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AN ANALYSIS OF THE EMPLOYMENT IMPACT OF GEORGIA'S JOB TAX CREDIT

Dagney Faulk

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Georgia State University

Andrew Young

School of Policy Studies

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EXECUTIVE SUMMARY

Over the past two decades state governments have assumed increasing responsibility for promoting economic development in their states, and employment tax credits have become a common tool of state economic development policy. This report addresses two issues: (1) the firm's decision to participate in an employment tax credit program, and (2) the employment impact of such a program.

The econometric model uses data for eligible firms that participated and did not participate in Georgia's Job Tax Credit (JTC) program between 1993 and 1995 to estimate the employment impact of the program. Results from the model indicate that tax liability, firm size, headquarters location, previous JTC participation, startup status, and the number of jobs credited are significant determinants of participation in the program. Firm size, the number of plants, and previous participation are significant determinants of the level of employment growth in firms claiming the credit. Estimates from the model imply that the JTC is responsible for 28 to 41 percent of the total jobs created in firms that participate in the JTC program. The number of jobs attributable to the program is small (2301 to 3299 jobs), but the cost per job is also small at $1518 to $2176 per job created.

AN ANALYSIS OF THE EMPLOYMENT IMPACT
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I. Introduction

Numerous studies have shown that taxes have limited effect on state economic growth.

Yet, over the past two decades, as state governments have assumed increasing responsibility for

promoting economic development in their states, corporate income tax incentives have become a

common tool of state economic development policy. The average state appropriation to

economic development activities increased from just over $9.9 million in 1984 to $36.5 million

in 1994 (1994 dollars).[1] This does not include tax incentives. Estimates of state tax expenditures

to corporations range from $26.4 million in Maryland (7.9 percent of Maryland corporate income

tax revenue) for 1996 to $2.3 billion in California (3.9 percent of California corporate income tax

revenue) for the 1995-96 period.[2] The Joint Committee on Taxation (1999) estimates that federal

tax expenditures to corporations will total $90 billion (0.04 percent of federal corporate income

tax revenues) in 1999. These tax expenditures represent literally hundreds of programs.[3] While

much research has focused on how federal tax incentives influence economic behavior, little is

known about the effects of state tax incentives.

The increased use of incentives has resulted, in part, from the fact that tax rates and

incentives are one of the few elements of business climate over which states have immediate and

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[1] These figures are based on the 29 states for which the National Association of State Development Agencies (NASDA) has information. The total budget for state development agencies in these 29 states was over 1.4 billion in 1994 (NASDA 1994).

[2] See California Department of Finance (1995) and Maryland Department of Budget and Fiscal Planning (1995).

[3] Howard (1997) defines tax expenditures as tax loopholes or tax breaks which favor a particular industry, activity, or group of people. They include tax deductions, tax credits, preferential tax rates, tax deferrals and exclusions of income from taxation. If the government uses tax expenditures to influence economic behavior, then it is a tax incentive.

visible control, and regardless of their effectiveness, tax incentives are politically acceptable. Although corporate tax incentives are a prominent part of many state economic development strategies, little research has focused on the effects of specific state tax incentives such as employment tax credits, investment tax credits, and training tax credits.

The current study focuses on Georgia's Job Tax Credit and addresses two issues. The first is the determinants of the firm's decision to participate in an employment tax credit program. Participation rates in employment tax credit programs are low, historically. Many firms that create the required number of jobs do not file for the credit. Only about 19 percent of eligible firms participate in Georgia's Job Tax Credit program, for example. This is not so unusual. Research on federal employment tax credit programs has shown that less than three percent of eligible firms participate in these programs. The second issue is the impact of state employment tax credits on the level of employment in participating firms.[4] Approximately half of the states in the U.S. offer some form of employment tax credit, which indicates that policymakers believe that such tax credits do encourage job creation. Yet, little is known about whether state employment tax credits actually lead to an increase in the number of jobs.

