development projects. Race and age compositions of the population are captured through the percent of nonwhite population and the percent of persons age 65 or above, which do not vary much by firm size.

Finally, local economic development efforts such as community revitalization enhancement districts (CRED) and tax increment financing (TIF) are considered. CREDs are supported by tax revenue captures to improve the value of real property in the area to be more suitable for commercial use. CREDs capture incremental state sales tax, individual income tax and local income tax revenue from businesses and employees working within the area. TIF areas are supported by the tax revenue generated on the assessed value exceeding the base assessed value (the assessed value in the area before its designation as a TIF area). Of these two, TIF tends to compete more with EZ since it captures the incremental property taxes that could be exempted by an EZ tax deduction. The analysis also includes fixed effects for each EZ and year of tax incentive claim.

V. Results

V.I Covariate balance after adjustment for the GPS

We assume a Box-Cox transformation of the treatment variable has a normal distribution given the covariates, a key assumption of the GPS method. The first step requires estimation of the treatment equation, which produces a propensity score that may be divided into a user-defined set of intervals. Table 2 presents estimation results of the treatment equation.

[Table 2 about here]

The balance of the GPS-adjusted covariates is tested by evaluating the GPS at the median value of tax savings for each treatment group. We divide the savings into five intervals at the 20th percentile. The intervals range as follows: [0; 1,295), [1,295; 4,311), [4,311; 11,921), [11,921; 30,726), [30,726; 1,489,785]. We use the median value of tax savings by treatment interval to block on the GPS score, as recommended by Hirano and Imbens (2004). We use 5 blocks, meaning that we divide the GPS into fifths based on whether it belongs to treatment interval 1, 2, 3, 4 or 5.

Prior to GPS adjustment, 22 of the 85 t-statistics of the mean differences are statistically significant. The top half of Figure 3 shows that a large portion of t-statistics are larger than 1.645 (absolute value). After adjustment, only 12 are statistically significant, indicating the balance of the covariates is improved by adjusting for GPS. While 12 t-statistics remain statistically significant, their magnitudes are much smaller. For example, the magnitudes on mining, utilities and construction and on information and finance decline significantly after GPS adjustment.

[Figure 3 about here]

V.II Estimation of the dose-response and treatment functions

After adjusting the covariates for balance, we estimate the outcome equation given the treatment following Hirano and Imbens (2004) and the generalized propensity score. Specifically, we estimate the conditional expectation of inmigration given the treatment and the generalized propensity score, first and second moments and an interaction term. Table 3 presents the estimates of the outcome equation. Note there is no direct meaning associated with the estimated coefficients. The estimated coefficients of the generalized propensity score generally should be statistically significant, however, and our estimates verify this.

[Table 3 about here]

After controlling for factors that influence the propensity with which a firm will receive some positive level of tax savings, we find there exists a threshold beyond which tax savings to a firm tend to have little impact, and in fact, cause a decline in employment. Employment tends to rise significantly for firms receiving up to $20,000 (see Figure 4). Above that threshold, firms still tend to create jobs but not as aggressively. In fact, any tax savings beyond $200,000 tends to have a negative effect on employment, meaning firms that receive a marginal amount above $200,000 tend to create fewer jobs. As firms are required to show reinvestment of their tax savings into the firm, this suggests that firms may be substituting capital for labor in the form of building renovation or purchase of new capital equipment.

Basic analysis of Bureau of Labor Statistics' Multi-Factor Productivity data suggests that firm decisions are still influenced by the Great Recession, which led to the reversal of previous trends whereby labor costs exceeded capital costs. Since 2009, capital costs have exceeded labor costs.

This trend is especially obvious in the manufacturing industry, where wages and employment remain below pre-recession levels. As Indiana's zone businesses appear to underutilize all tax incentives, but particularly the employment expense credit, it seems to confirm this same notion. Labor costs are still relatively low (compared to pre-recession levels), and EZ incentives may be attracting firms seeking capital investment instead.

[Figure 4 about here]

Recognizing that size of the workforce often has implications for a firm's behavior and economic development, we separate the firms that have received tax incentives over time into small firms and large firms. Interestingly, firms with fewer than 50 employees tend to respond very differently to tax savings than all firms combined. In fact, small firms tend to create jobs at tax savings below approximately $93,000 (where statistically significant impacts are below $60,000). Any additional tax savings beyond that threshold tend to cause a decline in employment.

While large firms tend to create a positive number of jobs at tax savings of any level, the results suggest this effect declines over time. For example, a firm that receives $10,000 in tax savings tends employ about 187 workers, on average. A firm that receives twice as much, or $20,000, tends to employ the same number of workers. Since large firms tend to receive more tax incentives than small firms, it makes sense that small amounts may not change their behaviors. The threshold happens to be much higher, around $230,000, meaning firms that receive tax incentives totaling more than $230,000 tend to employ fewer workers than firms that receive smaller savings. This suggests that while some large firms tend to benefit from tax incentives, a majority of large firms do not need incentives to maintain their labor forces.

[Figure 5 about here]

The average employee wage for firms that receive incentives is $36,000. Since EZs do not necessarily have to hire new workers to claim the employment expense credit, we do not expect to see a comparable increase in wages as a result of the tax incentives. In fact, we can see that firms receiving $10,000 in incentives tend to pay only $1,000 more per employee than firms receiving <$1. The following figure shows that while wages are positively related to tax savings, the marginal effect of a $10,000-increase in incentives is negative. This suggests that fewer tax savings are being translated into higher wages as firms continue to receive incentives.

