Senior Project
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"The Effect of Job Creation Tax Credits on State Employment"

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Abstract

This paper is motivated by the high level of unemployment in America today, resulting in a severe slowdown of economic growth. This paper utilizes a panel data set to determine the effects that job creation tax credits have on the number of people employed, the level of total payroll, the number of new hires, and the number of jobs gained in their respective states. This paper finds that JCTCs have a positive relationship with the total number of employees and with the number of new hires in a state, but no significant relationship was found with total payroll or new jobs gained. With this information, states struggling to remain a competitive location for employers can improve their situation by creating or increasing their job creation tax credits.

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I. Introduction

As America presses further into the twenty-first century and out of "Great Recession" there has been one severe illness weighing on our economy: the persistently high unemployment rate. The United States government has explored many avenues to help put the American people back to work, however the tangible effect remains mostly uncertain. In an effort to tackle the crippling problem of unemployment many states has seen fit to employ what are known as job creation tax credits (JCTCs). These tax credits are offered to businesses if they are seen to be eligible by the state and meet certain new hiring requirements. While many states utilize different methods of encouraging job creation (and many states, in fact, offer no such programs) the main goal is the same: to promote the creation of new jobs within the borders of their respective state.

The purpose of this paper is to study the effects of these JCTCs on net employment. Is there an effect, either positive or negative, of JCTCs on the total number of employees in a state? Also, is there an effect of JCTCs on the total payroll spent by firms in a state? What level of impact do JCTCs have on the amount of newly hired workers? These are the questions this paper will address. By collecting appropriate employment and tax data I aim to discover the effectiveness of these statewide tax credits. Because not all states utilize these incentive programs, it is my hope to provide useful research that can potentially help job creation within our country. By studying the effects of JCTCs one can possibly encourage their use in order to help put people back to work.

To test this purpose, the paper centers on four main hypotheses, each with one secondary condition. First, I hypothesize that state job creation tax credits do have an effect on net in-state employment. Second, I hypothesize that state job creation tax credits also have an effect on the employee in-state payroll compensation. Third, I hypothesize that state job creation tax credits have an effect on the number of new hires in a given state. Fourth, I hypothesize that state job creation tax credits will have an effect on the number of jobs gained within a respective state. The method taken to understanding the effects of tax credits on employment requires a panel regression approach using fixed effects to account for the differences among states. Yearly employment and payroll data were collected for 50 states for the period of 2001 to 2009.

This paper has four main sets of regressions. Four independent variables will be used: a measure of stable employment, a measure of total in state payroll, the total number of new hires in a state, and the total number of new jobs gained in a state. For each there will be two primary regressors of interest, one being a measure of the state's tax credit offering for a one year period and the other representing a multi-year summation of a state's credit value. Each of these are used independently in separate regressions. For this reason, each hypothesis will be tested with two variations; first with the one year period of tax credit offering and a second with a multi-year approach.

II. Review of Literature

The primary basis of my research came about from the work of Wilson (2009), who has worked on multiple projects seeking to understand and test the

effects of job creation tax credits on employment creation. Through his research I hope to understand the nature of these credits and to help further the comprehension of the effect of tax credits on job creation.

The Federal Reserve Bank of San Francisco has researched ways of stimulating job growth after the onset of the most recent U.S. recession. Wilson examines 22 states, ranging from all over the country that have passed such laws. While the details of each state's JCTC vary, in general they have little to no restriction on the industries to which these tax credits can be applied (retail industries are often excluded) and in general have a very similar structure (Wilson, 2009).

The primary goal of all 22 states employing JCTCs is to create a net increase in job creation within their respective state. Therefore, only new jobs that expand a business's total payroll will be qualified to receive tax credits. In addition, further requirements are put in place in order for a firm to claim tax credits, such as providing health insurance or having employee compensation above a certain level (Wilson, 2009).

These job creation tax credits are usually applied against a state's corporate income tax, although several states have varying structures. The most common form is by offering tax credits per job that is a percentage of the job's annual wage. Other states utilize a percentage of the state's income tax withholdings as a form of job creation credits. Finally, a number of states offer a fixed dollar amount that can be issued as a credit per job created within the state (Wilson, 2009). Another key function of these JCTCs is whether or not the credits are refundable. A credit that is

refundable is one that the business is still able to receive even without current tax liability. This is an important consideration when evaluating a tax credit's fiscal cost because the number of companies that do not have positive taxable incomes increases during economic downturns, which is precisely when a state government is likely to employ these types of credits. A similar function allows these tax credits to be carried forward for multiple years conditioned on firm's tax credit liabilities. Finally, some states employ tax credits which are capable of being redeemed in future years. This strategy encourages the retention of newly created jobs.

