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# Business Incentives and Employment: What Incentives Work and Where?

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## Abstract

State governments offer tax and location-based incentives to entice firms to locate or expand operations in their state. We evaluate the effect of these incentives on employment using a panel data of Kentucky counties. These data are unique because they contain information on actual incentives received rather than on incentives offered, an important distinction because the majority of incentives offered are never claimed. Because Kentucky offers incentive plans similar to other states, the results are applicable to other states. Training incentives have a strong, positive effect on economic activity, whereas tax incentives have a more modest positive effect. These effects differ with the location of the county, with almost no impact in interior counties and much larger, positive and significant impacts in counties along state borders. There are few if any spillover effects to adjacent counties.



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## *1. Introduction*

The practice of local and state governments offering tax and other location-based incentives to firms considering locating operations in their jurisdictions, as well as to existing firms that are expanding operations, has become a common practice with no abatement of this practice apparent in the near future. These incentive programs are used throughout the U.S. not only in the hopes of attracting very visible projects such as automobile assembly plants and high-technology firms but also to encourage existing firms to add new capacity and jobs.

Although frequently used, these programs are not without their critics. Undoubtedly some of the concerns about these programs arise from the lack of strong evidence, either supportive or critical, on the effects of these programs. Even though a significant literature has developed examining programs that focus on economic development in specific areas, such as enterprise or empowerment zones or tax incremental financing (TIF), there is a very limited literature on incentive programs used by states. The literature that has developed on business incentive programs has generally been theoretical and focused on when these incentives might be successful.

The relatively scant empirical literature on incentive programs has been plagued by limited access to data on these programs. In particular, researchers often know the value of incentives that are "awarded" to firms but do not know that actual amount of incentives firms receive. This is because firms may be awarded a certain amount of incentives but they are only able to claim the incentives once they meet certain criteria, such as creating a certain number of jobs and actually earning a profit. Because very few firms ever meet all of the criteria that would allow them to receive the full value of the incentives that have been awarded, there is often a large difference between credits awarded and received. For example, between 1992 and 2002 in Kentucky firms had

claimed only twelve percent of the tax incentives that they had been awarded.[1] Therefore, researchers using data on the value of incentives awarded as opposed to the value of incentives received by firms will be using a very noisy measure of incentives, and their results will be biased toward finding that incentives have a small or no effect on outcome measures.

In contrast, we have obtained a unique data set from the Kentucky Cabinet for Economic Development containing information on the incentives both awarded to and received by firms in Kentucky from 1992 to 2004. With these data we are able to track the annual value of incentives received, by type of incentive, in each of Kentucky's 120 counties. Specifically, these data represent the cost to the state government of providing these business incentive programs. Supplementing these data with data on employment in Kentucky's counties from the Bureau of Economic Analysis (BEA) enables us to examine the relationship between state government expenditures on business incentives and employment changes in Kentucky.

Although the incentive programs in Kentucky have a broadly-defined goal "to encourage economic development, business expansion, and job creation,"[2] we are more narrowly focused on the impacts of these incentives on local employment. Other measures of economic development, such as earnings and property value, might also be affected by the use of incentive programs and have been examined in other studies (e.g., Greenstone and Moretti (2003)).[3] We focus on

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[1]Based on authors' calculation using data on Kentucky tax incentives from the Kentucky Cabinet for Economic Development (KYCED).

[2]See the website for the KYCED at http://thinkkentucky.com/KYEDC/kybizince.aspx for more information.

[3]Hoyt, Jepsen, and Troske (2007) also examines the impacts of Kentucky's business incentive programs on earnings and property values in Kentucky counties.

employment because of its importance as a defined objective of these programs, the persistent high levels of unemployment in many Kentucky counties, and the fact that eligibility for many of the business incentive programs is determined in part by high levels of unemployment in a county.

For several reasons, Kentucky offers a unique opportunity for examining the impacts of state business incentive programs on local employment. First, the large number of counties (120) in a state of relatively small area and population means that when examining county-level impacts we are, in effect, examining the impacts of these programs on a relatively small area. It also means that it is easier to examine any spillover effects on neighboring counties that are in close proximity to the county where an incentive is received. The large number of counties, the shape of Kentucky, and its large number of neighboring states (seven) provides us a unique opportunity to distinguish the effects of these programs in areas bordering other states and areas interior to the state. By doing so, we believe we can shed light on whether these programs simply transfer employment among counties within a state or actually have interstate impacts on employment.

A number of findings emerge from our study. First, although we find evidence of positive and significant relationships between business incentives and employment, the significance and magnitude of these impacts depend on both the type of incentive and the location of the county. Specifically, training incentives and, to a lesser extent, tax credits have positive and significant impacts on employment. In none of our specifications do we find that financing programs have a statistically significant impact. These impacts are not uniform throughout the state—significant impacts of these incentive programs on employment, particularly in the short run, generally occur only in counties on the state border and not in interior counties. It appears that both training and tax incentives help attract firms that, in the absence of these incentives, would have located or expanded in neighboring states. We also find that, while tax incentives have a much larger impact on employment in MSA border counties, training incentives have a larger impact in non-MSA border

counties. In addition to examining short-run effects of these incentives on employment, we also examine longer-run impacts (five years) and find these long-run effects are significantly larger for both training and tax credits than the short-run effects.

We find little evidence of spillover effects from these incentive programs—the amount of incentives taken by firms in neighboring counties appears to have little impact on employment in a county.

In the next section we briefly discuss the most relevant literature. In *Section 3* we discuss our data and in *Section 4* we discuss our methodology. In *Section 5* we present our results on the relationship between county employment and business incentives. *Section 6* concludes.

## *2. Previous Research*

Numerous studies have been written on business incentives and their impacts on economic growth. This section provides a critical analysis of this literature. It contains separate sections on the impact of taxes in general and on the impact of economic development incentives in particular.

### *2.1 Taxes and Economic Growth*

Many researchers have studied the effects of taxes on economic growth. In general, these studies looked at the relationship between tax rates (such as the corporate tax rate) and economic growth. Economic growth typically means employment growth, but some studies used alternate measures such as rate of return on investment. Reviews of the literature often concluded that taxes have a negative relationship with economic growth (Bartik, 1991; Wasylenko, 1997)—higher taxes are associated with lower economic growth. However, it is unclear whether higher taxes cause lower economic growth, or whether there are other factors that are associated with both higher taxes and lower economic growth.

### *2.2 Economic Development Incentives and Economic Growth*

Even though a voluminous literature exists on the impacts of state and local taxes, few

researchers have explicitly looked at the effects of economic development programs on economic growth. The lack of attention to the impacts of these programs is undoubtedly due, in part, to the difficulty in measuring the impact of these programs because data on taxes paid by firms, which is what are needed to evaluate these programs, are confidential. Consequently, states typically have not conducted regular evaluations of their development incentive programs (Buss, 2001), although regular assessments are starting to become more common. For example, North Carolina and Georgia now require periodic evaluations of their incentive programs. However, Ihlanfeldt and Sjoquist (2001) claimed that only one of Georgia's incentive programs, the job tax credit program, had sufficient data to be evaluated. Faulk (2002) found that Georgia's jobs tax credit created a modest number of new jobs, at a price below most other tax incentive programs: under $2,500 per job created (in 1993 to 1995 dollars). The results from North Carolina suggest positive effects of their incentive programs (Luger, 2001; Luger, 2003). However, these estimates are questionable since they are based on simulations rather than actual data.

In addition to these state-funded evaluations of incentive programs, there have been a number of evaluations of incentive programs that have been undertaken independent of state governments. These articles vary greatly in their statistical sophistication, their measures of economic development, and the time periods studied. Newman and Sullivan (1988), Bartik (1991), and Fisher and Peters (1997) provided the most detailed summaries of this literature. The most recent of these summaries, Fisher and Peters (1997), generally found a positive relationship between development incentives and economic growth, but they also pointed out that the pre-1997 literature did not adequately control for differences across counties and states in general business climate. For example, a county or state may use business incentives to level the playing field with other more attractive counties or states. More recent work was aware of these county and state differences, but authors still often failed to control adequately for these differences (e.g., Goss and Phillips, 2001;

Gabe and Kraybill, 2002; Calcagno and Thompson, 2004).