[Figure 6 about here]

The results suggest a firm's capital investment is positively related to the tax incentives it receives. This makes sense, as a firm is required to show reinvestment of its tax incentives. This is certainly the case for incentives totaling less than $100,000, and especially the case for incentives totaling less than $40,000. While firms receiving $30,000 tend to invest about 184% more than firms receiving $20,000, firms receiving $40,000 tend to invest only 73% more than those receiving $30,000. This negative trend continues with each additional $10,000 in tax incentives up to approximately $120,000, after which tax incentives appear to have no statistically significant impact on capital investment. This suggests that while there tends to be a positive relationship between tax incentives received and capital invested, firms that receive much more in tax savings do not tend to invest any differently than firms that receive little in tax savings.

[Figure 7 about here]

The results suggest the effect on property values is not significant beyond total firm incentives of $640,000, suggesting that the reinvestment of tax savings by firms into their business does not impact the property values of firms receiving higher-than-average amounts in tax incentives. As previously noted, firms that receive relatively low amounts of tax incentives, generally below $100,000, tend to benefit more than firms that receive high amounts. Specifically, firms that receive $20,000 tend to experience a 68% higher gross AV than firms that receive $10,000. This figure drops drastically to 14% for firms that receive $30,000 vs. $20,000 and 11% for firms that receive $40,000 vs. $30,000.

[Figure 8 about here]

VI. Conclusion

EZ programs are intended to assist in the prevention of further decline and potentially reverse the course of the region. This article examines various measures of economic development during the period 2006 to 2015 for firms receiving at least one EZ tax incentive. The results suggest that, on average, employment tends to rise more significantly for firms receiving a modest amount in tax incentives than for those receiving above-average amounts. Additionally, the results suggest that fewer tax savings are being translated into higher wages as firms continue to receive incentives. Lastly, firms that receive much more in tax incentives do not invest any differently or experience any higher property values than firms that receive very little. Generally, the results align with prior research on the impact of tax incentives on firm performance. Clearly, while some firms tend to benefit from government subsidies of relatively modest amounts, other firms do not need them. In fact, any perceived economic development would probably have occurred regardless of the incentives.

The nature of firm location itself tends to drive economic development. Government subsidies such as property tax abatements and incentives for employment creation and capital investment are often offered to firms with the intention of attracting subsequent firms. As firms begin to relocate to an area based on lower taxes, other firms may follow, thereby leading to the agglomeration of an industry. Additionally, firms tend to move to areas where they can harness the resources and knowledge already available. As a result, lower taxes may not necessarily attract firms in search of operational support but may provide a breeding ground for leading firms. Those firms that are able to overcome barriers to development tend to be most successful.

One barrier facing the development of distressed regions is their geographic makeup. While the majority of community revitalization programs are focused on inner cities and urban neighborhoods, rural communities can also be distressed. Even though there has been a steady increase in agricultural productivity, farm employment has gradually decreased. In addition, the loss of a large employer, such as a manufacturing facility or a hospital, can significantly impact a rural community given the relative isolation of the area. These factors, along with an aging and generally declining population, result in distressed rural regions. And tax incentives alone may not be effective in developing these regions if firms are leaving and other firms are not moving in.

Another barrier facing the development of distressed regions is the presumed mismatch between the workforce skills demanded by employers and those supplied by residents. People living in areas of concentrated poverty are more likely to have limited educational opportunities, which results in lower levels of educational attainment. And the demand for such unskilled labor is decreasing. Of course, even a skilled labor force may find itself at a loss, especially when its skill set does not match the needs of a changing job market. Although the residents in the region may be highly skilled in a particular field, those skills may not match the skills required by other businesses moving into the region. As such, businesses cannot utilize tax incentives for hiring workers if there is no adequate workforce. Workforce and economic development training programs are increasingly working to develop new training programs highlighting the transferability of skills, yet social barriers may still exist.

References

Bia, Michela, and Alessandra Mattei. “A Stata package for the estimation of the dose-response function through adjustment for the generalized propensity score.” The Stata Journal 8.3 (2008): 354-373.

——— “Assessing the effect of the amount of financial aids to Piedmont firms using the generalized propensity score.” Statistical Methods & Applications 21.4 (2012): 485-516.

Boarnet, Marlon G., and William T. Bogart. "Enterprise zones and employment: Evidence from New Jersey." Journal of Urban Economics 40.2 (1996): 198-215.

Bondonio, Daniele, and Robert T. Greenbaum. "Do local tax incentives affect economic growth? What mean impacts miss in the analysis of enterprise zone policies?" Regional Science and Urban Economics 37.1 (2007): 121-136.

Bostic, Raphael W., and Allen C. Prohofsky. "Enterprise zones and individual welfare: A case study of California*." Journal of Regional Science 46.2 (2006): 175-203.

Brashares, Edith. "Empowerment Zone Tax Incentive Use: What the 1996 Data Indicate." Statistics of Income Bulletin 3 (2000): 236-252.

Burtless, Gary. "Are targeted wage subsidies harmful? Evidence from a wage voucher experiment." Industrial & Labor Relations Review 39.1 (1985): 105-114.

Couch, Jim F., Keith E. Atkinson, and Lewis H. Smith. "The impact of enterprise zones on job creation in Mississippi." Contemporary Economic Policy 23.2 (2005): 255-260.

