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The Effect of Enterprise Zone-Related Tax Savings on Economic Development: A Generalized Propensity Score Approach

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***A*bstract:** Since their onset in the early 1980s, enterprise zones (EZ) have been utilized for the revitalization of traditional downtown areas or old industrial and manufacturing areas that have undergone a protracted period of decline. Businesses within EZs often receive some combination of labor and/or capital tax incentives. This article examines various measures of economic development during the period 2006 to 2015 for Indiana firms receiving at least one tax incentive. This relationship is examined using a generalized propensity score model in an effort to remove the potential endogeneity between tax savings to each EZ business and economic development. 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. However, this is not the case for capital investment, where firms receiving modest amounts do not invest any differently than firms receiving above-average amounts. Additionally, the results suggest that fewer savings are being translated into higher wages for employees as firms continue to receive tax incentives.

Keywords: Enterprise zones; Economic development; Employment; Wages; Capital investment; Generalized propensity score

JEL Classifications: C21, H25, O12

1. 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 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 and/or show economic growth through higher wages or capital investment. 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 the designation of EZs, since states focus their community revitalization efforts on needs and preferences.

A locality desiring to be designated as an EZ must show certain demographic and economic characteristics. This means that only areas that show those characteristics are eligible to be designated as EZs, making them targeted and non-random. Additionally, zone businesses receive a range of savings from tax incentives related to the EZ program, suggesting that zone businesses themselves are characteristically different, with some receiving very little in savings and some receiving a lot. Because of this, there exists an endogeneity bias between the amount of tax savings that zone businesses receive and any subsequent economic development. Propensity score matching (Rosenbaum and Rubin, 1983) has been used to effectively remove bias among observed covariates used to explain the variation in a given binary treatment. Hirano and Imbens (2004) generalize this by permitting the treatment group to have non-discrete values. The continuous nature of tax savings to a zone business makes Hirano and Imbens' generalized propensity score (GPS) technique appropriate for this study.

This article aims to understand the impact of EZs on economic development, specifically by examining the intensity of tax savings received by zone businesses. Following Bia and Mattei (2012), it is important to go beyond estimation of the causal effects of public policies employing a binary discrete intervention, i.e., whether a business is located in an EZ or not. Rather, estimating a dose-response function, as described below, could provide more information regarding the effectiveness of the subsidy program, namely, whether small businesses are receiving the financial aid they may require to grow or whether large businesses are receiving a larger portion of the financial aid as is often reported. This line of thought motivates three research questions: 1) Do tax savings to EZ businesses from labor and capital incentives directly affect their economic growth? 2) If so, is there a threshold beyond which tax savings have no impact? and 3) Do small businesses fare differently than large businesses in their receipt and application of tax savings?

To answer these questions, this article examines firms receiving at least one tax incentive in each of the 22 designated EZs in the State of Indiana during the period 2006 to 2015. 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. However, this is not the case for capital investment, where firms receiving modest amounts do not invest any differently than firms receiving above-average amounts. Additionally, the results suggest that fewer savings are being translated into higher wages for employees as firms continue to receive tax incentives.

The article is arranged as follows. Section 2 summarizes relevant literature on EZs. Section 3 describes the GPS technique used to remove potential endogeneity. Section 4 describes the data sample and relevant variable characteristics. Section 5 provides a discussion of the empirical results, and the last section concludes.

2. Background and Literature Review

EZs function on a basis set by state law. Each state's program is different and specifies criteria for its areas to meet in order to be designated as an EZ. While many EZs are generally designated on the basis of high unemployment and poverty, some are designated by low income, population decline, high building vacancy rate or high proportion of aging buildings. 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. As such, it offers tax incentives to zone businesses that can create new jobs or invest capital in the zone.

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. Additionally, as Papke (1993) states, firm location tends to be more dependent on proximity to markets, labor costs, infrastructure, and utility costs and less dependent on tax cost differentials except for a few firms on the margin.