Using individual plant and firm-level data from the Census of Manufactures from 1972 to 1992 merged with listings on the existence and nature of state development programs, Lee (2004) examined how these programs influence plant relocations. He found that plant relocations account for only a small amount of the difference in employment growth across states and that tax incentives play only a small role in explaining whether a plant relocates in a different state.

Greenstone and Moretti (2003) compared economic growth in counties that won "million-dollar plants" with counties that lost the competition for these plants. They provided detailed evidence that the winning and losing counties were quite similar before the plant was built. However, the winning counties had dramatically higher economic growth after the plants were built. Their paper provides compelling evidence that the construction of these plants led to higher economic growth. In follow-up work, Greenstone, Hornbeck, and Moretti (2008) found evidence that the construction of these plants also led to noticeable improvements in productivity for other plants (what they call "incumbent plants") in the same county. Because the authors did not have data on the size of the incentives, they could not say whether or not the benefits of the plants out-weighed their costs. Even with this limitation, these papers are considered the most informative and technically rigorous work on economic development incentives.

Probably the most common localized economic development program is enterprise zone programs. Hoyt and Garen (2006) concluded that enterprise zones do not have a clear positive (or negative) impact on economic growth. Similar conclusions have been found for other localized programs such as tax abatement and tax incremental financing.

A final piece of the literature review is to consider the effect of federal programs. The federal government offered several tax credit programs in the 1970s and 1980s. Bishop and Mont-gomery (1993) and Perloff and Wachter (1979) found modest, positive effects of these programs on

employment growth. However, Bishop and Montgomery (1993) estimated that much of the credits went to employers that would have hired workers even in the absence of the tax credit program.

One of the most frequent shortcomings of studies of incentive programs is their failure to address the fact that these business incentives are not randomly given to companies. Presumably, the companies that received the incentives were the ones that could benefit the most from the incentives. Therefore, a simple comparison between firms that receive incentives and those that do not will likely overstate the benefits of the incentives. Although many recent studies acknowledged this concern, they still failed to control for these non-random differences and therefore produce biased estimates of the benefits. Further, these studies generally assumed that business incentives have immediate effects on employment, rather than allowing a gradual response to them over several years. Greenstone and Moretti (2003) were careful to avoid these problems, but they only considered the existence of a subsidy rather than the type or amount.

Our analysis of Kentucky's incentive programs is an improvement on previous work for several reasons. First, we use more than ten years of county-level data. This is a much longer panel than has been used in previous studies, many of which were cross-sectional studies. With a panel of this length, we can control for many of the unobserved differences among counties that are likely to influence economic activity in these counties. Second, we use data on actual incentives taken by firms. As we discuss later, the amount of incentives actually taken is much lower than amount of potential incentives offered to the firm.[4] Previous work has used much less precise measures of business incentives such as expenditures of state economic development agencies and therefore is biased towards finding that incentives have no effect. Finally, we allow incentives to have an impact several years after the incentive is received instead of assuming the incentive has an immediate impact on employment.

[4]Faulk (2002) finds a significant difference between incentives offered and taken in Georgia as well.

## *3. Data*

### *3.1 Data on Incentives*

Our data on business incentives come from the Kentucky Cabinet for Economic Development and cover the period from 1992 to 2004. The data start in 1992 because this is the first year that many of these business incentive programs were available. The Commonwealth of Kentucky, like other states, has a myriad of incentive programs with some being very broadly defined while others are specific to a region or industry. We aggregate these incentives into three broad classifications: tax incentives, training incentives, and financing incentives.[5]

We focus on the impact of tax incentives from the four largest tax incentive programs: the Kentucky Industrial Development Act (KIDA); the Kentucky Rural Economic Development Act (KREDA); the Kentucky Jobs Development Act (KJDA); and the Kentucky Industrial Revitalization Act (KIRA). When examining the impact of tax incentives, we combine these four programs together and treat them as a single program. We do not examine the impact of each program separately. We also have financing data from two programs, the Kentucky Economic Development Finance Authority (KEDFA) a direct loan program, and the Economic Development Bonds (EDB) program, and again we analyze the impact of these two programs together. Finally, we have data on training grants and incentives from the Bluegrass State Skills Corporation (BSSC) program, which we also combine into a single training program.[6] We do not include incentives that are tailored to individual firms and – in some cases – require legislative approval. Instead, our focus is on general

[5]See Hoyt, Jepsen, and Troske (2007) for more information on Kentucky's business incentive programs.

[6]Most training incentives are in the form of grants. Job training credits were first offered in 1998, but credits comprise a small share of the money allocated to training incentives.

incentive programs.

For each of these incentive programs, we know the total amount received by firms operating in a county between 1992 and 2004.[7] Unless noted otherwise, throughout this analysis we focus on the actual amount of tax incentives received in a year, as opposed to the actual incentives approved, since the former measure captures the true cost of the program. The incentives received in a particular year vary across the three types of incentives. Because most training incentives are grants designed to reimburse firms for training costs, firms receive training grants when they provide training. Firms claim financing incentives, which are loans and grants, after completion of the project. Firms claim tax incentives when two conditions are met. First, they must meet the requirements, usually in the form of job creation, required by the specific type of tax credit. Second, they must have a tax liability in that year.

*3.2 Employment and Demographic Data*

Our interest is the impact of incentive programs on county employment. Our primary source of data on employment comes from the Regional Economic Information System (REIS) produced by the Bureau of Economic Analysis (BEA).[8] The measure of employment reported by

[7]We know the credits received under the KIDA, KREDA, KJDA and KIRA programs. We do not always know the credits received under the BSSC program, so we use amount approved when we do not have data on amount received. Based on conversations with officials from Kentucky's Cabinet for Economic Development, we feel that, for the BSSC program, the amount approved closely matches the amount taken.

[8]For more discussion of the methodology used by the BEA to determine employment and earnings see http://www.bea.gov/regional/pdf/lapi2005/employment.pdf and http://www.bea.gov/regional/pdf/lapi2005/wagsal.pdf.

REIS is based on employer records and measures total employment within a county including both full- and part-time workers.

To control for other aspects of a county that may affect employment growth, we supplement our data on employment with county-level data on demographics, school expenditures, and taxation. Yearly population data by age, gender, and race for a county are from the U.S. Census Bureau.[9] From these data, we construct and include in our estimation a measure of the percentage of the county population that is male. Also included in our estimation are variables measuring the percentage of the county population under the age of twenty, the percentage between twenty and twenty-nine, between thirty and forty, between forty and forty-nine, and between fifty and sixty-four. We also include, as separate variables, the percentage of the county population that is African-American, Native-American, Hispanic, and Asian.

The National Center for Education Statistics (NCES) provides yearly data on per-pupil expenditures for elementary and secondary education, and we use these data in our estimation. The Census of Governments has detailed tax and government expenditure data for each county for the years 1992, 1997, and 2002. For non-survey years values of these variables are interpolated. Using these data, we calculate total local taxes paid in a county, and include the natural logarithm of this variable in our estimation.

## *4. Methodology*

[9]The data on total population and population characteristics for these counties is based on intercensal estimates for the years 1992 – 1999 and 2001-2005 and is found at the Census site, http://www.census.gov/popest/datasets.html.

To examine the impact of business incentive programs on economic growth, we employ panel data techniques. An observation is a county and year, such as Bourbon County in 1997. We have complete data for each of Kentucky's 120 counties from 1994 to 2005.

*4.1 Basic Empirical Model*

Our basic underlying model for employment in a county is given by:

$$E = f(I, I^N, D, G, \gamma, \upsilon) \qquad (4.1)$$

where $E$ denotes employment in a county; $I$ denotes the amount of incentives actually paid to businesses operating in a county; $I^N$ denotes the amount of incentives paid to businesses operating in neighboring counties; the vector $D$ includes the total population of the county as well as measures the gender, age, and racial distribution of the county discussed earlier; and $G$ includes per-pupil expenditures and the natural log of total local taxes in the county. The term $\gamma$ denotes unobserved factors that are fixed over time and that affect employment in a county and $\upsilon$ denotes time-varying factors that affect employment in all counties equally.

Because we believe that incentives are unlikely to immediately affect economic activity in a county, for our initial estimates, we control for incentives received by businesses two years prior to the current period. In assuming that economic growth depends on the policies of preceding year(s) (lags), we are also following the long-standing approach in the literature on economic development to reduce concerns about the endogeneity of the incentives. By this we mean the possibility that high levels of economic growth might be leading to tax incentives being taken by firms, rather than incentives leading to economic growth. By having tax incentives in 1995 explain employment in 1997, for example, we reduce this concern, as it would be difficult to argue employment in 1997 leads to more incentives taken in 1995.