Coulson, N. Edward, Crocker H. Liu, and Sriram V. Villupuram. "Urban economic base as a catalyst for movements in real estate prices." Regional Science and Urban Economics 43.6 (2013): 1023-1040.

Elvery, Joel A. "The impact of enterprise zones on resident employment: An evaluation of the enterprise zone programs of California and Florida." Economic Development Quarterly (2008).

Engberg, John, and Robert Greenbaum. "State enterprise zones and local housing markets." Journal of Housing Research 10.2 (1999): 163-187.

Felix, R. Alison, and James R. Hines. "Who offers tax-based business development incentives?." Journal of Urban Economics 75 (2013): 80–91.

Gerritse, Michiel. "Competing for firms under agglomeration: Policy timing and welfare." Regional Science and Urban Economics 49 (2014): 48-57.

Greenbaum, Robert, and John Engberg. "An evaluation of state enterprise zone policies." Review of Policy Research 17.23 (2000): 29-45.

Ham, John C., et al. "Government programs can improve local labor markets: Evidence from state enterprise zones, federal empowerment zones and federal enterprise community." Journal of Public Economics 95.7 (2011): 779-797.

Hanson, Andrew. "Local employment, poverty, and property value effects of geographically-targeted tax incentives: An instrumental variables approach." Regional Science and Urban Economics 39.6 (2009): 721-731.

He, Zekai, and Michael Romanos. "Spatial agglomeration and location determinants: Evidence from the US communications equipment manufacturing industry." Urban Studies (2015): 0042098015586698.

Hirano, Keisuke, and Guido W. Imbens. “The propensity score with continuous treatments.” Applied Bayesian modeling and causal inference from incomplete-data perspectives 226164 (2004): 73-84.

Krupka, Douglas J., and Douglas S. Noonan. "Empowerment Zones, neighborhood change and owner-occupied housing." Regional Science and Urban Economics 39.4 (2009): 386-396.

Landers, Jim. "Why don't enterprise zones work? Estimates of the extent that EZ benefits are capitalized into property values." Journal of Regional Analysis and Policy 36.1 (2006).

Lynch, Devon, and Jeffrey S. Zax. "Incidence and substitution in enterprise zone programs: the case of Colorado." Public Finance Review (2010): 1091142110386210.

Mauer, David C., and Steven H. Ott. "On the optimal structure of government subsidies for enterprise zones and other locational development programs." Journal of Urban Economics 45.3 (1999): 421-450.

Neumark, David, and Jed Kolko. "Do enterprise zones create jobs? Evidence from California’s enterprise zone program." Journal of Urban Economics 68.1 (2010): 1-19.

O'Keefe, Suzanne. "Job creation in California's enterprise zones: a comparison using a propensity score matching model." Journal of Urban Economics 55.1 (2004): 131-150.

Reese, Laura A. "Not just another determinants piece: Path dependency and local tax abatements." Review of Policy Research 23.2 (2006): 491-504.

Rogers, Cynthia L., and Jill L. Tao. "Quasi-experimental analysis of targeted economic development programs: Lessons from Florida." Economic Development Quarterly 18.3 (2004): 269-285.

Rosenbaum, Paul R., and Donald B. Rubin. “The central role of the propensity score in observational studies for causal effects.” Biometrika 70.1 (1983): 41-55.

Rubin, Barry M., and Craig M. Richards. "A transatlantic comparison of enterprise zone impacts: The British and American experience." Economic Development Quarterly 6.4 (1992): 431-443.

Whitacre, Brian E., David Shideler, and Randi Williams. "Do Incentive Programs Cause Growth? The Case of the Oklahoma Quality Jobs Program and Community-Level Economic Growth." Economic Development Quarterly (2015): 0891242415614641.