And for those firms on the margin, firm size tends to influence the intensity of tax incentive use, with small firms behaving quite differently from large firms. Based on economic theory, the effectiveness of those incentives, often some type of labor and/or capital subsidy, should depend on the elasticity of supply of factors of production to the zone and elasticity of demand for output (Papke, 1993). At a fundamental level, labor subsidies should raise zone wages while capital subsidies alone may reduce zone wages as employers substitute capital for labor. But what we often notice is that large firms tend to claim tax incentives to a much greater extent than small firms. Yet, small firms disproportionately contribute to job creation (Birch, 1981; Teruel-Carrizosa, 2010), suggesting that some small firms tend to create jobs without government aid.

While many would argue that a positive association between EZs and a given measure of economic development would suggest the success of the program, this 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 property values over time, it is difficult to assess whether property values would have risen in the absence of EZs. This dilemma refers to the "but for" question, which asks whether a given outcome would have occurred ‘but for’ the designation of an area as an EZ. 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 (e.g., Landers, 2006; Engberg and Greenbaum, 1999; Greenbaum and Engberg, 2000; Hanson, 2009; Krupka and Noonan, 2009).

Recognizing the limitation of property values as an outcome measure, 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) finds the first six years of designation contribute to employment growth but that the effect does not persist past year six. Ham *et al*. (2011) find that state EZs, federal empowerment zones and federal enterprise community programs significantly impact labor markets but particularly that federal programs have larger effects than a given state program. Contrarily, Boarnet and Bogart (1996) find the EZ program does not affect municipal employment at all (see also Elvery, 2009 and Neumark and Kolko, 2010).

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.

3. Method

In Indiana, a locality desiring to be designated as an EZ must show the following: 1) at least 25% of the households in the zone are below the poverty level; 2) a population of more than 2,000 but less than 10,500; 3) an area of more than ¾ of a square mile but less than 4 square miles; and 4) property suitable for economic development. Because EZs are obviously targeted based on their ability to show these characteristics, they are not random. Therefore, this paper employs the generalized propensity score or GPS method (Hirano and Imbens, 2004) to eliminate any biases associated with EZ tax incentive claim amounts and economic development. First, let us discuss the "standard" model:

$$T_i = X_i\beta + \mu_i \quad (1)$$

where T_i refers to the treatment, X_i refers to a vector of covariates used to explain the treatment and μ_i are independently and identically distributed errors. Practical implementation of GPS requires estimation of the treatment as a function of its covariates (see Table 1 for descriptions of the relevant variables) given the normal distribution:

$$T_i|X_i \sim N(\beta_0 + \beta_1' X_i, \sigma^2) \quad (2)$$

We must then assess the validity of the assumed normal distribution. In case one of the goodness-of-fit tests (e.g., Kolmogorov-Smirnov, Shapiro-Francia, Shapiro-Wilk) fails, it is advised to try a different transformation of the treatment variable (this paper employs the Box-Cox transformation). Note the regression function (1) does not have causal interpretation. Instead, the idea behind estimating (1) is to collect and use the βs and σ^2 in the estimation of the GPS as follows:

$$\hat{R}_i = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{1}{\sqrt{2\hat{\sigma}^2}}\left(T_i - \hat{\beta}_0 - \hat{\beta}_1' X_i\right)^2\right) \quad (3)$$

We use the estimated GPS (3) to investigate the balance of the covariates. We divide the firm-level tax savings into five intervals at the 20th percentile. Following Hirano and Imbens (2004), we investigate the balance by testing whether the mean of each covariate in one of the four treatment groups is different from the mean in the other three treatment groups combined. The balancing property also requires evaluation of the GPS at some user-specified "representative" point of the treatment and "blocking" of that GPS value by a user-specified number of blocks. We choose the median of the treatment and ten blocks each at the 10th percentile and provide further details and examples in Section 5.

Upon testing the balance of the covariates, we estimate the conditional expectation of the outcome given the treatment and the GPS. We estimate a quadratic approximation of the outcome and propensity score (i.e., we include all second-order moments of tax savings and GPS following Hirano and Imbens) as follows:

$$E[Y_i T_i, R_i] = \alpha_0 + \alpha_1 T_i + \alpha_2 T_i^2 + \alpha_3 R_i + \alpha_4 R_i^2 + \alpha_5 T_i R_i \quad (4)$$

Given the estimates of the outcome equation (i.e., $\hat{\alpha}$ parameters), we average the outcome function over the user-specified treatment intervals (i.e., five treatment intervals at the 20th percentile) as:

$$\widehat{E[Y(t)]} = \frac{1}{N}\sum_{i=1}^{n}(\hat{\alpha}_0 + \hat{\alpha}_1 t + \hat{\alpha}_2 t^2 + \hat{\alpha}_3 r\hat{(}t, X_i) + \hat{\alpha}_4 \hat{r}\,(t, X_i)^2 + \hat{\alpha}_5 t\hat{r}(t, X_i)) \quad (5)$$

where t refers to the treatment level. Once we estimate the average outcome at each treatment interval, we derive an estimate of the complete dose-response function. The results obtained in the last step imply the outcome is un-confounded by the assignment to treatment.