Wilson (2010) continued his work on the study of job creation tax credits in a later paper focusing on the effects of the state tax credits over the past twenty years. The main subject of this paper examines whether JCTCs encourage within-state job growth and studies where the increased employment comes from.

He first assesses whether the job creation tax credits succeed in stimulating job growth within the state in question rather than simply being the marginal transfer of employees from one state to another. The empirical model employed in this paper is a two-way fixed effects panel regression with the dependent variable representing the logarithm of the growth rate of employment. Wilson's model contains dummy variables to identify the month in which the tax credit goes into effect, which is known as the "effective date" of the credit. This is valuable to include in order to see how quickly employment effects may be witnessed resulting from the creation of the tax credit. Additional parameters of the model include a variable representing the distance between key population centers of a given state, an

estimate of what employment would have been had no tax credit been enacted, industry composition by state, and national industry employment trends.

Wilson (2010) found evidence suggesting that hiring increased in periods directly after the tax credits can be obtained. In addition, there appeared to be a decrease in hiring for the months directly before the credits were available, likely due to the firm's anticipation of the forthcoming incentive.

Another paper that has helped to inspire the study of job creation tax credits comes from Faulk's (2002) work in his analysis of state employment tax credits. His main focus is to determine if these jobs would have been created in the absence of state employment tax credits. He goes about his study by providing estimates of the employment impact of these credits by comparing changes in employment in firms that choose to participate in tax credit programs with firms that have not participated.

Faulk (2002) argues that a firm faces costs in participating in a JCTC as well as obvious benefits. The benefits lie in the tax savings that are offered based on the number of new employment; however there are a number of implicit costs including search costs, compliance costs, hiring costs, and the possibility of additional federal tax liabilities. Faulk (2002) then employs a system of three equations to develop his empirical model: an employment equation for participants, an employment equation for eligible nonparticipants, and a participation equation.

The data used in Faulk's paper consists of firms' corporate income tax returns for corporations in the state of Georgia. The data included 151 firms eligible to receive tax credits for job creation while nonparticipating firms were selected

randomly from a list of eligible firms that chose not to participate. The results of this study found a positive relationship between the size of a firm and the change in employment for both participating and nonparticipating firms. Employment growth in participating firms was found to be sixty percent larger than comparative firms that chose not to participate in the tax credit program. Faulk (2002) suggests in conclusion that firms are indeed creating jobs in response to Georgia's tax credits. Firm's taking the credits created roughly twenty-five percent more jobs than eligible firms that did not receive the credits.

This paper aims to improve upon the previous research. In Wilson (2009) the fiscal size of the tax credits are based on 2006 data for from the Annual Survey of Manufacturers in conjunction with each respective state's credit conditions. For my paper I will use similar data from each state we are studying, with a total of 27 states that offer credits as well as 17 states that offer no credits for a period of 9 years. One of the limitations that Wilson (2010) points out is that his empirical model has a large number of parameters, which may make it difficult to develop precise variable estimates. This paper utilizes some of Wilson's most useful parameters while still developing a reasonably useful model. Finally, Faulk (2002) offers a basic concept for how we hope to look at the relationship between job creation and JCTCs, however his tests included a limited number of firms. This paper examines employment trends for all firms in a state, thereby offering an aggregate view of employment.

III. Empirical Model Development

The primary basis for these models comes from Wilson's (2010) work on predicting levels of employment based on state JCTCs. The economic theory behind the development of these models follows the assumption that firms operate to maximize profits and minimize costs. In this sense, it is expected that firms will be more willing to hire if the cost of employing an additional worker is subsidized by the government. This paper derives the theoretical model foundation from Wilson's (2009) work on the Job Creation Tax Credits. Wilson suggests that firms will choose their levels employment differently between periods in which there are no JCTCs offered by the state and for periods where the JCTCs are enacted. In this sense, firms operating in period 1 in which no money is offered by the state will employ less people that in period 2 in which the JCTC goes into effect. Thus it is expected that $[L_2 - L_1] > 0$ for L=level of employment for a given firm. By having net positive employment by firms subsidized by the state it is expected that overall employment will rise for states in periods after JCTCs are offered. The data set used for these models includes forty-four state observations, each with data points for nine separate years from 2001 to 2009. Each of the nine years represents a new period for the data set. In order to account for this type of panel data set, dummy variables are used for each year and each territory. In this manner the models are able to expose the fixed effects that vary from state to state in their offerings of JCTCs and their respective changes in employment. Multiple models are developed to test my hypotheses.