Figure 1. Location and Area of Indiana EZs by Rurality

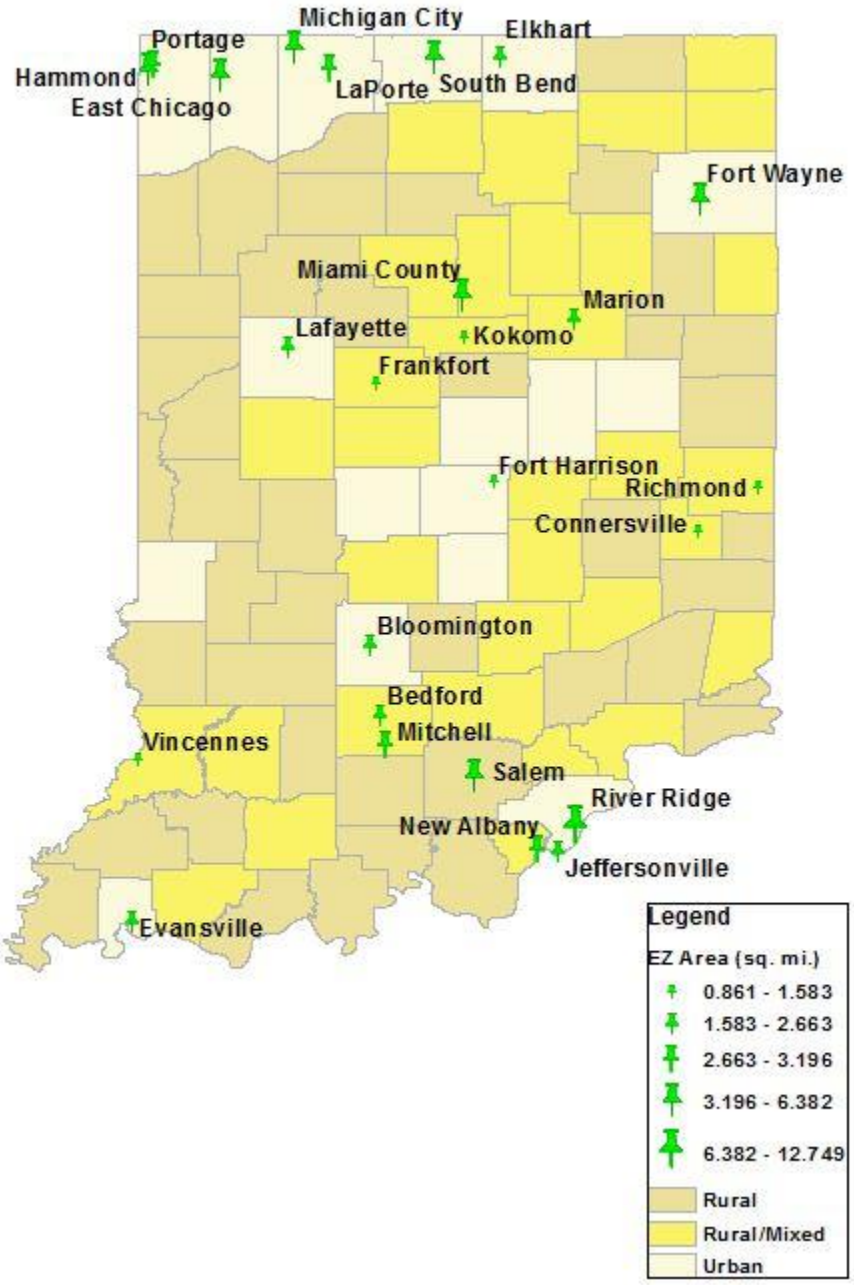
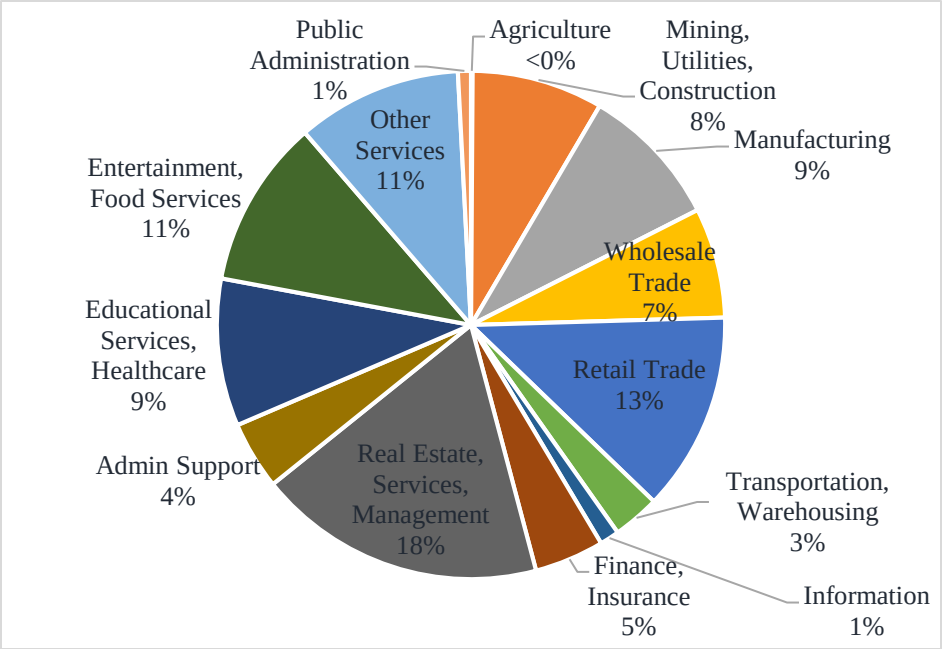
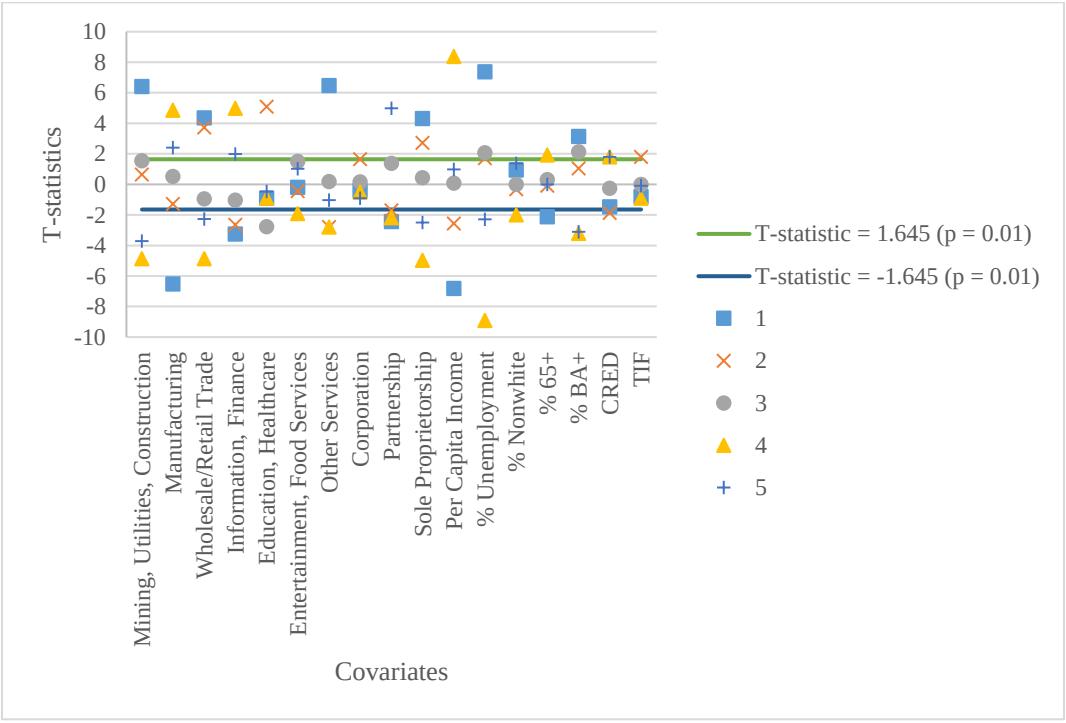