4. Data

The United States Census Bureau provides shape files and a rich source of socioeconomic and demographic data at the block-group level. Additionally, we use quarterly employment reports filed for the purposes of unemployment compensation and EZ business registration (EZB-R) reports filed by zone businesses that received at least one tax incentive. Table 1 presents variables and descriptive statistics. Discussed below are the outcome, treatment and control variables used to implement the GPS technique.

Table 1. Descriptive statistics for firms that received EZ incentives

	Small firms		Large firms	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**
Business Characteristics				
Total savings (treatment)	$0.01 M	$0.03 M	$0.06 M	$0.15 M
Average employment (outcome)	19.56	13.13	198.87	340.61
Average wages (outcome)	$0.20 M	$0.18 M	$2.72 M	$7.55 M
Total capital investment (outcome)	$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	$17,650	$7,580	$19,450	$8,550
% 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

4.1 Outcome variables

Economic development is often measured by job creation, and several papers have examined the effect of financial 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 at least 50 employees. While 50 employees are not the traditional cutoff used to describe small businesses, as the Small Business Administration sets 500 employees as the cutoff, it is very reasonable for Indiana businesses, a vast majority of which employ well below 100 employees. Approximately 68% of the zone businesses employed fewer than 50 employees between 2006 and 2015.

Economic development is also measured by wages and capital investment. The average wage across all non-EZ establishments is approximately 11% higher than that across all EZ establishments. The average small zone business received approximately $14,000 in tax incentives and invested $162,000 annually. Contrastingly, the average large firm received approximately $61,000 and invested $1.3 million.

4.2 Treatment variable

Businesses in each zone are eligible for a property tax investment deduction, an employment expense credit and a loan interest credit. Approximately 4% to 5% of all Indiana businesses in an EZ tend to claim tax incentives annually. Over the period from 2006 to 2015, approximately 1,622 small firms and 779 large firms received tax incentives.

4.3 Covariates

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 local economic development efforts other than EZ.

The average among small firms with fewer than 50 employees is approximately 20 employees. This is significantly smaller than the average among large 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.

Of more interest is the industry. Real estate, technical services and management of companies comprise the largest percent of zone businesses. This is followed by retail trade. The majority of EZ tax incentives tend to be claimed by manufacturing firms. 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.

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. Race and age compositions of the population are captured through the percent of nonwhite population and the percent of persons aged 65 or above, which do not vary much by firm size, suggesting that small and large firms are largely interspersed throughout the communities.

Finally, local economic development efforts such as community revitalization enhancement districts (CRED) and tax increment financing (TIF) are considered, since economic development policies tend to work in combination rather than in isolation (Kolko *et al.*, 2013). CREDs are supported by tax revenue captures to improve the value of real property in the area to be more suitable for commercial use. TIF areas are supported by the tax revenue generated on the assessed value exceeding the base assessed value. Of these two, TIF tends to compete more with EZ since it captures the incremental property taxes that could be exempted by the EZ property tax investment deduction. The analysis also includes fixed effects for each EZ and year of tax incentive claim.

5. Results

This section empirically tests the GPS technique described above using STATA's *gpscore* command, developed by Bia and Mattei (2008). First, we assess the validity of the assumed normal distribution given in equation (2). Then, we test for covariate balance after estimating the GPS given in equation (3) (see Figure 1). Finally, we derive the dose-response function given in equation (5) from the outcome equation given in equation (4) (see Table 2) for each of four outcomes: employment, wages, capital investment and gross assessed values. The following sections provide details.