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[4] In this analysis the terms "job tax credit" and "employment tax credit" are used interchangeably. Eligible firms are those firms in qualifying industries that create at least the minimum number of jobs necessary to take the credit. Firms that do not create enough employment to be eligible for the credit are not considered in this analysis.

II. Employment Tax Credit Programs in the United States

Employment tax credits were initially implemented at the federal level. These programs had two broad objectives. One objective was to encourage employers to hire disadvantaged workers in the case of the Targeted Job Tax Credit, JOBS tax credit, WIN tax credit, and more recently the enterprise zone tax credits. Another objective was to offset cyclical downturns in unemployment or stimulate recovery from such downturns, as in the case of the New Job Tax Credit. As shown in Table 1, the federal government has offered a variety of employment tax credit programs over the past several decades, and the participation rates have been quite low, ranging from 3 to 13 percent.

Over the last decade, state governments spurred by tax competition from other states have increasingly adopted employment tax credits as an economic development tool. Approximately half of the state governments in the United States now offer some form of employment tax credit program. In all cases, employment tax credits are a credit against corporate income tax liability. However, these programs vary widely in their structure, as shown in Table 2. States choose qualifying industries, the job creation criteria, the credit amount per job created, the credit life, the maximum credit that a firm can take, and whether unused credit is refundable or can be carried forward.

Employment tax credits may be part of a "negotiated" package between a state and firms interested in moving into the state or threatening to leave the state. Such negotiations affect the equity of the tax system among firms receiving the tax breaks and similar firms who do not receive tax breaks. Alternatively, employment tax credits may be broadly available to both new and existing firms. It is this later type of employment tax credit that is of interest here.

Table 1. Federal Employment Tax Credit Programs

Programs and Years of Implementation	Application	Base	Subsidy 'rate'	Participation Rate
WIN 1973-82	Targeted	Welfare recipients enrolled in the Work Incentives Program	50% and 25% of first $6000 in wages, respectively, for first and second years of employment.	3% of firms familiar with the program participated
NJTC 1977-78	Broad-based	Increase in wages	50% if wage base above 102% of previous year's wage base up to $4200 per employee.	6.1% of participating firms made a conscious effort to increase employment
TJTC 1978-1996	Targeted	Unemployed disadvantaged workers*	40% of first $6000 in wages for first year of employment. $2400 max (1995)	13% of firm familiar with the program participate
Work Opportunity Tax Credit 1997	Targeted	Unemployed disadvantaged workers*	35% of first $6000 for first year wages ($2100 max)	Not available
Welfare-to-Work Tax Credit 1998	Targeted	Long-term family assistance recipients	30% of the first $10,000 of wages for the first year of employment and 50% of the first $10,000 in wages for the second year or employment.	Not available

Source: Bishop and Montgomery (1986) and U.S. Master Tax Guide (various years).

* Includes handicapped individuals, qualified youth, Vietnam veterans, welfare recipients, ex-convicts, general assistance recipients, work incentive employees, qualified summer youth.

Table 2. Features of the Employment Tax Credit Programs of Various States, 1997

	Eligible Industries*	Credit Amount	Credit Life	Minimum Jobs Required	Credit Ceiling	Carry-forward
Delaware	M, W, C, E, L, T, A	$400 per new employee			50 % of CIT	10 years
Georgia	M, W, Tr, R&D	$2500, $1500, $500 depending on location	5 years	5, 15, 25	50 % of CIT	10 years
Indiana		Percentage of individual income tax withholdings	up to 10 years		Refundable	
Iowa	M	$882 per new employee		10% increase of base employment		
Kansas	M, R&D, W, S, R	$1500 metro $2500 non metro		2 Manuf 5 Non manuf	50 % of CIT	until credit is used
Louisiana		Negotiated			Refundable	
Maine	Corporations other than Utilities	Negotiated	7 years	$5 million in investment and 100 new jobs in 24 months	$500,000 annually	6 years or $3.5 million in total.
Maryland				60 jobs over a two year period		
Michigan			up to 20 years	75 if expanding 150 if moving into state		
Mississippi		$2000, $1000, $500 additional $500 for R&D and headquarters	5 years	10, 15, 20	50 % of CIT	
Missouri		$75 for new $100 for existing	10 years			
Montana	M	1 % of total new wages paid	3 years			