Figure 2. Percent of EZ Establishments by Industry



Source: U.S. Department of Labor

Figure 3. Unadjusted (top) and GPS-Adjusted (bottom) T-statistics



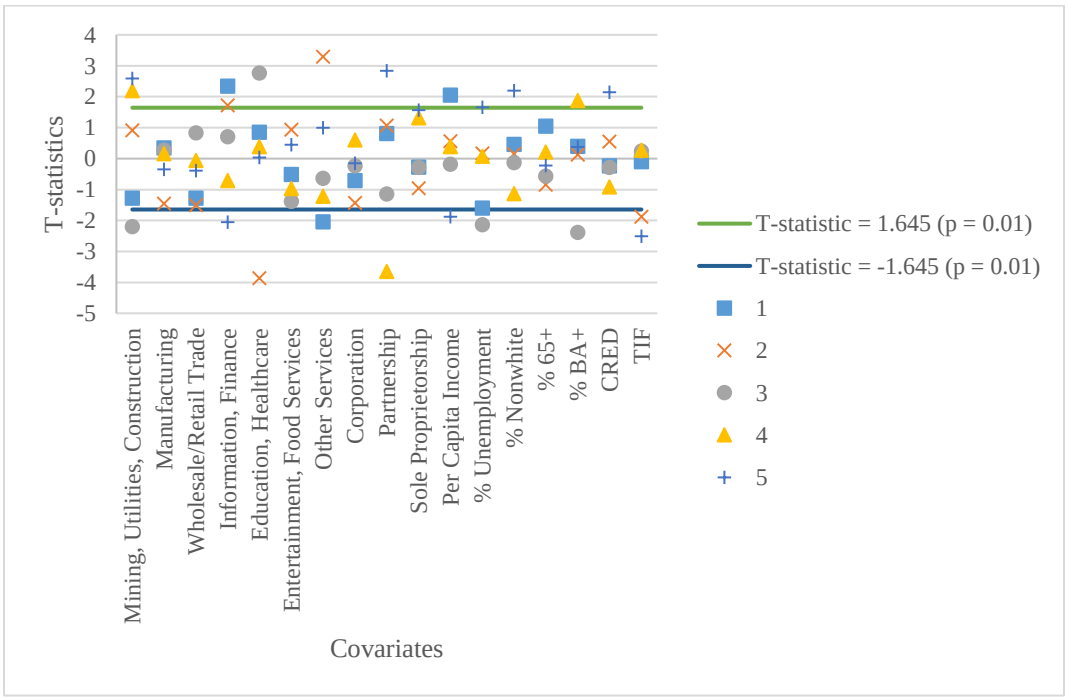


Figure 4. Average Dose-Response Function and Treatment Effect Function with 95% Confidence Bands for All Business Employment