Table 2. Estimation results of the employment outcome equation

	Est.	***t*-stat**
Treatment	3.65E-04*	1.96
Treatment^2	-2.88E-10*	-1.85
Propensity Score	-1357.360*	-1.73
Propensity Score^2	10672.13*	1.70
Treatment*Propensity Score	0.03***	8.35
Intercept	63.47**	2.86
Sample size (*N*)	2,401	
R^2	0.110	

*** p<0.01; ** p<0.05; * p<0.10

5.1 Covariate balance after adjustment for the GPS

We assume a Box-Cox transformation of the treatment variable has a normal distribution given the covariates. The first step requires estimation of the treatment equation given in equation (2), which produces a propensity score that may be divided into a user-defined set of "intervals" and a user-defined set of "blocks," as explained below. Table 3 presents estimation results of the treatment equation. The results suggest the mining, utilities and construction; educational services and food services; and other services industries tend to have the largest negative effect on tax savings to EZ businesses, which makes sense since businesses affiliated with those industries tend to claim zone tax incentives the least. Manufacturing businesses tend to have the smallest negative effect, although the effect is statistically insignificant due to the fact that a very small percentage of them claim zone tax incentives. And the negative effect can be attributed to the fact that a majority of those manufacturing businesses tend to claim very small amounts.

Perhaps of more interest are the signs on the economic development efforts. The results suggest that while the presence of CRED in an area where a business is receiving an EZ incentive tends to have a positive effect on tax savings to the business, the presence of TIF has a negative effect. This opposite relationship makes sense. Sales tax is the primary source of revenue capture for CREDs in Indiana. And since EZs in Indiana do not allow any sales tax exemptions, there is no competitive between CREDs and EZs with respect to sales tax. While there is some competition for individual income and local income taxes, CREDs have a capture limit of $1 M, meaning any tax revenue above $1 M goes to the state as usual. So, EZ businesses are benefiting from the sales tax revenue captured by CRED, which can then be used to improve the value of real property. And EZ businesses can take an investment deduction on these improvements. TIF, on the other hand, tends to have a negative effect due to competition. Some EZ businesses are asked by their local redevelopment commissions not to claim the investment deduction because it limits the property tax revenue that could instead be captured by TIF.

Table 3. Estimation results of the Treatment Equation

	Est.	*z*-value
Business Type		
Corporation	-1.98***	-6.73
Partnership	-1.30**	-2.70
Sole Proprietorship	-2.17***	-7.17
Industry		
Mining, Utilities, Construction	-5.49***	-4.05
Manufacturing	-1.34	-1.03
Wholesale/Retail Trade, Transportation, Warehousing	-3.93**	-2.99
Information, Finance, Real Estate, Management	-2.46*	-1.85
Educational Services, Healthcare	-5.18***	-3.42
Entertainment, Food Services	-2.30*	-1.69
Other Services	-5.68***	-4.17
Census Characteristics		
Per capita income	0.057***	3.65
% Unemployment	-0.02**	-2.29
% Nonwhite	-0.01	-1.43
% Over 65	0.02*	1.73
% Bachelor's +	-0.003	-0.26
Economic Development Efforts		
CRED	3.77***	5.25
TIF	-1.30***	-5.96
Intercept	20.03***	13.19
Sample size (*N*)	2,401	
Wald	908.13***	

*** p<0.01; ** p<0.05; * p<0.10.

Based on the estimated treatment equation, 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 tax savings into five intervals at the 20th percentile to capture the wide variation in tax savings. 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]. The median value of tax savings for each treatment interval is then used to "block" on the GPS score, as recommended by Hirano and Imbens (2004). Specifically, five blocks are used, meaning that we divide the GPS into fifths based on whether it belongs to treatment interval 1, 2, 3, 4 or 5. In other words, each of five GPS intervals is then divided into five of its own blocks. These steps are clearly more complicated than those for a binary treatment, where it is sufficient to compare the covariate mean differences of the treatment equal to 0 with those of the treatment equal to 1. Because the treatment here is continuous, a simple dichotomous comparison will not do. Instead, according to Hirano and Imbens, we must compare across multiple groups (or intervals) and subgroups (or blocks within those intervals) in order to ensure the covariate mean differences are no longer statistically significant after propensity score matching.