Because the choice of a two-year lag for incentives is somewhat arbitrary, we also estimate specifications in which we include measures of incentives received by firms in a county in each of

the five years prior to the current period. This more flexible specification allows us to estimate the effects of business incentives in both the short- and long-run. Although it is possible that impacts of incentives continue beyond five years, each lag that we add to the model reduces our sample size by one year so we are limited in the number of lags we can include. The disadvantage of this specification is that we lose precision in our estimates. Because our point estimates from the more restrictive model correspond closely with our point estimates from the more general model, we have chosen to focus primarily on the results from the more restrictive model.

It is possible that business incentives received by a firm in one county influence economic activity in neighboring counties. The impact might be through suppliers to a firm locating in neighboring counties rather than in the county where the firm which they supply is located. Or, perhaps, existing firms in one county experience an increase in sales volume arising from the increased demand by firms receiving incentives in another county. Alternatively, expansion of business activity in one county related to obtaining business incentives might lead to reductions in business activity in neighboring counties. Thus, it is an open question whether business incentives in one county increase or decrease economic activity in neighboring counties. To try to capture possible cross-county impacts of incentives, we include the level of incentives for surrounding counties in some of the models we estimate. We measure the amount of incentives received by businesses in surrounding counties by constructing a population weighted average of the incentives received in a given year in all of the counties that share a common border with a given county.[10]

Of course, employment levels in a state, region, or county are not solely determined by the incentives received by business operations in that area, nor are employment levels constant over

[10]Since we only have data on incentive awarded in Kentucky, for counties that border counties in other states, we only include incentives awarded in other counties in Kentucky.

time. Therefore, any attempt to examine the influence of incentives on employment levels must attempt to control for other possible influences on employment in a region. Because we have repeated observations on the same counties over time, we are able to include county-fixed effects to control for time-invariant, underlying long-term employment levels in each county that are unrelated to the tax incentives. Analogously, observing employment levels in 120 different counties with different levels of tax incentives each year enables us to account for how employment varies over time within the Commonwealth due to business cycles and other time-variant influences through the use of year fixed effects.

In addition to tax incentives, we include other characteristics of the counties that vary over time and are likely to influence economic growth in our estimation. As discussed earlier, these variables include the total population of a county, the gender, racial and age composition of the population in a county, local taxes and spending on primary and secondary education. Although these variables are included in all of the specifications we estimate, we do not report their coefficients in our results because they are not the focus of this study.

Based on this discussion, the basic model of the effects of business incentives can be expressed as

$$LN(E_{it}) = LN(I_{it-2})\alpha + LN(I^{N}_{it-2})\beta + D_{it}\chi + \gamma_i + \upsilon_t + \varepsilon_{it} \qquad (4.2)$$

and our more flexible model can be expressed as:

$$LN(E_{it}) = \sum_{k=1}^{5} LN(I_{it-k})\alpha + LN(I^{N}_{it-2})\beta + D_{it}\chi + \gamma_i + \upsilon_t + \varepsilon_{it} \qquad (4.3)$$

where $t$ denotes the year and $i$ the county.[11]

[11] As it is frequently the case that counties receive zero payments from one or more of the programs, it is not possible to use a simple logarithmic transformation. Instead, if we let x be the level of

*4.2 Employment Growth in Different Regions*

We expect that the impact of the level of incentives on employment growth may differ among counties in Kentucky. Specifically, we expect that differences in the level of incentives between two interior Kentucky counties will have a different impact on employment than differences in the level of incentives in Kentucky counties that border other states. Businesses in the interior counties of Kentucky and their neighboring counties are, for the most part, eligible for the same incentive programs. In contrast, counties on the border are neighbors to counties in other states that are eligible for a different set of programs. This being the case, we might well imagine that favorable incentive programs in Kentucky counties might lead to employment growth at the expense of growth in neighboring counties in border state.

For this reason we estimate equation *(4.2)* and *(4.3)* separately for interior and border counties, where a border county is defined as any county that shares a boundary with another state. However, it should be noted that when estimating a separate equation for border counties, we are, in effect, comparing how the level of incentives in border counties is related to economic growth relative to growth in other Kentucky border counties. Analogously, estimating equation *(4.2)* with only interior counties provides an estimate of the relationship between incentives and economic growth relative to other interior counties.

In addition, as it is not unreasonable to think that incentives might have differential impacts in urban and rural areas, we also interact the incentive variables with a dummy variable indicating

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incentives, then our transformation of the variable is ln(x+1), which, when x = 0, has a value of zero. Given that the mean level of training credits is $28,923, the mean of tax credits is $428,097, and the mean level of financing is $252,274, adding one dollar to the level of incentives should not make much difference.

whether the county is part of a metropolitan statistical area (MSA).

*4.3 Specification Tests*

One obvious question about any analysis that is similar to the one we are conducting is the direction of causality—do incentives lead to employment growth in an area or are incentives more likely to be taken by firms operating in areas where there is above average employment growth? To reduce concerns that our findings are the result of employment driving incentives, we conduct a standard specification test and estimate a model in which we examine the relationship between employment from two years earlier and the current levels of business incentives in the county. For example, we relate the employment in Clark County in 1996 to the level of business incentives received in Clark County in 1998. If it is the case that business incentives are being taken by firms operating in counties with faster employment growth or simply more employment, we would expect a positive relationship between employment in a county in 1996 and the amount of incentives received by firms in a county in 1998. Failure to find a positive relationship between earlier growth and the current level of incentives should reduce our concerns about the possibility that the positive relationships we find in our estimation are the result of employment driving incentives and not incentives influencing employment.

Another possibility we consider is that our dependent variable is serially correlated. To try and address this problem in some of our specifications we include the lagged dependent variable as an additional control variable. Although this procedure has the advantage of controlling for trends in economic activity, it also has the disadvantage of introducing endogeneity: the lagged dependent variable is likely correlated with the unobserved component of the current value of the dependent variable. We attempt to mitigate this concern by estimating a differences equation, as well as – in some specifications – using instrumental variables.

*4.4 Potential Concerns with Incentives Coefficients*

If firms claim incentives in years when the local economy is doing well for reasons unrelated to business incentives, then we would be concerned that local economy is driving both the claiming of incentives and the increase in employment. To put it another way, there is the concern that we are pre-disposed to find positive effects of incentives on employment because firms claim incentives only when they have a tax liability, and they are more likely to have tax liabilities in years with employment growth. Although it is possible that individual firms engage in such behavior, we found no evidence of a positive relationship between county-level incentives claimed and county-level changes in employment in the same year. This finding is consistent with the findings in the next section that incentives are very small in comparison to the overall economy.

Training incentives have an addition reason not to be subject to these concerns. The vast majority of training incentives – over 90 percent during our time period – are in the form of grants rather than tax incentives, and firms are required to claim training grants within a year of the approved start date of training. Although firms can plan the timing of their training, they are extremely limited in their ability to coordinate the timing of when they claim their training grants once their grants are approved.

## *5. Business Incentives and Employment*

### *5.1 Trends in the Use of Business Incentives*

We begin our analysis of the use of business incentive programs in Kentucky by documenting trends in the use of incentives. *Figure 1* shows the statewide trend in the use of the three types of incentive programs (tax incentives, BSSC training incentives, and financing incentives) as a percentage of total earnings in the state. As is apparent from the figure, the most popular incentive program in the early 1990's was financing but its use since then has diminished dramatically. In contrast, the value of the tax incentive program grew fairly steadily until 2002, but then fell in 2003

and 2004.[12] The BSSC training program was a relatively small program in 1992 and has remained so throughout this period. This relative stability in the BSSC program is not surprising given the statutory limits on the BSSC tax credit program and state general fund limitations on the grants program.

*Figure 1* also shows that the incentives received by firms in a year are quite small relative to the size of the economy. No single program has ever paid out incentives greater than 0.12 percent of earnings and the values of all three programs together have never exceeded 0.16 percent of earnings.