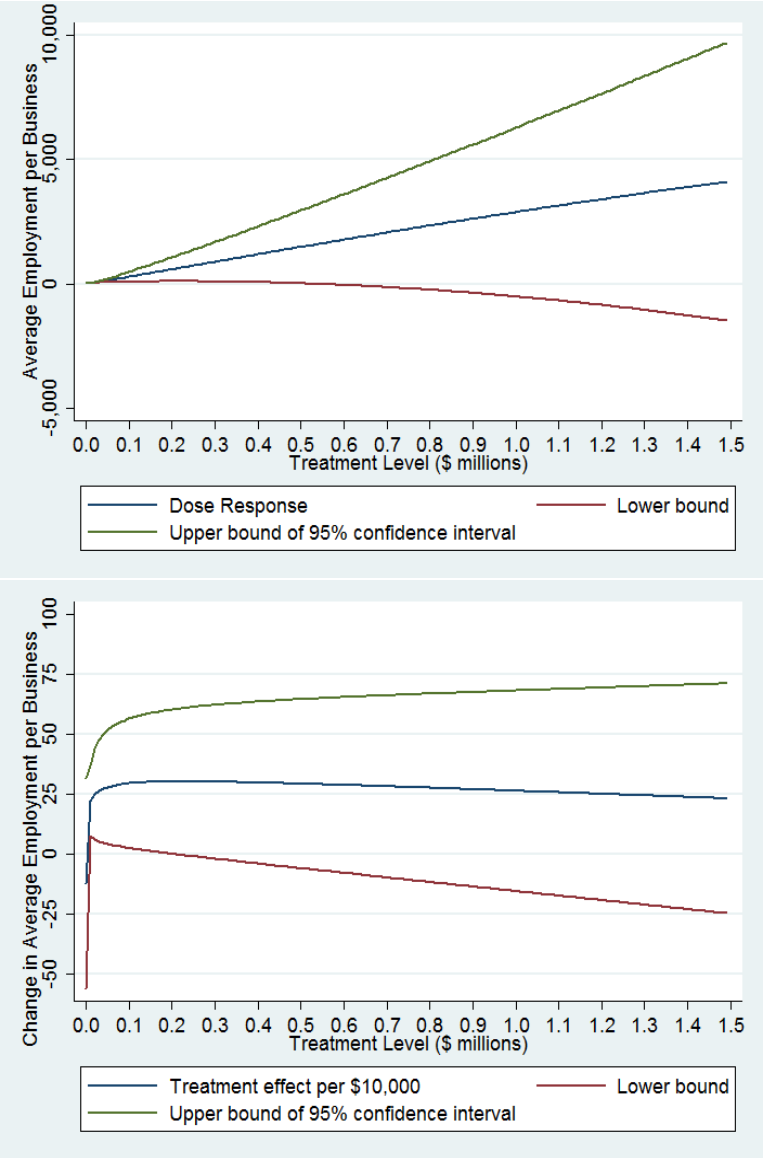


Figure 5. Dose-Response Function for Small (top) and Large (bottom) Business Employment