Four dependent variables are used to create four main models. Each of these has multiple sub-models using different independent variables. The purpose of running each model multiple different ways was to have the maximum opportunity to develop a useful model. All model results are reported in the Tables section.

Model 1

$Emp\_stable = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Emp\_stable = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Emp\_stable = \beta_1 + \beta_2(jctc\_multi) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Emp\_stable = \beta_1 + \beta_2(jctc\_multi) + \beta_3(jctc\_multisq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(emp\_stabel) = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(emp\_stable) = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(emp\_stable) = \beta_1 + \beta_2(Ln[jctc\_one]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(emp\_stable) = \beta_1 + \beta_2(Ln[jctc\_multi]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

where e*mp_stable* represents the number of employees working within a given state at the beginning and end of a fiscal quarter, *jctc_one* is an indicator of the amount of tax credit available per new hire for one year in a given state, and *jctc_multi* indicates the summation of a tax credit available in future years. Additionally, squared variables of the main independent variables are included in these regressions. The year and territory dummy variables represent each individual year and state observations to control for fixed effects. Logged versions of these models

are also utilized in order to determine the elasticity, or percent changes, of employment due to changes in a JCTC

In theory, a greater tax credit functions as an incentive for firms to hire new workers. However, with the law of diminishing returns it is expected that the gains from greater JCTCs will have decreasing returns to scale in terms of employment. Therefore, it is expected that $\beta_2 > 0$ and $\beta_3 < 0$ (for models where the squared term is used).

In conjunction with the previous model, it is also demonstrated by Wilson (2009) that payroll levels by state will rise after periods in which JCTCs are offered to states resulting from increasing employment. Thus it is expected that $[P_2 - P_1] > 0$ where P=net payroll for all firms within a state. Model 2 is proposed to measure payroll effects of JCTCs

Model 2

$Payroll = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ dummies) + \beta_4(state\ dummies) + e$

$Payroll = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ dummies) + \beta_5(state\ dummies) + e$

$Payroll = \beta_1 + \beta_2(jctc\_multi) + \beta_3(year\ dummies) + \beta_4(state\ dummies) + e$

$Payroll = \beta_1 + \beta_2(jctc\_multi) + \beta_3(jctc\_multisq) + \beta_4(year\ dummies) + \beta_5(state\ dummies) + e$

$Ln(Payroll) = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ dummies) + \beta_4(state\ dummies) + e$

$Ln(Payroll) = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ dummies) + \beta_5(state\ dummies) + e$

$Ln(Payroll) = \beta_1 + \beta_2(Ln[jctc\_one]) + \beta_3(year\ dummies) + \beta_4(state\ dummies) + e$

$Ln(Payroll) = \beta_1 + \beta_2(Ln[jctc\_multi]) + \beta_3(year\ dummies) + \beta_4(state\ dummies) + e$

Here, the aggregate level of funds paid from employers to workers is used as the dependent variable. This offers an insight into whether or not job creation tax credits have an influence on how much firms are will to spend pay out to employees. It is expected that a greater tax credit will boost employment, and in turn have a positive effect on state payroll due to an increase in workers. Similar to employment, due to diminishing returns it cannot be expected that increasing JCTCs will have constant returns to scale. Therefore, it is expected that $\beta_2 > 0$ and $\beta_3 < 0$ (for models where the squared term is used).

Model 3

$New\_hires = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$New\_hires = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$New\_hires = \beta_1 + \beta_2(jctc\_multi) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$New\_hires = \beta_1 + \beta_2(jctc\_multi) + \beta_3(jctc\_multisq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(New\_hires) = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(New\_hires) = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(New\_hires) = \beta_1 + \beta_2(Ln[jctc\_one]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(New\_hires) = \beta_1 + \beta_2(Ln[jctc\_multi]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

Model 3 uses the number of new hires within a state as the dependent variable. Here I will examine if JCTCs has an effect on the number of new workers hired. Tax credit offerings should encourage business to hire new workers as they will be

cheaper to compensate, therefore I expect that $\beta_2 > 0$ and $\beta_3 < 0$ (for models where the squared term is used).