In *Figure 2* we illustrate an important distinction between tax incentives and the two other business incentive programs. Tax incentives are *awarded* to businesses that apply for them and meet certain criteria. However, tax incentives can only be *claimed* by these businesses when they meet other additional criteria, such as creating a certain number of jobs and actually incurring a tax liability in a year.[13] Over this entire period, tax incentives claimed were approximately twelve percent of incentives awarded. As we can see from the figure, the ratio of incentives claimed to those awarded is particularly low prior to 1996. Claims, as a percentage of credits awarded, increased after 1996, undoubtedly due in large part to claims on incentives awarded in the early 1990's. Because actual tax incentives claimed represents the true cost of the program, in our subsequent analysis we focus on the relationship between tax incentives claimed and economic growth rather than on the relationship between tax incentives awarded and economic growth.

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[12]Unless otherwise noted, in all of the figures we measure the amount of incentives actually received in a year and *not* the amount of credits approved.

[13]This is also true for the other incentive programs — incentives are only received by firms who meet certain criteria.

*5.2 Differences in the Use of Business Incentives among Regions in Kentucky*

In our analysis, in addition to estimating the relationship between economic activity and business incentives on a sample of all Kentucky counties, we also estimate this relationship separately for counties located on the border of the state and counties located in the interior of the state. We also interact our incentive variables with MSA status. This being the case, in addition to providing summary statistics for all counties, in *Table 1* we also report summary statistics for border, interior, MSA, and non-MSA counties. As shown in the table, employment in border counties is, on average, twice as large as employment in interior counties, not a surprising result given that two of the three largest metropolitan areas in Kentucky (Louisville and Cincinnati) are on borders. Of course, employment in MSA counties is much larger than in non-MSA counties. Of most interest is how the use of incentives, as a percentage of income, compares across these regions. The value of incentives is slightly higher in border counties than in interior counties, although none of the differences are statistically significant. MSA and Non-MSA counties have approximately the same value of training (BSSC) incentives relative to earnings, but non-MSA counties have a much higher relative value of tax credits and financing incentives than MSA counties. Some of these differences may be explained by program eligibility—many of the MSA counties, which have a higher per capita income, are not eligible for KEDFA, a financing program, and KREDA, a tax incentive program.

*Figure 3* provides another look at the geographical distribution of business incentives throughout Kentucky. To construct this figure we sum over all years of our data the yearly total of incentives received by firms in a county in a year relative to earnings in the county. We then divide the counties into quartiles based on this sum, and this is what is depicted in *Figure 3*. This map shows that the use of incentives is relatively disperse across counties in Kentucky, although the use in Eastern and Southeastern Kentucky appears noticeably lower than other regions of the state. This map also shows that the counties with the highest use of incentives relative to earnings are rural

counties with low levels of employment. This should not be surprising as it is in these counties where the difference in one or two plants receiving these incentives would have the most impact on the use of incentives as a percentage of earnings.

*5.3 The Relationship between Business Incentives and Employment*

As discussed in the preceding section, in our basic specification we undertake a logarithmic transformation of both the dependent variable and our measures of business incentives. In addition to including variables characterizing the demographic characteristics of the county (age, race, gender), public services (primary and secondary spending per student), and local taxes, we also control for the impact of time-invariant characteristics of a county that affect the level of economic activity and for business cycle influences on the entire state by including county fixed effects as well as year fixed effects. Because we compare economic activity in a county with the values of tax incentives from two years earlier, our analysis is restricted to the period from 1994 to 2005.

*Table* 2 contains the results from our initial estimates of equation *(4.2)*. The first three columns report the results from estimating the model using three different samples: all counties, border counties, and interior counties, respectively. While the coefficients on $LN(Training)_{t-2}$ and $LN(Credits)_{t-2}$ are both positive and statistically significant in our sample of all counties (column 1), inspection of the results with the samples of border and interior counties shows the positive relationship for all counties is primarily due to a positive relationship among border counties.[14]

[14] We have also estimated this model using the log of employment in an industry as our dependent variable. Our results show that the positive effects of training and tax incentives occur on manufacturing employment in border counties. It is not surprising that these incentives primarily affect manufacturing employment since several of the incentive programs are directed exclusively at manufacturing firms.

As we are estimating a log-linear model, the coefficients on the incentives are elasticities and readily interpretable. For border counties, a ten percent increase in the level of training incentives in a county will increase employment there by approximately 0.022 percent. Based on the results from our estimates using all counties, a ten percent increase in the level of tax credits will increase employment 0.013 to 0.015 percent.

Although these elasticities suggest that these incentive programs have small impacts on employment, it is important to bear in mind that these programs are also quite small, at least measured as a share of total earnings. From 1992 to 2004, BSSC training incentives averaged about 0.01 percent of earnings; tax credits averaged 0.09 percent of earnings; and financing incentives average 0.04 percent of earnings. The mean annual BSSC training award in border counties was $80,775, making ten percent equal to $8,078. With mean employment in these counties during this period at 26,585, based on our results in *Table 2,* a ten-percent increase in training incentives is associated with increased employment of 5.86 jobs. Based on the results reported in column (2), a ten-percent increase in tax credits in border counties is associated with increased employment of 4.08 jobs, although it should be noted that with tax credits averaging $540,192 during this period, a ten-percent increase in tax credits is over $54,000 which is significantly larger than a ten-percent increase in training incentives.

One explanation for why training grants have a larger per-dollar impact on employment than tax credits is that, by definition, training grants are used to provide training for workers. If the training workers receive is primarily general training, then this will increase a worker's human capital regardless of whether the worker continues to work for the firm that provides the training. So the training grant may have a more pervasive effect on the local economy.

The fact that we primarily find effects of incentives in counties located on the state border suggests that incentives help convince companies that are considering locating in other states to

locate in Kentucky. Presumably a company that locates or expands in a border county could have easily located or expanded in a county across the border in another state. According to our results, companies' receipt of incentives and their subsequent decisions to locate or expand in Kentucky results in employment growth that is larger than the employment growth that would have occurred in the absence of the incentives.[15]

*Table 3* reports the results of regressions in which we examine whether incentives have a differential effect on employment in metropolitan and non-metropolitan counties. In these regressions we interact the value of incentives in a county with a dummy variable indicating whether the county is part of a metropolitan statistical area (MSA). The results suggest that the effects of training incentives and tax incentives on employment seem to differ between MSA and non-MSA counties. In column (1) we see that the effect of training grants is positive and significant for all counties, but the interaction between training grants and whether the county is an MSA county is not significant. For tax incentives, the coefficient on the interaction between tax incentives and the MSA county dummy is positive and significant. Looking at the results in column (2), where the sample is border counties, we see that the positive effect of training incentives only appear in border counties that are not in MSAs while the positive effects of tax incentives appear only in MSA counties that are also border counties. In column (3), where the sample is interior counties, we find no positive or negative effects of incentives on employment.

[15] We also estimated models where we interacted the incentives received in a county with a dummy variable for whether there was an interstate highway in the county. Our hypothesis was that plants that are deciding between several states when making a location decision may want to locate near a major highway. However, we do not find any significant difference in the effect of incentives between counties with interstate highways and counties without interstate highways.

*5.4 Spillover Effects*

*Table 4* reports the results from regressions in which we include the log of incentives of adjacent counties. With the exception of a positive and significant coefficient on neighboring counties' tax credits for the sample of border counties (column (2)), none of the coefficients on neighboring counties' incentives are statistically significant, providing little evidence of positive or negative spillover from business incentives in adjacent counties. In addition, inspection of the coefficients on the county's own level of incentives shows both the value and significance to be virtually the same as reported in *Table 2* when neighboring incentives were not included in the regression.[16]

*5.5 Long-Term Effects of Business Incentives*

In the preceding sections, we discussed the results obtained from estimating the relationship between employment in a county and the level of incentives received by county businesses two years earlier. Our findings, particularly for the BSSC training program, indicate a positive relationship between the amount of spending on incentive programs and economic growth. However, the models we have estimated may not fully capture the relationship between the level of business incentives in a county and the level of economic activity in the county. Specifically, our approach ignores the possibility that it may take more than two years for the full impact of the incentives to

[16] *Table A1* in the appendix reports the results from models where the dependent variable is the difference between the (log) of employment in a county and the log of a population weighted average of employment in its contiguous neighboring counties. These regressions again show that both tax and training incentives have a significant impact on a county's employment, but only in border counties and that incentives received by firms operating in neighboring counties has almost no effect on employment in the county.

occur. Alternatively, it may be that the impacts of these programs are short-lived, and after they have been received economic growth diminishes or even abates.