Prior to GPS adjustment, 22 of the 85 t-statistics of the covariate mean differences are statistically significant. The top half of Figure 3 shows that a large portion of t-statistics are larger

than 1.645 in 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 than prior to adjustment. For example, the magnitudes on mining, utilities and construction and on information and finance decline significantly after GPS adjustment.

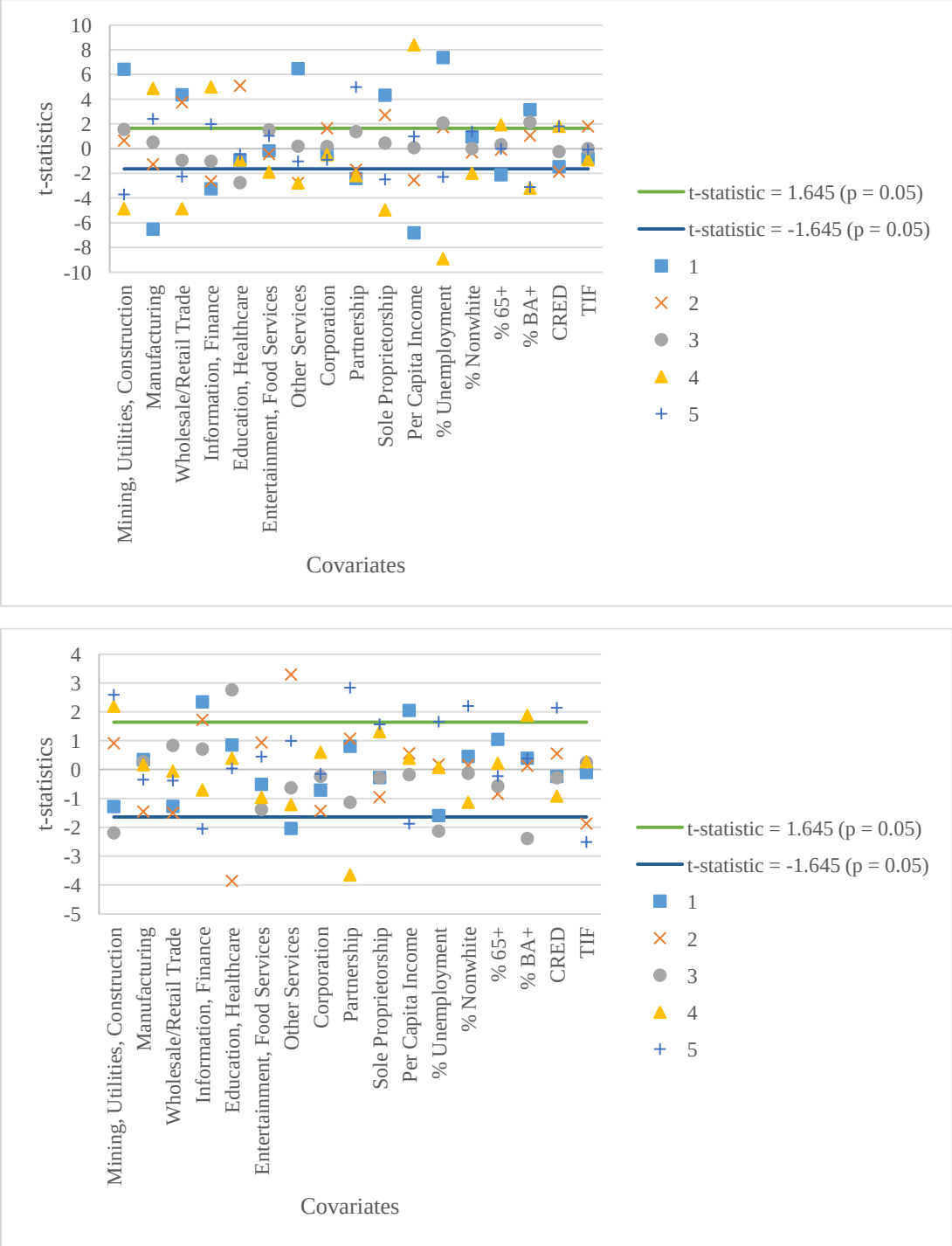

Figure 1. Unadjusted (top) and GPS-Adjusted (bottom) *t*-statistics

5.2 Estimation of the dose-response function

Table 2 presents the estimates of the outcome equation, which is a function of the treatment, the GPS, first- and second-order moments of both and an interaction term, as given in equation (4). Note there is no direct meaning associated with the estimated coefficients. The estimated coefficients of the GPS generally should be statistically significant, however, and the estimates verify this.