Model 4

$Jobs\_gained = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Jobs\_gained = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Jobs\_gained = \beta_1 + \beta_2(jctc\_multi) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Jobs\_gained = \beta_1 + \beta_2(jctc\_multi) + \beta_3(jctc\_multisq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(Jobs\_gained) = \beta_1 + \beta_2(jctc\_one) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(Jobs\_gained) = \beta_1 + \beta_2(jctc\_one) + \beta_3(jctc\_onesq) + \beta_4(year\ FEs) + \beta_5(state\ FEs) + e$

$Ln(Jobs\_gained) = \beta_1 + \beta_2(Ln[jctc\_one]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

$Ln(Jobs\_gained) = \beta_1 + \beta_2(Ln[jctc\_multi]) + \beta_3(year\ FEs) + \beta_4(state\ FEs) + e$

Finally, model 4 uses the number of new jobs gained in state as the dependent variable. The availability of subsidized labor should make firms more likely to create new positions, therefore I expect that $\beta_2 > 0$ and $\beta_3 < 0$ (for models where the squared term is used).

IV. Data

There are two primary types of data used in these analyses. First, information was gathered specific to each of the 51 states (including District of Columbia). Each of the fifty states as well as Washington D.C. required individual data inputs for their respective job creation tax credit programs. By my count there were twenty-seven states with active tax credit programs. For each state there are multiple facets that must be considered for each individual tax program. The first

item to consider is what month and year the state put into effect the tax credit program. This information is critical for the comparison of employment between years before and after the program takes effect. The next item to consider is the method in which each state chooses to allocate money to participating firms. This is where the greatest degree of variation can be found from one state to the next. Most states offer tax credits in the form of a percentage of payroll or percentage of state income tax for each eligible new employee, however some states offer flat amounts per new worker.

The primary variable coming from this section of the data is the actual amount of tax credit per worker. This is derived from the method in which each state allocates credits for new workers. Similar to this is multi year credit; several states offer continued tax credit support for a predetermined amount of years as long as the new job is maintained. These range from zero to fifteen years and can dramatically increase the real value of a state's JCTC. Next I took account for whether or not each state offers a refundable tax credit. Refundable tax credits allow a firm to receive payment from the state even if they have no tax liability, which in turn makes it one of the less popular considerations in a state's offering. Finally there is the carry forward effect. Here the firm can be allowed to carry forward the credit several years (determined individually by each state), which allows companies to use the credit in future years if they have a positive tax credit liability (Wilson, 2009).

The second data set used in this research is the Quarterly Workforce Indicator production from the U.S. Census Bureau. The data used captures quarterly

employment statistics for every county by fiscal quarter in the United States ranging from the years 2001 to 2009. This data's primary focus is on jobs gains and losses over time periods.

The data points that I focus on concern stable employment numbers as well as total payroll numbers by state. For this paper, I chose to study stable employment levels by state as it represents the total number of workers who are employed by the same firm on both the start and end date of every quarter. This is used in conjunction with the total quarterly payroll for all jobs in each state. Additionally, this data set accounts for the number of new hires in a given state and time period, as well as the number of jobs gained by firms within a state. Both of these will be used as dependent variables for some of the models in this paper. Additionally, the variables are described in detail in the appendix.

V. Results

The Tables section displays all relevant results for models one through four. Model 1 tests the effect JCTCs on the level of stable employment (see Table 2 for full results). Model 1 suggests that the one year JCTC variable has a strong, positive, and statistically significant effect on stable employment. An increase in a JCTC's value by $100 should increase employment in state by about 120,000 workers, with all other things held constant. While this does seem severe, the reported mean number of workers per state is 1.5 million, therefore this is only a marginal shift. This variable was found to significant beyond the 1% probability level. The parameter estimate for squared JCTC is negative, suggesting that as the values of tax credit options continue to increase, the resulting increase in employment cannot be sustained

indefinitely. While the multi-year component was found to have no effect by itself, when used in conjunction with the multi-year squared estimate the results turned out to be positive and significant beyond the 10% probability level. As seen with one year squared, the multi-year squared variable was negative, implying that while employment increases with additional JCTCs marginal returns do in fact set in. The adjusted R-squared for the linear models centers around 0.23, implying that roughly 23% of the variation in the data can be explained by these models. The log-linear parameters of model 1 are also useful. Variation 6 suggests that if one year JCTCs were to increase by $100 there should be an expected increase in in-state employment by 10%, all other things held equal. All of Model 1's reported F-statistics are significant beyond the 1% probability level, therefore model 1 supports the initial expectation and the null hypothesis suggesting that JCTCs have no effect on employment can be rejected.