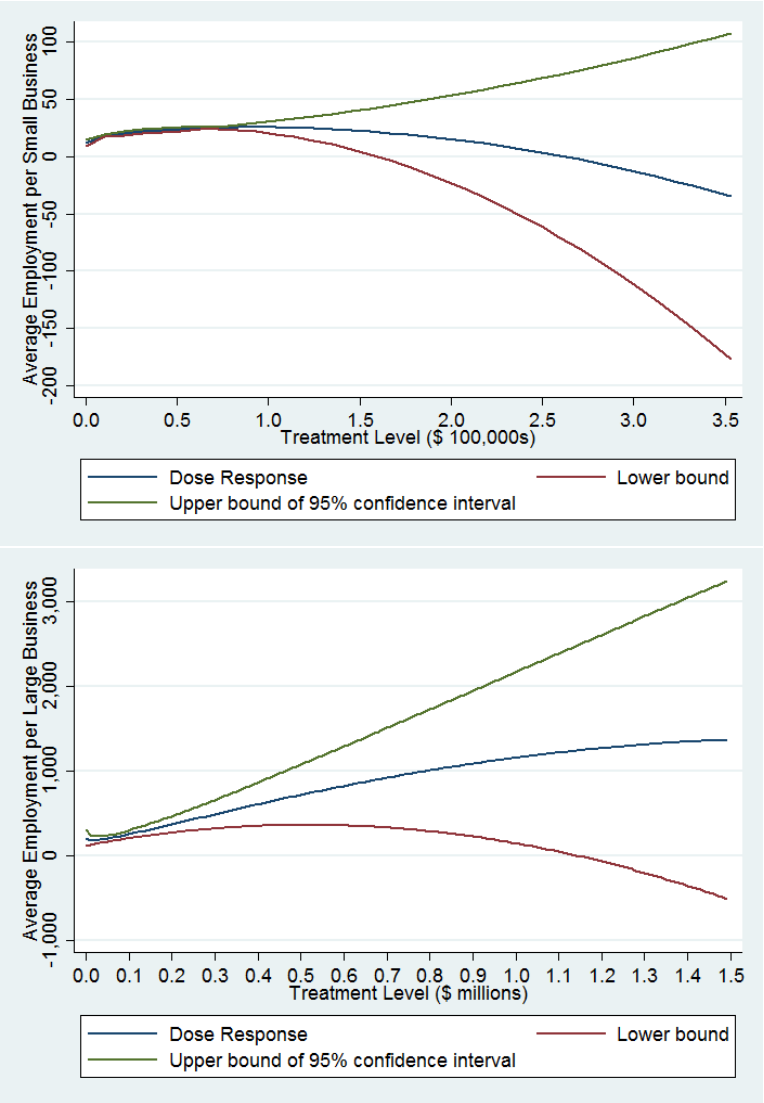


Figure 3. Dose-Response (left) and Treatment Effect (right) Functions for Wages

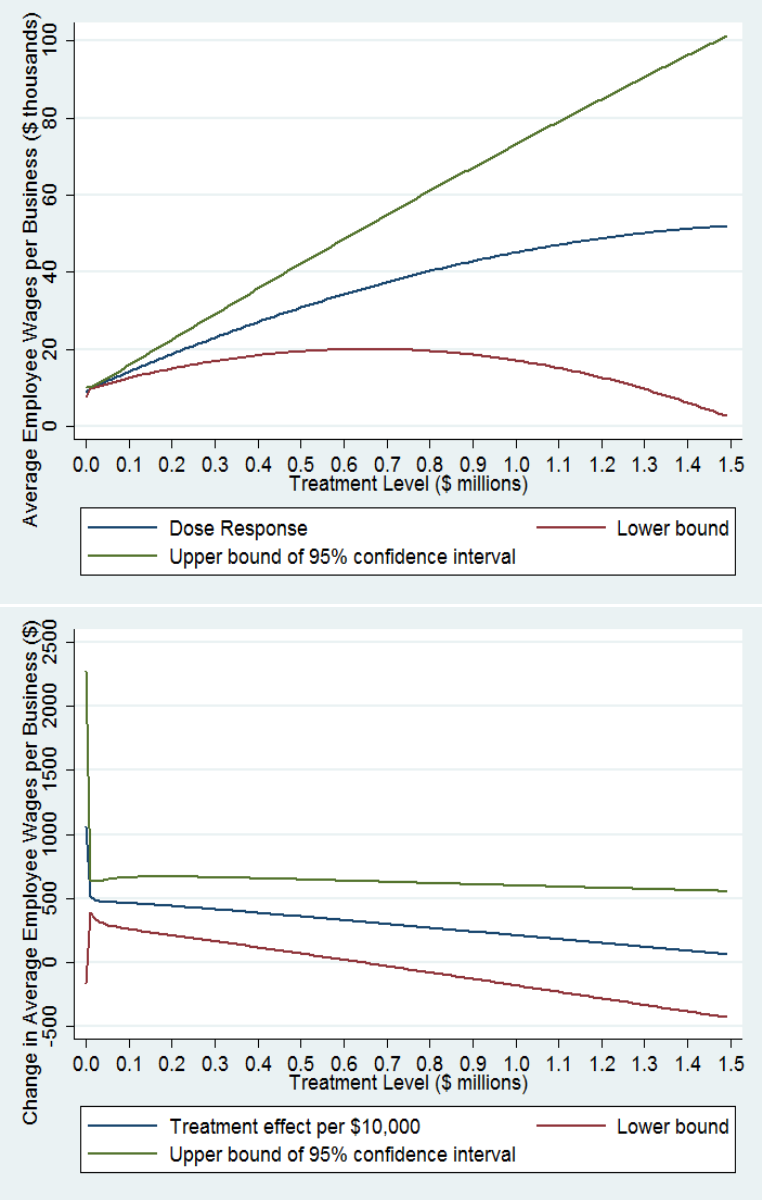


Figure 4. Dose-Response (left) and Treatment Effect (right) Functions for Capital Investment

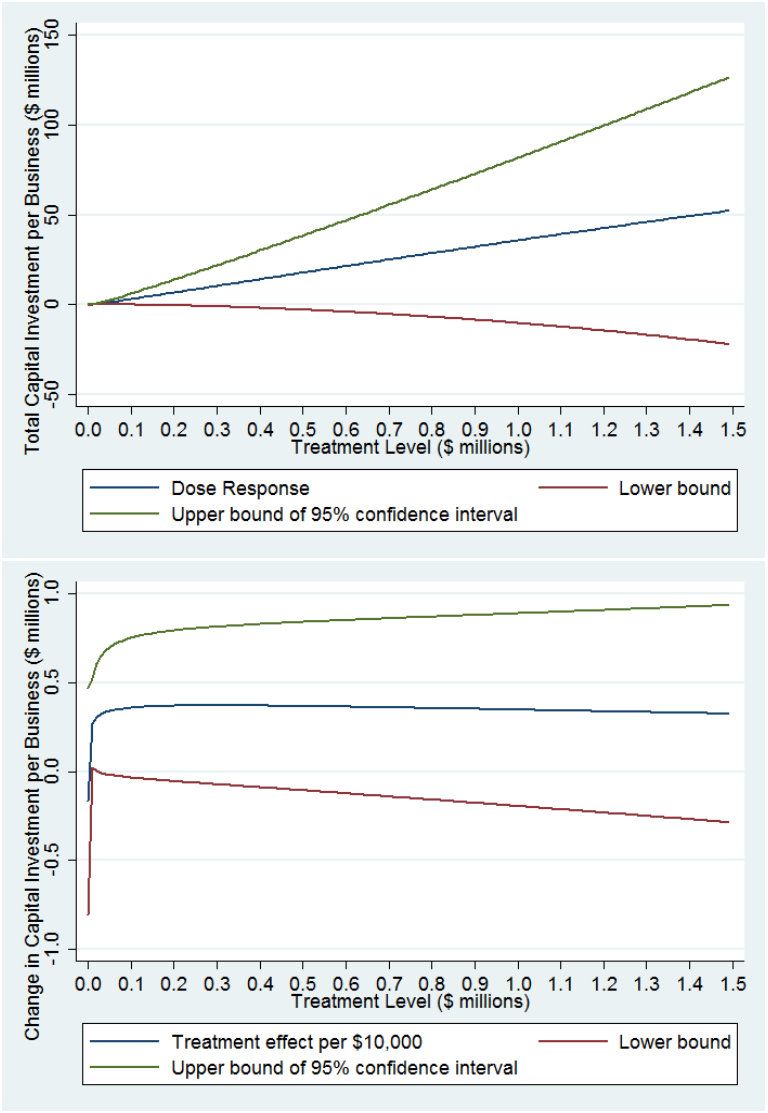


Figure 5. Dose-Response (left) and Treatment Effect (right) Functions for Assessed Values