To examine the long-term impact of incentives on economic activity, we estimate equation *(4.3)* that includes the level of business incentives from each of the preceding five years. Revising our model in this way allows us to get a better indication of the long-term impacts of these programs, but it comes at a cost – the loss of three additional years of data to use in estimating our model. These regressions cover the time period from 1997 to 2005.

*Table 5* contains the results from this more flexible model where the log of employment is again the dependent variable. We again estimate separate regressions for the samples of all counties, border counties and interior counties. By looking at the individual coefficients, it is difficult to determine whether incentives are associated with greater economic activity. Focusing on the samples of border and interior counties, we find that for border counties the coefficients on training incentives are positive for all lags but significant only for lags of less than four years. In contrast, although training incentives are positive for all lags for our sample of interior counties, they are only significant for lags of three and four years. Tax credits have a positive and significant coefficients for the border sample and then only for lags of three or five years. None of the tax credit coefficients are significant for the sample of interior counties. The coefficients on financing incentives are not statistically significant for any sample or any lag.

A more intuitive measure of the long-term effect of business incentives is to look at the cumulative effect of incentives on economic activity. Therefore, at the bottom of *Table 5* we present an estimate of the long-term impact of incentives by summing the coefficients from the five lag measures of incentives for each type of business incentives. The results show that training has a positive and significant effect on employment in all three columns, with a long-term elasticity of 0.004 for all counties, 0.005 for border counties, and 0.003 for interior counties. Recall that in *Table*

*2* in our more restrictive model, the estimated effect of training incentives in border counties was 0.002 and was statistically insignificant for interior counties. The sum of coefficients on the lags of tax credits is not statistically significant for interior counties, but it is for border counties and equals 0.005. Again, this is much larger than estimates reported in *Table 2*.

It should not be too surprising that there appears to be evidence of a long-term association between the level of training incentives and employment in a county. Presumably training incentives are being used to train workers and increase their productivity. In this sense training incentives are similar to spending money on education. If the training is effective, then the enhanced productivity of workers will continue beyond the period when their training is received and the funds from the incentive have been spent. This enhanced productivity should increase the demand for these workers, increasing both the level of employment and earnings in the county. More surprising is the significant long-run impacts of tax credits in border counties. This long-run response may indicate increases in employment from subsequent growth in complementary businesses and expanded retail and services.

*5.6 Specification Tests*

One obvious question about our previous estimates is whether the effects are causal—does an increase in training or tax incentives in a county cause an increase in employment in the county? Or, alternatively, are incentives being taken by firms operating in counties that will have faster future growth than other counties and faster growth than these counties have had in the recent past? To address this question we estimate regression models where the dependent variable is the current level of incentives in the county, and the explanatory variable of interest is lagged employment (measured in natural logs). The regression models also include explanatory variables measuring the demographic and government characteristics included in equation (4.1) and in previous regressions. Data for training and financing are from 1994 to 2005, and data for tax credits are from 1994 to

2004 (data on credits claimed are not available for 2005). *Table 6* reports the results of several forms of the model, where the time period of the lag varies from one to five years. Each coefficient comes from a separate regression.

The results in *Table 6* indicate that the level of employment in previous years is negatively associated with the current level of business incentives. In several cases, the lagged employment coefficient is statistically significant at the five percent level. Based on these results it appears that business incentives are more likely to be taken in counties with unusually low levels of employment and suggests that, if anything, we are understating the impact of business incentives on employment growth. In the end these results reduce our concern that it is positive employment growth that is influencing the use of incentives. Instead, they suggest that it is the use of incentives influencing economic activity in an area.

Another possible concern about the specification of the model is that the dependent variable is serially correlated. To try and address this problem we estimate a difference equation based on *(4.2)* of the form

$$\Delta LN(E_{it}) = \lambda \Delta LN(E_{it-1}) + \alpha \Delta LN(I_{it-2}) + \Delta D_{it}\chi + \Delta \upsilon_t + \Delta \varepsilon_{it}. \qquad (5.1)$$

Consistent with our use of two-year lags on our measures of business incentives, we estimate (5.1) using a two-year difference in all variables. This also provides more variation than a difference of a single year in our explanatory variables, particularly the lag of employment and the business incentives. Then our dependent variable, $\Delta LN(E_{it})$, is equal to $LN(E_{it-1}) - LN(E_{it-2})$. The difference in the lag of employment, $\Delta LN(E_{it-1})$, then, is $LN(E_{it-1}) - LN(E_{it-3})$. The difference in incentives is defined to be the difference in the log of the two year and four year lags ($LN(I_{it-2}) - LN(I_{it-4})$) and the difference in the demographic variables is simply the current level of the demographic measures less the level of them two-years earlier ($\Delta D_{it} = D_{it} - D_{it-2}$). Finally, the error terms represent the

difference in the current errors and their values two years earlier.[17]

The results from estimating this model using data from 1995 to 2005 are presented in *Table 7*. Columns (1) – (3) present the results for a difference equation that does not include a lagged dependent variable as an explanatory variable while columns (4) – (6) present the results when the difference in lagged (log) employment is included. Finally, because the differencing of the data results in correlation between the error term ($\Delta\varepsilon_{it} = \varepsilon_{it} - \varepsilon_{it-2}$) and the lagged difference in the dependent variable ($\Delta LN(E_{t-1}) = LN(E_{t-1})-LN(E_{t-3})$), we estimate an instrumental variables model in columns (7) – (9). Following the instrument variable approach used in Papke (1994), we estimate this equation with the difference between the third and fourth lags of (log) employment, $LN(E_{t-3}) - LN(E_{t-4})$, as an instrument for the lagged difference in the dependent variable.

Generally the magnitude of the coefficients on the training and tax incentives are smaller and less precisely estimated than those reported in *Table* 2, but the general pattern of results for training and tax incentives is consistent with previous tables.[18] However, the coefficients are insignificant once we include the difference in lagged (log) employment (columns 4 through 9). Surprisingly, when the difference in lagged (log) employment is included, the coefficients on financing incentives are significant or near-significant for our samples of all or border counties (columns 4, 5, 7, 8).

## *6. Summary and Conclusions*

[17] Because the county fixed effects are time invariant, they are not included in the difference equations.

[18] The coefficients are smaller in the specifications with the lagged dependent variable (columns 4 through 9) because the total long run effect is measured as the coefficient divided by (1-lambda), where lambda is the coefficient on the lagged dependent variable. Even after making this adjustment, the long-run effects are usually lower than the coefficients in *Table 2*.

Business incentives are used by every state to attract new businesses and entice existing businesses to expand. In this paper, we investigate whether these incentives achieve their goal of improving economic activity in the county where the incentives are located. An important contribution of the analysis is that it focuses on incentives actually received by businesses rather than incentives awarded to businesses. The actual incentives received are the most relevant measure of incentives, since they represent the true costs of the program for states and are a more accurate measure of the benefits received by businesses. Our analysis uses a panel of more than ten years of data on incentives, economic activity, and demographics for each Kentucky county.

Training and tax incentives have a positive effect on county employment, although the impact of these programs depends on the type of county. Specifically, we find that the impact of business incentives is larger in border counties than in interior counties, with the impacts generally being statistically insignificant in interior counties. A ten-percent increase in training incentives corresponds with a short-run increase of employment of roughly 0.02 percent or about six jobs. The short-term effect for tax incentives in these counties is somewhat smaller, on the order of an increase in employment of about four jobs for a ten-percent increase in tax incentives. The cumulative effect of training and tax incentives over a five-year period is even larger with the effect of tax incentives statistically significant for both border and interior counties. We also find that training incentives seem to have a much larger impact on employment in border counties that are not in MSAs, but tax credits seem to have a much larger impact on employment in border counties that are also in MSAs. Financing incentives have no effect on economic activity in any county.

The fact that incentives primarily affect economic activity in border counties suggests that these incentives work by attracting businesses that may have otherwise chosen to locate in a neighboring state.

None of the programs has any significant impact on employment in neighboring counties.

Additional analysis suggests that the positive relationship between incentives and economic activity is not simply attributable to firms in economically healthy counties using more of them. In fact, we find that tax incentives and financing are associated with lower levels of past employment in a county. We also find that current use of training is not significantly associated in any way with past employment.