Model 2 tests for the direst effect of JCTCs on aggregate in state employee payroll (see Table 3 for full results). There were no significant relationships found between JCTCs and total in-state payroll . Model 2 was not found to be useful for predicting payroll, therefore the null hypothesis suggesting that JCTCs have an effect on total payroll could not be rejected.

Model 3 tests for the effect of JCTCs on the total number of new hires in a state (see Table 4 for full results). The only significant effect observed here was found for the one year JCTC variable, which has a strong, positive, and significant effect on new hires. This model suggests that an increase in the amount of JCTCs by $100 should result in roughly 3,900 new hires in a state, all other things held equal.

While the squared JCTC was not fully significant, the parameter estimate is negative; therefore the best guess is that there are decreasing returns to new hires as JCTCs are increased. The multi-year JCTC component along with any non-linear models were found to be statistically significant. However, the results from variations 1 and 2 of model 3 support our initial expectation, and the null hypothesis suggesting that JCTCs have no effect on the number of new hires can be rejected. The adjusted R-squared for this model is 0.9551, suggesting that roughly 95% of the variation in the data can be explained by this model. Also, the F-value for this model is statistically significant beyond the 1% probability level, thus making this a useful model for predicting new hires.

Model 4 tests for the effects of JCTCs on the number of total jobs gained by firms in a state. While some of the results may be useful, the differences between this variable and the *new_hires* variable are somewhat ambiguous. For reference, the results are reported in Table 5.

VI. Conclusions and Limitation

The models developed in this paper offer an important outlook on employment. It can be said with confidence that states whose main priority is to get their citizens back to work can find some refuge in offering or marginally increasing job creation tax credits. This is economically significant because the consistently high levels of employment in America today result in a severe drag on economic growth. By understanding the relationship between employment and JCTCs, steps can be made to help economies everywhere move forward.

The data clearly suggests a positive relationship between the amount of job creation tax credit offerings for one year and overall employment within a state. However, when taking into account the receivable tax credits over a multi year period, the relationship appears to be weaker. This is a significant finding for regions that may be desperate for job growth. With the appropriate incentive programs states should feel confident that one way of encouraging employment growth is by creating programs that offer incentives to create new jobs by offering tax credits to eligible companies.

The total number of new hires also has a positive relationship with JCTCs in states where they are offered. This is an important implication because there is expected to be a direct negative effect on unemployment where new people are added to the work force. For this reason alone I believe that this research is useful and states that can afford offering tax credits to employers should take this approach to help get their residents back to work.

Concerning aggregate employee payroll within a state, these models were unable to find a significant trend relating to JCTCs. This result was unexpected because an increase in the level of employment should intuitively increase total payroll. I suggest that future research continues to develop models testing for this relationship, possibly taking into account additional factors such as whether or not the same total earnings are being spread out over all of the new workers.

Additionally, I recommend future researchers study in greater detail the implications of a multi-year tax credit. Many states do offer tax credits over multiple

years, thus increasing the value of a JCTC however the variables in these models were not found to be statistically significant for the most part.

One limitation this study encountered was the inability to test for the negative effects of JCTCs. It is reasonable to expect that some states that do not have the budget to help subsidize employment may be left behind and experience negative job growth as firms move across state borders. The impact would be devastating to these areas and the effects of simply having new jobs moving from one area to the next without having actual jobs created is far from progressive.

I believe that the examination of job creation tax credits on employment is important to understand some of the steps that can be taken to encourage job growth. These JCTCs can have significant impact on regional economies that can help or hurt them for years to come. There is plenty of evidence suggesting positive effects, however the results are not fully clear. I recommend further and more expansive studies using a greater range of years. For now, however, economies in need of imminent job growth can find some solace in the incentives of job creation tax credits.