Let us first examine employment as an outcome. The dose-response function in Figure 2a shows that all firms receiving some positive level of tax savings tend to create jobs. But we also notice that the relationship between tax savings and jobs tends to get flatter the more tax savings a firm receives. And that is what the marginal or treatment effect function in Figure 2b shows. As we continue to increase the level of tax savings by $10,000, there exists a threshold beyond which tax savings to a firm tend to have little impact. Specifically, employment tends to rise statistically significantly only for firms receiving $200,000 or less. Beyond that, firms receiving, say, $400,000 are not creating any more jobs than firms receiving $200,000. 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.

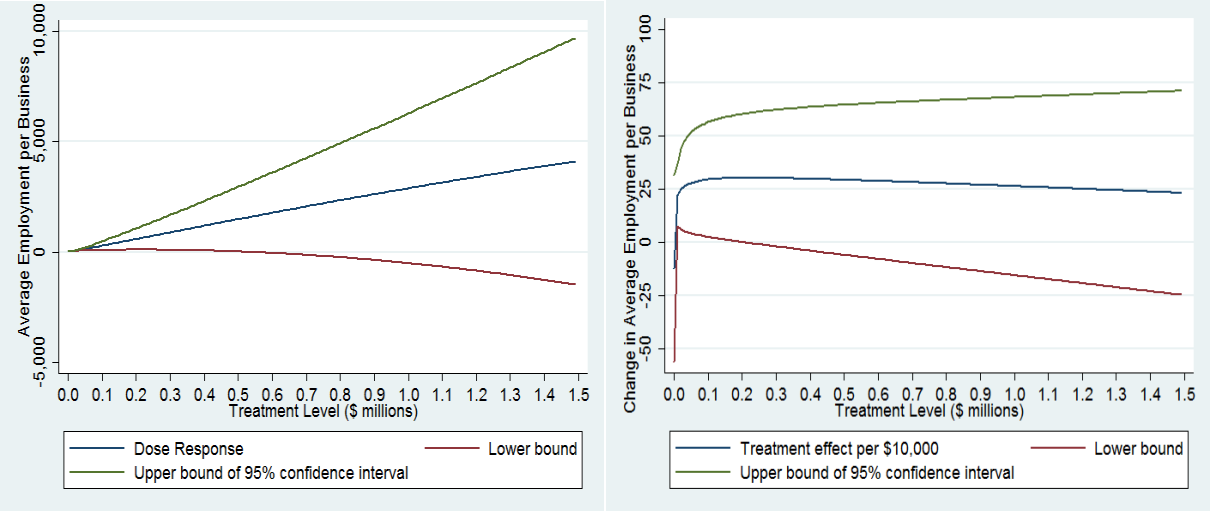

Figure 2. a) Dose-Response (left), and b) Treatment *E*ffect (right) Functions for All Business Employment

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.

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 into small (see Figure 3a) and large (see Figure 3b). Interestingly, firms with fewer than 50 employees tend to respond very differently to tax incentives than all firms combined. We notice that small firms receiving up to $250,000 tend to create jobs, although the effect is only statistically significant for

the range below $165,000. But what we can also infer is that the treatment effect (not directly pictured here), is only positive for the range below $100,000. What this means is that the average small firm receiving $10,000 more than the next small firm tends to create more jobs. For example, a small firm receiving $100,000 tends to create more jobs than a small firm receiving only $90,000, but the same cannot be said about a small firm receiving $110,000 compared to a small firm receiving only $100,000 since the treatment effect is only positive for the range below $100,000.