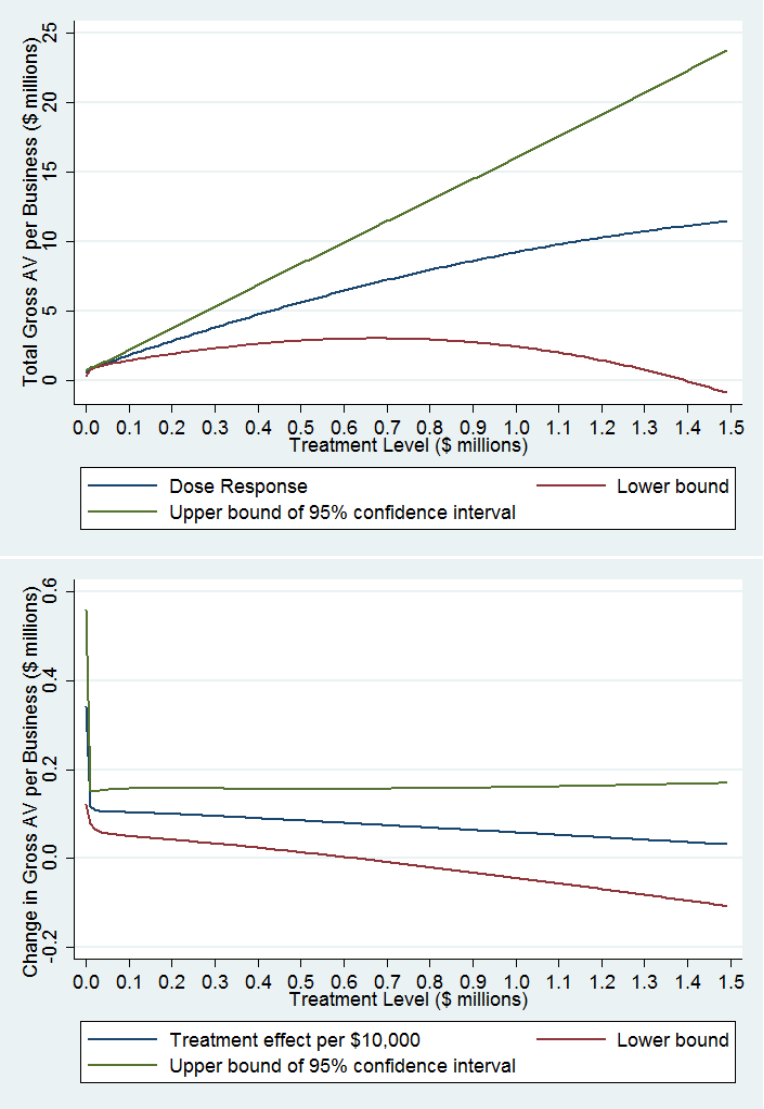


Table 1. Descriptive Statistics for Firms that Received EZ Incentives

	Small firms		Large firms	
Variable	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Business Characteristics				
Average employment	19.56	13.13	198.87	340.61
Average wages	$0.20 M	$0.18 M	$2.72 M	$7.55 M
Total expected savings	$0.01 M	$0.03 M	$0.06 M	$0.15 M
Total capital investment	$0.16 M	$0.46 M	$1.24 M	$5.04 M
Business Type				
Corporation	0.49	0.50	0.43	0.50
Partnership	0.04	0.20	0.06	0.24
Sole Proprietorship	0.35	0.48	0.38	0.49
Industry				
Mining, Utilities, Construction	0.06	0.23	0.04	0.20
Manufacturing	0.41	0.49	0.64	0.48
Wholesale/Retail Trade, Transportation, Warehousing	0.25	0.43	0.17	0.37
Information, Finance, Real Estate, Management, Administrative Support	0.16	0.37	0.07	0.26
Educational Services, Healthcare	0.01	0.10	0.02	0.13
Entertainment, Food Services	0.05	0.22	0.04	0.19
Other Services	0.06	0.23	0.02	0.14
Public Administration	4.9E-03	0.07	2.6E-03	0.05
Census characteristics				
Per capita income (1,000s)	$17.654	$7.584	$19.451	$8.547
% Unemployment	24.55	17.74	23.68	17.72
% Nonwhite	28.07	24.50	26.58	25.01
% Over 65	12.42	6.85	12.87	7.11
% Bachelor's +	19.17	14.32	20.63	14.10
Economic Development Efforts				
CRED	0.01	0.10	0.03	0.17
TIF	0.27	0.44	0.22	0.41

Table 2. Estimation Results of the Treatment Equation

	Est.		z-value
Business Type			
Corporation	-2.061	***	-6.580
Partnership	-1.596	**	-3.190
Sole Proprietorship	-2.354	***	-7.420
Industry			
Mining, Utilities, Construction	-3.570		-0.820
Manufacturing	0.216		0.050
Wholesale/Retail Trade, Transportation, Warehousing	-1.916		-0.440
Information, Finance, Real Estate, Management	-0.653		-0.150
Educational Services, Healthcare	-3.512		-0.790
Entertainment, Food Services	-0.184		-0.040
Other Services	-3.823		-0.880
Census Characteristics			
Per capita income	0.000	***	4.820
% Unemployment	-0.017	**	-2.080
% Nonwhite	0.017	**	2.980
% Over 65	-0.003		-0.210
% Bachelor's +	-0.002		-0.150
Economic Development Efforts			
CRED	4.864	***	6.870
TIF	-1.137	***	-5.080
N	2411		
Log Likelihood	-6802.166		

*** p<0.001 ** p<0.05 * p<0.01

Table 3. Estimation Results of the Employment Outcome Equation

	Est.		t-stat
Treatment	3.65E-04	*	1.960
Treatment^2	-2.88E-10	*	-1.850
Propensity Score	-1357.360	*	-1.730
Propensity Score^2	10672.130	*	1.700
Treatment*Propensity Score	0.034	***	8.350
Intercept	63.467	**	2.860
N	2,411		
R^2	0.110		

*** p<0.001 ** p<0.05 * p<0.01