VII. References

Chirinko, Robert S., and Daniel J. Wilson. "Job Creation Tax Credits and Job Growth: Whether, When, and Where?" Federal Reserve Bank of San Francisco (2010): 1-39.

Faulk, Dagney. "Do State Economic Development Incentives Create Jobs? An Analysis of State Employment Tax Credits." National Tax Journal, 55 (June 2002), 263-280.

Wilson, Daniel J. "Tax Credits for Job Retention: What Can We Learn from the States?" Federal Reserve Bank of San Francisco Economic Letter (2009): 1-4.

VIII. Tables

Table 1			
State	JCTC One Year ($)	JCTC Multi Year ($)	Multi Year
Arkansas	5877.14	1395.21	5
California	3000	3000	0
Colorado	6267.46	1487.3	5
Connecticut	6291.44	1493.56	5
Florida	1000	1000	0
Georgia	6682.53	2500	3
Illinois	9873.09	1341.43	10
Indiana	11591.5	1574.91	10
Kentucky	9201.83	2184.48	5
Louisiana	22199.35	3016.18	10
Maine	9022.73	1225.9	10
Maryland	5000	5000	0
Mississippi	7384.732	1753.109	5
Missouri	2484.19	2484.19	0
Montana	428	428	0
Nebraska	6254.72	1120.44	7
New Jersey	5582.38	1000	7
New Mexico	18491.77	4389.88	5
North Carolina	8851.6	2554.5	4
North Dakota	1952.35	1952.35	0
Ohio	14887.64	1532.87	15
Oklahoma	2106.18	500	5
Pennsylvania	1000	1000	0
Rhode Island	2400	2400	0
South Carolina	14743.27	3500	5
Tennessee	13365.06	5000	3
Virginia	1000	1000	0

Table 2

Descriptive Statistics

Variable	Number	Mean	Std Dev	Min	Max
emp_stable	388	1523127	5239489	2947	9385994
payroll	388	15240553890	22830472758	32861289	1.47071E+11
new_hires	384	317415	446587.68	713	2714544
jobs_gained	384	97039	131774	266	799271
jctc_one	414	687.73	1073	0	5000
jctc_multi	414	2742	5089	0	22199
ln(emp_stable)	388	13.34	1.41	7.98	18.41
ln(payroll)	388	22.58	1.51	17.31	25.71
ln(jctc_one)	161	7.31	0.58	6.06	8.51
ln(jctc_multi)	161	8.37	1.09	6.05	10.01
jctc_onesq	414	1623340	3752638	0	25000000
jctc_multisq	414	33363674	88589309	0	492811140

Stable Employment	Linear-Linear	Linear-Linear	Linear-Linear	Linear-Linear	Log-Linear	Log-Linear	Log-Log	Log-Log
Model 1	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JCTC_one	1289.84***	2980.51***	-	-	0.000065***	0.0011*	-	-
Pr > |t|	0.0004	0.0045	-	-	0.001	0.06	-	-
JCTC_onesq	-	-0.4587*	-	-	-	-1.13E-08	-	-
Pr > |t|	-	0.08	-	-	-	0.434	-	-
LN(JCTC_one)	-	-	-	-	-	-	0.021***	-
Pr > |t|	-	-	-	-	-	-	0.0023	-
JCTC_multi	-	-	42.503	526.17*	-	-	-	-
Pr > |t|	-	-	0.646	0.055	-	-	-	-
JCTC_multisq	-	-	-	-0.033*	-	-	-	-
Pr > |t|	-	-	-	0.06	-	-		0.016***
LN(JCTC_multi)	-	-	-	-	-	-		0.0058
Pr > |t|	-	-	-	-	-	-	-	-
State Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	384	384	384	384	384	384	384	384
Adj R-Squared	0.2467	0.2512	0.219	0.2249	0.9701	0.9701	0.97	0.9698
Pr > F	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 3								
Statistical significance beyond the 10, 5, and 1% levels are marked by *, **, and ***, respectively								