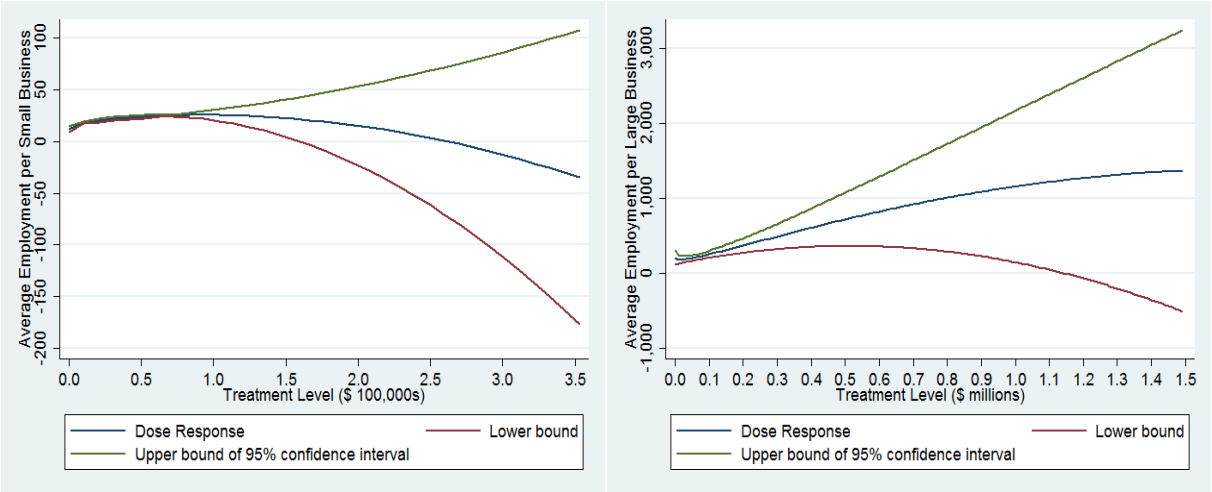

Figure 3. a) Dose-Response Functions for Small (left) and Large (right) Business Employment

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 below $20,000 in tax savings tends to employ about 187 workers, on average. A firm that receives 1.5 times as much, or below $30,000, tends to employ the same number of workers. Since large firms tend to receive more in tax incentives than small firms, it makes sense that small amounts may not change their behaviors drastically. But what we do notice is that along the statistically significant range from $40,000 to $250,000, each large firm is creating more jobs than the next large firm. For example, a large firm receiving, say, $150,000 tends to create more jobs than a large firm receiving only $140,000. But that positive treatment effect (not directly pictured here) does not continue beyond $250,000, meaning firms that receive tax incentives totaling more than $250,000 tend to employ fewer workers than firms that receive smaller amounts. 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. Indeed, this coincides with Wren (1994), who finds that government subsidies to large firms are largely ineffective in inducing job growth.

Now let us examine wages as an outcome. As with employment, the dose-response function in Figure 4a shows an increasing relationship between tax incentives received by firms and wages paid to employees. And we also notice this relationship tends to get flatter, and even negative, the more tax savings a firm receives. The average wage paid to employees by firms receiving tax incentives is approximately $36,000. Since EZs do not necessarily have to hire new, full-time workers to claim the employment expense credit but could instead hire part-time workers or increase wages to current workers, we do not expect to see a comparable increase in wages due to the credit. What we notice instead is that a firm receiving up to $20,000 in incentives, for example, tends to raise the average worker's wage by approximately $515. And as is clear from Figure 4b, this relationship only tends to decline, as a firm receiving up to $50,000 in incentives, for example, tends to increase the average worker's wage by only $475. This suggests that more tax savings to firms do not necessarily equal higher wages for employees.