Our work provides useful evidence on the relationship between business incentives and economic activity. Although we find compelling evidence that training and tax incentives lead to higher economic activity, we do not examine whether the "price" of increases in employment and earnings associated with these programs is too high. Attempts to quantify the benefits of increased employment or earnings would be a valuable extension and complement to the analysis we have undertaken here. Because our evidence on the impact of incentives on the location decisions of firms is indirect, future work should also focus on providing more direct evidence on the question of whether incentives actually influence business location decisions or if they are given to companies that would have located in the same place even if they did not receive incentives.

*References*

Bartik, Timothy J. (1991). *Who Benefits from State and Local Economic Development Policies?* Kalamazoo, MI: W.E. Upjohn Institute for Employment Research.

Bishop, John, and Mark Montgomery. (1993). "Does the Targeted Tax Credit Create Jobs at Subsidized Firms?" *Industrial Relations*, 32(3), 289-306.

Buss, Terry B. (2001) "The Effect of State Tax Incentives on Economic Growth and Firm Location Decisions: An Overview of the Literature," *Economic Development Quarterly*, 15(1), 90-105.

Calcagno, Peter and Henry Thompson. (2004). "State Economic Incentives: Stimulus or Reallocation?" *Public Finance Review*, 32(6), 651-665.

Faulk, Dagney. (2002). "Do State Economic Development Incentives Create Jobs? An Analysis of

State Employment Tax Credits," *National Tax Journal*, 55(2), 263-280.

Fisher, Peter S., and Alan H. Peters. (1997). "Tax and Spending Incentives and Enterprise Zones," *New England Economic Review*, March-April, 109-130.

Gabe, Todd M. and David S. Kraybill. (2002). "The Effect of State Economic Development Incentives on Employment Growth of Establishments," *Journal of Regional Science* 42(4), 703-730.

Goss, Ernest P. and Joseph M. Phillips. (1994). "State Employment Growth: The Impact of Taxes and Economic Development Agency Spending," *Growth and Change*, 25(Summer), 287-300.

Greenstone, Michael, and Enrico Moretti. (2003). "Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare?" National Bureau of Economic Research Working Paper Number 9844.

Greenstone, Michael, Richard Hornbeck, and Enrico Moretti. (2008). "Identifying Agglomeration Spillovers: Evidence from Million Dollar Plants?" National Bureau of Economic Research Working Paper Number 13833.

Hoyt, William H. and John E. Garen. (2006). "Fiscal Policy and Economic Development." National Center for Real Estate Research, State and Local Fiscal Research Institute. November.

Hoyt, William H., Christopher Jepsen, and Kenneth R. Troske. (2007). "An Examination of Incentives to Attract and Retain Businesses in Kentucky," Center for Business and Economic Research, University of Kentucky.

Ihlandfeldt, Keith and David L. Sjoquist. (2001). "Conducting an Analysis of Georgia's Economic Development Tax Incentive Program," *Economic Development Quarterly*, August, 217-228.

Lee, Yoonsoo. (2004). "Geographic Redistribution of U.S. Manufacturing and the Role of State Development Policy," Federal Reserve Bank of Cleveland Working Paper 04-15.

Luger, Michael. (2001). "Report: 2001 Assessment of the William S. Lee Act," report prepared for the North Carolina Department of Commerce.

Luger, Michael. (2003). "Report: 2003 Assessment of the William S. Lee Act," report prepared for the North Carolina Department of Commerce.

Newman, Robert J. and Dennis Sullivan. (1988). "Econometric Analysis of Business Tax Impact on Industrial Location: What do We Know and How do We Know It?" *Journal of Urban Economics*, 23, 215-34.

Papke, Leslie E. (1994). "Tax Policy and Urban Development: Evidence from the Indiana Enterprise Zone Program," *Journal of Public Economics* 54(1), 37-49.

Perloff, Jeffrey M., and Michael L. Wachter. (1979). "The New Jobs Tax Credit: An Evaluation of the 1977-1978 Wage Subsidy Program," *The American Economic Review*, 69(2), 173-179.

Wasylenko, Michael. (1997). "Taxation and Economic Development: The State of the Economic Literature," *New England Economic Review*, March-April, 37-52.

*Table 1 Means of Incentives, Employment and Demographic Variables by County Location*

| Sample | All | Border | Interior | MSA | Non-MSA |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Employment | 18,757 | 26,585 | 13,539 | 40,671 | 9,734 |
| Total annual value of BSSC training incentives | 28,923 | 80,775 | 57,504 | 55,211 | 18,099 |
| Total annual value of tax incentives | 428,097 | 540,192 | 353,366 | 739,522 | 299,863 |
| Total annual value of financing incentives | 252,274 | 433,539 | 131,430 | 527,634 | 138,890 |
| BSSC Incentives as a percent of earnings | 0.0062 | 0.0128 | 0.0139 | 0.0061 | 0.0062 |
| Tax incentives as a percent of earnings | 0.0876 | 0.0832 | 0.0905 | 0.0631 | 0.0977 |
| Financing incentives as a percent of earnings | 0.0521 | 0.0500 | 0.0534 | 0.0324 | 0.0602 |
| Total taxes (in thousands of dollars) | 21,934 | 32,707 | 14,753 | 53,897 | 8,773 |
| Per pupil spending | 6,870 | 6,896 | 6,853 | 6,600 | 6,981 |
| Population | 50,441 | 67,317 | 39,190 | 97,196 | 31,189 |
| Percent male | 49.13 | 48.96 | 49.24 | 49.20 | 49.10 |
| Percent under 20 years of age | 45.83 | 45.97 | 45.74 | 46.28 | 45.65 |
| Percent 20 -29 years of age | 9.93 | 9.77 | 10.04 | 10.20 | 9.82 |
| Percent 30 – 39 years of age | 11.04 | 10.92 | 11.12 | 11.51 | 10.84 |
| Percent 40 – 49 years of age | 11.29 | 11.25 | 11.32 | 11.61 | 11.16 |
| Percent 50 – 64 years of age | 12.03 | 12.02 | 12.05 | 11.61 | 12.21 |
| Percent African-American | 3.89 | 4.94 | 3.19 | 5.44 | 3.26 |
| Percent Native American | 0.30 | 0.35 | 0.27 | 0.36 | 0.28 |
| Percent Asian | 0.35 | 0.42 | 0.31 | 0.63 | 0.24 |
| Percent Hispanic | 0.90 | 1.00 | 0.83 | 1.35 | 0.71 |
| Number of counties | 120 | 48 | 72 | 35 | 85 |

Note: All dollar values in the table have been converted to 2005 dollars. All of the incentive measures reflect the amount of incentives actually received by firms.

*Table 2: Effects of Business Incentives on Employment*

| Dependent Variable | LN(Employment) | | |
|---|---|---|---|
| Sample | All | Border | Interior |
| | (1) | (2) | (3) |
| $LN(Training)_{t-2}$ | 0.001068** | 0.002203*** | 0.000546 |
| | (2.25) | (2.99) | (0.96) |
| $LN(Credits)_{t-2}$ | 0.001292** | 0.001534** | 0.000922 |
| | (2.05) | (2.27) | (1.01) |
| $LN(Financing)_{t-2}$ | -0.000119 | 0.000220 | -0.000276 |
| | (-0.37) | (0.51) | (-0.59) |
| Observations | 1440 | 576 | 864 |
| Number of counties | 120 | 48 | 72 |
| R-squared | 0.45 | 0.48 | 0.49 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects.

*Table 3: The Differing Effect of Business Incentives on Employment for Counties that are in an MSA*

| Dependent Variable | LN(Employment) | | |
|---|---|---|---|
| Sample | All | Border | Interior |
| | (1) | (2) | (3) |
| $LN(Training)_{t-2}$ | 0.001017* | 0.002810*** | 0.000262 |
| | (1.94) | (2.99) | (0.54) |
| $LN(Credits)_{t-2}$ | 0.000667 | 0.000439 | 0.000473 |
| | (0.95) | (0.55) | (0.47) |
| $LN(Financing)_{t-2}$ | 0.000176 | 0.000460 | -0.000129 |
| | (0.48) | (1.11) | (-0.23) |
| $MSA*LN(Training)_{t-2}$ | -0.000054 | -0.002812** | 0.001239 |
| | (-0.050) | (-2.43) | (0.67) |
| $MSA*LN(Credits)_{t-2}$ | 0.002842* | 0.004807** | 0.002241 |
| | (1.76) | (2.19) | (0.91) |
| $MSA*LN(Financing)_{t-2}$ | -0.001075 | -0.000533 | -0.000931 |
| | (-1.48) | (-0.53) | (-1.04) |
| Observations | 1440 | 576 | 864 |
| Number of counties | 120 | 48 | 72 |
| R-squared | 0.46 | 0.51 | 0.50 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects.