Payroll	Linear-Linear	Linear-Linear	Linear-Linear	Linear-Linear	Log-Linear	Log-Linear	Log-Log	Log-Log
Model 2	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JCTC_one	-200942	-1087982	-	-	0.00001744	-0.00003631	-	-
Pr > |t|	0.601	0.326	-	-	0.3684	0.5149	-	-
JCTC_onesq	-	240.376	-	-	-	1.46E-08	-	-
Pr > |t|	-	0.393	-	-	-	0.3041	-	-
LN(JCTC_one)	-	-	-	-	-	-	0.00272	-
Pr > |t|	-	-	-	-	-	-	0.6842	-
JCTC_multi	-	-	-120402	-298290	-	-	-	-
Pr > |t|	-	-	0.206	0.291	-	-	-	-
JCTC_multisq	-	-	-	11.961	-	-	-	-
Pr > |t|	-	-	-	-	-	-	-	-
LN(JCTC_multi)	-	-	-	-	-		-	0.0016
Pr > |t|	-	-	-	0.5033	-	-	-	0.7815
State Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	384	384	384	384	384	384	384	384
Adj R-Squared	0.9563	0.9562	0.9563	0.9564	0.9745	0.9745	0.9744	0.9744
Pr > F	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 4								
Statistical significance beyond the 10, 5, and 1% levels are marked by *, **, and ***, respectively								

New_hires	Linear-Linear	Linear-Linear	Linear-Linear	Linear-Linear	Log-Linear	Log-Linear	Log-Log	Log-Log
Model 3	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JCTC_one	18.725**	39.794*	-	-	0.00003114	0.00001019	-	-
Pr > |t|	0.014	0.0692	-	-	0.118	0.8588	-	-
JCTC_onesq	-	-0.00571	-	-	-	5.68E-09	-	-
Pr > |t|	-	0.304	-	-	-	0.6966	-	-
LN(JCTC_one)	-	-	-	-	-	-	0.00664	-
Pr > |t|	-	-	-	-	-	-	0.3344	-
JCTC_multi	-	-	2.462	6.479	-	-	-	-
Pr > |t|	-	-	0.1944	0.2494	-	-	-	-
JCTC_multisq	-	-	-	-0.00027	-	-	-	-
Pr > |t|	-	-	-	-0.4478	-	-	-	-
LN(JCTC_multi)		-	-	-	-	-	-	0.00498
Pr > |t|	-	-	-	-	-	-	-	0.4024
State Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	384	384	384	384	384	384	384	384
Adj R-Squared	0.9551	0.9551	0.9545	0.9483	0.9701	0.97	0.9699	0.9699
Pr > F	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 5								
Statistical significance beyond the 10, 5, and 1% levels are marked by *, **, and ***, respectively								

Jobs_gained	Linear-Linear	Linear-Linear	Linear-Linear	Linear-Linear	Log-Linear	Log-Linear	Log-Log	Log-Log
Model 4	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JCTC_one	5.049**	9.128	-	-	0.000032	-0.000015	-	-
Pr > |t|	0.035	0.1858	-	-	0.3569	0.8015	-	-
JCTC_onesq	-	-0.00111	-	-	-	1.29E-08	-	-
Pr > |t|	-	0.5279	-	-	-	0.407	-	-
LN(JCTC_one)	-	-	-	-	-		0.00466	-
Pr > |t|	-	-	-	-	-	-	0.5279	-
JCTC_multi	-	-	0.8122	1.7892	-	-	-	-
Pr > |t|	-	-	0.1733	0.3116	-	-	-	-
JCTC_multisq	-	-	-	-0.00007	-	-	-	-
Pr > |t|	-	-	-	-	-	-	-	-
LN(JCTC_multi)	-	-	-	-	-	-	-	0.00369
Pr > |t|	-	-	-	0.5571	-	-	-	0.5629
State Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	384	384	384	384	384	384	384	384
Adj R-Squared	0.9488	0.9587	0.9484	0.9483	0.9658	0.9745	0.9656	0.9656
Pr > F	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Table 6								
Statistical significance beyond the 10, 5, and 1% levels are marked by *, **, and ***, respectively								

VIII. Appendix

Variable	Description
Employment_stable	The total number of employees in a state in a given year, stable from the beginning of Quarter 1 to the end of Quarter 1
Payroll	Gross compensation paid to employees by firms in a state for Quarter 1
New_hires	Total number of new employees hired by firms in Quarter 1
Jobs_gained	Total number of new positions created by firms in Quarter 1
JCTC_one	Total amount of tax credits offered to employers for new hires kept for one year
JCTC_multi	Total amount of tax credits offered to employers for new hires kept over a pre-determined period of years