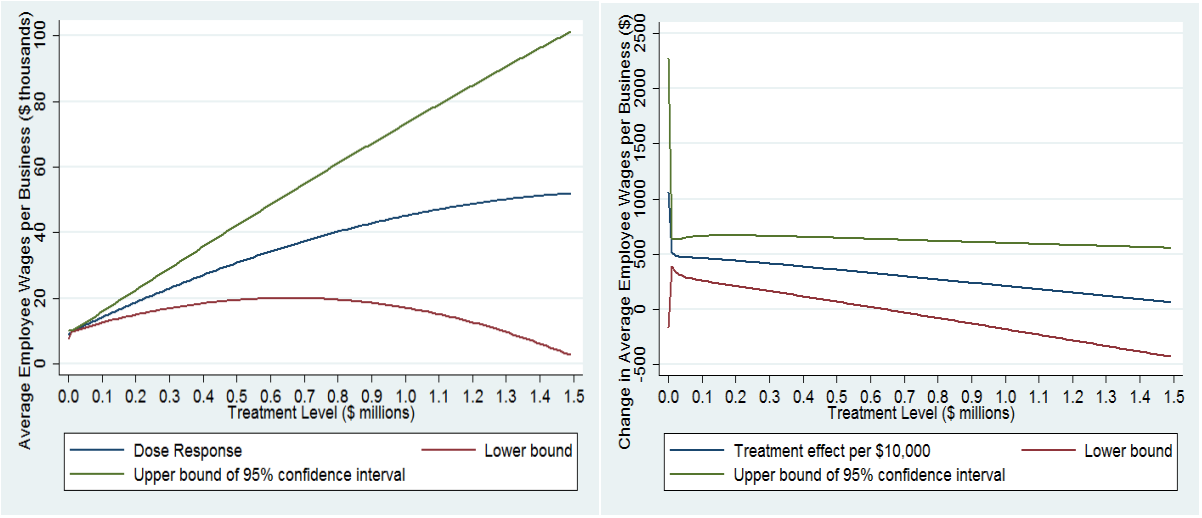

Figure 4. a) Dose-Response (left), and b) Treatment Effect (right) Functions for Wages

Lastly, let us examine capital investment as an outcome. The dose-response function in Figure 5a shows that a firm's investment in capital is positively related to the tax incentives it receives. This makes sense, as a firm is required to show reinvestment of its tax incentives. But the increasing relationship, as shown by the treatment effect function in Figure 5b, is only up to $300,000, meaning that firms receiving more than $300,000 in tax incentives do not tend to invest more in capital than firms receiving less, although the treatment effect is only statistically significant for the range from $10,000 to $30,000. This negative trend continues with each additional $10,000 in tax incentives. 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.

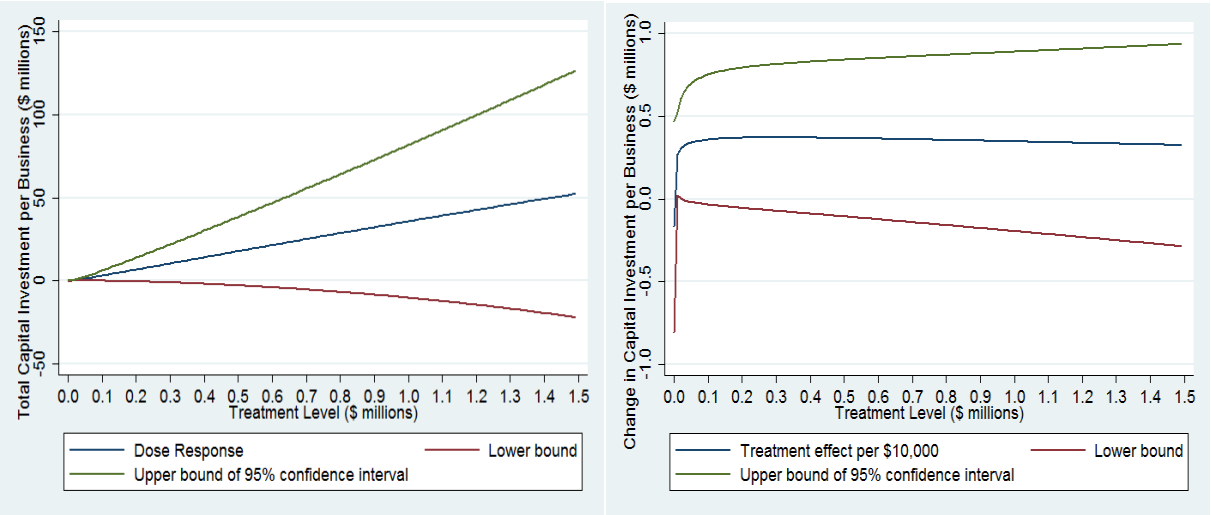

Figure 5. a) Dose-Response (left), and b) Treatment Effect (right) Functions for Capital Investment

6. Conclusion

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. However, this is not the case for capital investment, where firms receiving modest amounts do not invest any differently than firms receiving above-average amounts. Additionally, the results suggest that fewer savings are being translated into higher wages for employees as firms continue to receive tax incentives. 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.

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