*Table 4: The Spillover Effect of Neighboring County Incentives on Employment*

| Dependent Variable | LN(Employment) | | |
|---|---|---|---|
| Sample | All | Border | Interior |
| | (1) | (2) | (3) |
| $LN(Training)_{t-2}$ | 0.001107** | 0.002286*** | 0.000556 |
| | (2.35) | (3.19) | (0.98) |
| $LN(Credits)_{t-2}$ | 0.001285** | 0.001534** | 0.000916 |
| | (2.02) | (2.17) | (1.00) |
| $LN(Financing)_{t-2}$ | -0.000105 | 0.000276 | -0.000332 |
| | (-0.33) | (0.63) | (-0.73) |
| Neighboring $LN(Training)_{t-2}$ | 0.000373 | 0.000379 | 0.000463 |
| | (0.50) | (0.45) | (0.45) |
| Neighboring $LN(Credits)_{t-2}$ | 0.001221 | 0.002514** | -0.000373 |
| | (1.22) | (2.08) | (-0.27) |
| Neighboring $LN(Financing)_{t-2}$ | 0.000033 | -0.000582 | 0.000484 |
| | (0.11) | (-1.55) | (1.15) |
| Observations | 1440 | 576 | 864 |
| Number of counties | 120 | 48 | 72 |
| R-squared | 0.45 | 0.50 | 0.50 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects.

*Table 5: Long Term Effects of Business Incentives on Employment*

| Dependent Variable | LN(Employment) | | |
|---|---|---|---|
| Sample | All | Border | Interior |
| | (1) | (2) | (3) |
| $LN(Training)_{t-1}$ | 0.000690* | 0.001447*** | 0.000029 |
| | (1.81) | (3.26) | (0.061) |
| $LN(Training)_{t-2}$ | 0.000612 | 0.001570** | 0.000220 |
| | (1.62) | (2.50) | (0.52) |
| $LN(Training)_{t-3}$ | 0.000932** | 0.001250** | 0.000885* |
| | (2.32) | (2.28) | (1.71) |
| $LN(Training)_{t-4}$ | 0.000818** | 0.000469 | 0.001105** |
| | (2.23) | (0.89) | (2.18) |
| $LN(Training)_{t-5}$ | 0.000761* | 0.000113 | 0.001052 |
| | (1.66) | (0.21) | (1.58) |
| $LN(Credits)_{t-1}$ | 0.000488 | 0.000111 | 0.001021 |
| | (0.96) | (0.17) | (1.44) |
| $LN(Credits)_{t-2}$ | 0.000330 | 0.000279 | 0.000419 |
| | (0.89) | (0.49) | (0.87) |
| $LN(Credits)_{t-3}$ | 0.000668* | 0.001494** | -0.000116 |
| | (1.72) | (2.42) | (-0.23) |
| $LN(Credits)_{t-4}$ | 0.000825** | 0.000820 | 0.000471 |
| | (2.22) | (1.27) | (1.09) |
| $LN(Credits)_{t-5}$ | 0.000746 | 0.002114*** | -0.000480 |
| | (1.41) | (2.84) | (-0.82) |
| $LN(Financing)_{t-1}$ | -0.000163 | 0.000195 | -0.000227 |
| | (-0.50) | (0.38) | (-0.45) |
| $LN(Financing)_{t-2}$ | -0.000251 | 0.000097 | -0.000322 |
| | (-0.67) | (0.17) | (-0.64) |
| $LN(Financing)_{t-3}$ | -0.000064 | 0.000274 | -0.000154 |
| | (-0.19) | (0.59) | (-0.31) |
| $LN(Financing)_{t-4}$ | 0.000022 | 0.000312 | -0.000232 |
| | (0.067) | (0.80) | (-0.51) |
| $LN(Financing)_{t-5}$ | 0.000110 | 0.000156 | -0.000107 |
| | (0.34) | (0.33) | (-0.28) |
| LN(Training), 5 periods | 0.003812** | 0.004848** | 0.003291* |
| F-Statistic | (6.68) | (5.83) | (2.91) |
| LN(Credits), 5 periods | 0.003058** | 0.004818*** | 0.001315 |
| F-Statistic | (6.37) | (9.19) | (0.79) |
| LN(Financing), 5 periods | -0.000346 | 0.001034 | -0.001043 |
| F-Statistic | (0.06) | (0.35) | (0.28) |
| Observations | 1080 | 432 | 648 |
| Number of counties | 120 | 48 | 72 |
| R-squared | 0.30 | 0.41 | 0.35 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects.

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*Table 6: The Relationship Between Past Employment and Current Incentives*

| Dependent Variable<br>Sample | LN(Training)<br>All<br>(1) | LN(Credits)<br>All<br>(2) | LN(Financing)<br>All<br>(3) |
|---|---|---|---|
| $LN(Employment)_{t-1}$ | -1.976768 | -5.111994 | -6.873921*** |
| | (-0.74) | (-1.65) | (-3.37) |
| $LN(Employment)_{t-2}$ | -2.475753 | -6.217269** | -7.468323*** |
| | (-0.91) | (-2.05) | (-3.50) |
| $LN(Employment)_{t-3}$ | -3.415750 | -6.757715** | -4.705593* |
| | (-1.23) | (-2.30) | (-1.73) |
| $LN(Employment)_{t-4}$ | -2.839672 | -5.566308** | -2.466584 |
| | (-0.88) | (-2.02) | (-0.78) |
| $LN(Employment)_{t-5}$ | 0.864171 | -3.325211 | -0.874053 |
| | (0.25) | (-1.21) | (-0.30) |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects. Each coefficient and t-statistic are from a different regression.

*Table 7: The Relationship between Two Year Differences in Employment and Incentives*

| Dependent Variable | $LN(Employment)_t - LN(Employment)_{t-2}$ | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample | All | Border | Interior | All | Border | Interior | All | Border | Interior |
| Estimation | OLS | OLS | OLS | OLS | OLS | OLS | IV | IV | IV |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| ΔLN(Employment) | | | | 0.613524*** | 0.571215*** | 0.646548*** | 0.630271*** | 0.861201*** | 0.562964*** |
| | | | | (30.5) | (15.8) | (25.2) | (4.04) | (2.95) | (2.78) |
| ΔLN(Training) | 0.000472* | 0.001009** | 0.000171 | 0.000293 | 0.000393 | 0.000205 | 0.000288 | 0.000080 | 0.000201 |
| | (1.76) | (2.12) | (0.55) | (1.13) | (0.91) | (0.64) | (1.08) | (0.17) | (0.66) |
| ΔLN(Credits) | 0.000780** | 0.000722 | 0.000797 | 0.000294 | 0.000511 | 0.000014 | 0.000281 | 0.000404 | 0.000115 |
| | (2.23) | (1.44) | (1.58) | (0.99) | (1.13) | (0.033) | (0.82) | (0.79) | (0.22) |
| ΔLN(Financing) | 0.000176 | 0.000368 | 0.000011 | 0.000291 | 0.000487* | 0.000127 | 0.000294 | 0.000547* | 0.000112 |
| | (0.85) | (1.17) | (0.040) | (1.54) | (1.92) | (0.49) | (1.51) | (1.92) | (0.44) |
| Observations | 1200 | 480 | 720 | 1200 | 480 | 720 | 1200 | 480 | 720 |
| Number of Counties | 120 | 48 | 72 | 120 | 48 | 72 | 120 | 48 | 72 |
| R-squared | 0.15 | 0.21 | 0.15 | 0.48 | 0.48 | 0.50 | 0.48 | 0.41 | 0.49 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the two-year difference in the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior.

*Figure 1: Amount of Business Incentives Taken as Percentage of Earnings, 1992 to 2004*

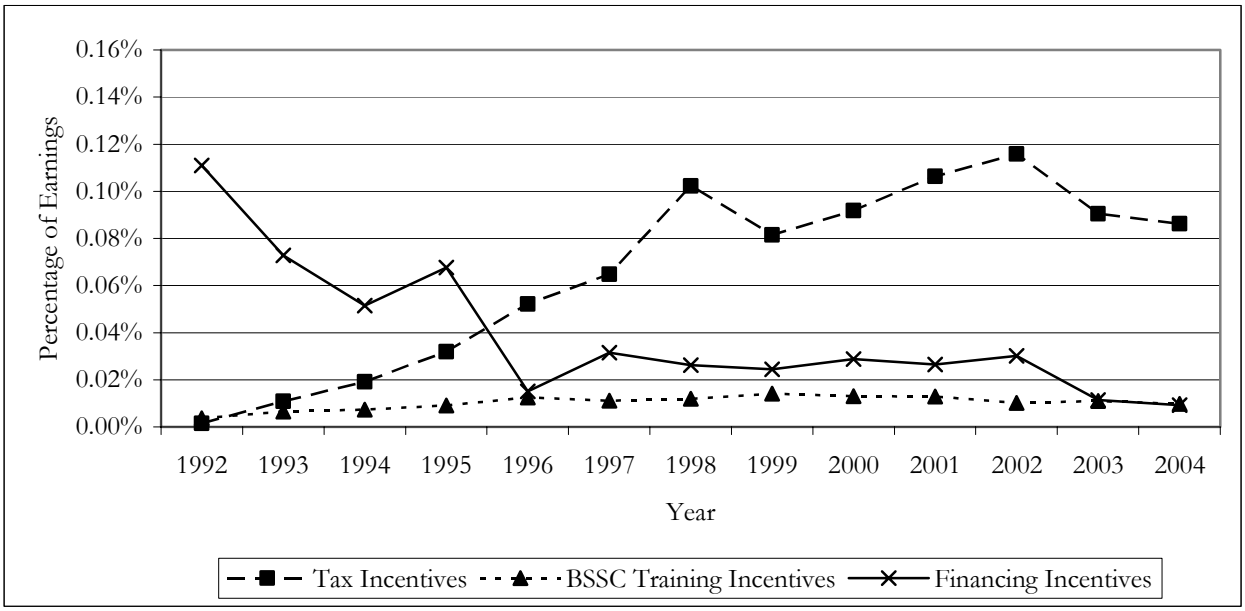



*Figure 2: Tax Incentives Claimed as a Percentage of Tax Incentives Awarded*

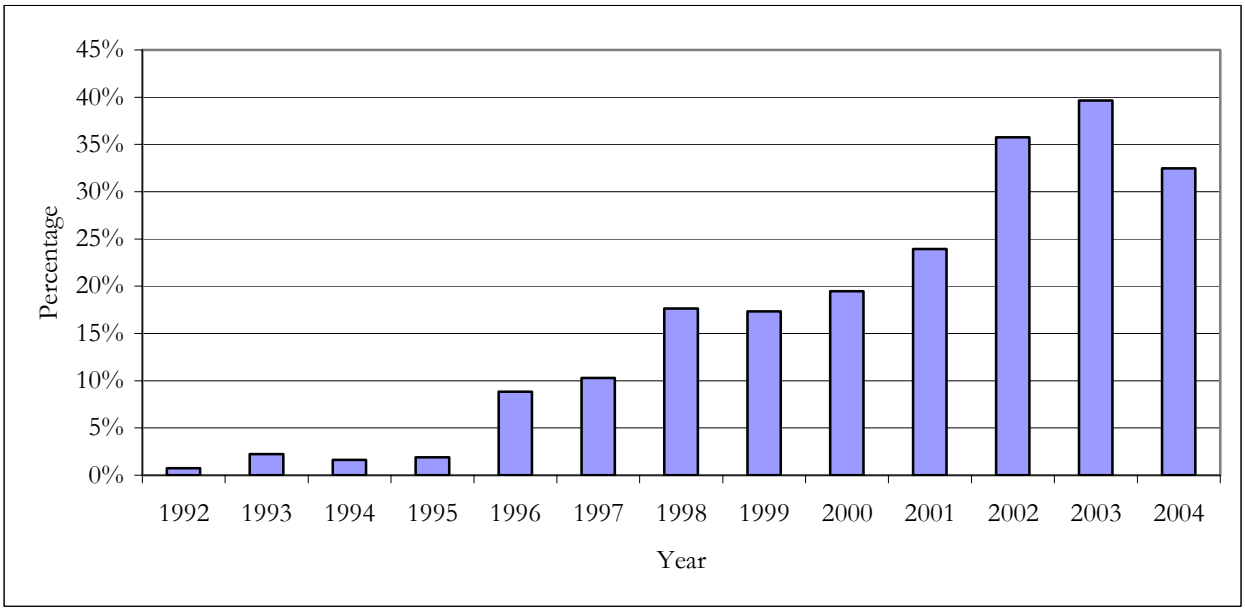
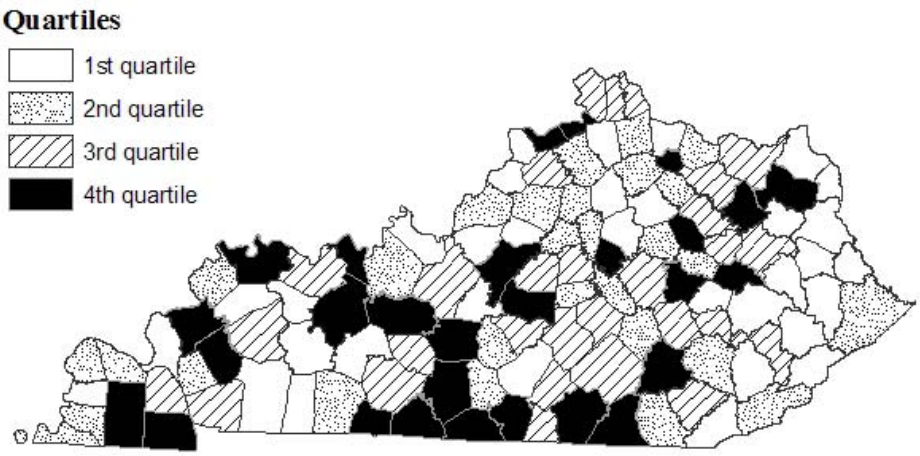


*Figure 3: Ranking of Counties Based on the Total Value of Incentives Relative to Total Earnings*




Note: Quartiles are ordered from lowest to highest, so that the 1st quartile has the lowest value of incentives relative to total earnings.

*Appendix: Results from Additional Estimation*

*Table A1: The Effects of Incentives on Differences in Employment between Neighboring Counties*

| Dependent Variable | LN(Employment)–LN(Neighbor Employment) | | |
|---|---|---|---|
| Sample | All | Border | Interior |
| | (1) | (2) | (3) |
| LN(Training)$_{t-2}$ | 0.001549** | 0.002438*** | 0.001104 |
| | (2.56) | (2.87) | (1.39) |
| LN(Credits)$_{t-2}$ | 0.001450* | 0.001967* | 0.001173 |
| | (1.91) | (1.78) | (1.17) |
| LN(Financing)$_{t-2}$ | 0.000301 | 0.000671 | 0.000251 |
| | (0.85) | (1.43) | (0.51) |
| Neighboring LN(Training)$_{t-2}$ | -0.000061 | -0.000533 | 0.000489 |
| | (-0.087) | (-0.63) | (0.52) |
| Neighboring LN(Credits)$_{t-2}$ | 0.001050 | 0.001177 | 0.000629 |
| | (0.86) | (0.78) | (0.38) |
| Neighboring LN(Financing)$_{t-2}$ | 0.000458 | -0.000093 | 0.000937** |
| | (1.40) | (-0.19) | (2.17) |
| Observations | 1440 | 576 | 864 |
| Number of counties | 120 | 48 | 72 |
| R-squared | 0.14 | 0.22 | 0.18 |

Notes: *** p<0.01, ** p <0.05, * p<0.1. T-statistics that are robust to arbitrary within-county correlation are in parentheses. In addition to the variables reported in the table, all specifications include the percent of the population that is: male, female, under the age of 20, 20-29 years old, 30-39 years old, 40 – 49 years old, 50 – 64 years old, African-American, Native American, Asian, Hispanic; the population, the per pupil expenditures, the log of total local taxes two year prior, and county and year fixed effects.

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