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Table 2. Continued

State	Eligible Industries*	Credit Amount	Credit Life	Minimum Jobs Required	Credit Ceiling	Carry-forward
Nebraska		5 % of payroll of new jobs	7 years	30 new jobs and $3 million in investment		
		$1500 per job income tax withholding equal to 5 % of wages.	10 years	2 / 500 (250) jobs and $50 (100) million in investment		
Nevada	Businesses paying $12.36 per hour and basic benefits			25 ,75 jobs and $250,000, $1 million in investment		
N. Carolina	M, R&D, D With 5 full-time employees working 40 weeks/yr .		1, equal installments over a four year period	1		4
N. Dakota	New business not receiving a 5-year income tax exemption.	1 % of wages and for years 1-3 .5% or wages for years 4-5	up to 5 years			
Ohio		% of income tax withholdings of new employees (60% on average)	up to 10 years		refundable	
Oklahoma	CO, R&D, M, some S	Quarterly cash payments of up to 5% of new taxable payroll	up to 10 years		5% of payroll	
	M, A, CS, R&D	$500 per new employee			$25000 annual credit	

Table 2. Concluded

State	Eligible Industries*	Credit Amount	Credit Life	Minimum Jobs Required	Credit Ceiling	Carry-forward
Pennsylvania		$1000	3 years	25 new jobs or 20% of work force		
Rhode Island		0.25 percentage point decrease in CIT rate	Permanent if jobs are created by 12/31/00 and maintained	50 if base employment is above 100 10 if base employment is below 100	minimum tax rate of 3%	
S. Carolina	M, P, W, D, R&D, CO, Tr, I	$1500 to $4500	5 years	1	50% of corporate tax liability	15 years
Virginia		$1000	1/1/05	100, 50		
West Virginia		A 90%, 50%, 30% of investment	10 years	100, 50,10 jobs created by a qualified investment		12 years

Source: <u>Area Development</u>, January 1997.

*Note: A = Aviation, C = Computer processing, CS = Computer Services, CO = Corporate Office or Central Administration, D= Data Processing, I = Insurance, L = Laboratories, M = Manufacturing, W = Wholesale, T = Telecommunications, R&D = Research and Development, R = Retail, S = Services, Tr = Tourism.

Most states limit eligibility to certain types of industries. The extremes are Iowa in which only manufacturing industries are eligible and Kansas where Manufacturing, Research and Development, Processing, Warehousing, Service and Retail industries are eligible. Nevada takes a different approach and offers a credit to any new or expanding business paying at least $12.36 per hour and basic benefits.

The minimum number of jobs that must be created to be eligible for an employment tax credit differs among states, from one new job in North and South Carolina to 500 new jobs in Nebraska. Many states have different job creation criteria for firms of different sizes. In Rhode Island, a firm with 100 base employees must create 50 jobs while a firm with less than 100 base employees must create 10 jobs. Pennsylvania requires 25 new jobs *or* a 20 percent increase in the workforce. Iowa requires a 10 percent increase over base employment. An employment tax credit program that requires firms to create 10 or 25 jobs effectively eliminates the smallest firms from the program. A percent increase over base employment is more advantageous to small firms. A firm with 10 workers is unlikely to create 10 jobs in a year to qualify for Georgia's JTC, whereas a 10 percent increase in employment is one job.

Some states offer a credit as a fixed dollar amount per job created, as in Georgia, while others link the credit to a proportion of wages as in Montana, Nebraska, and North Dakota, or a proportion of the income tax withholdings of new employees as in Indiana or Ohio. A credit that is a fixed dollar amount encourages the hiring of low-wage workers since the credit is a higher proportion of wages for these workers relative to high-wage workers. A credit that is a fixed proportion of wages does not have this effect. Credit amounts vary widely from $75 per new job in Missouri to $4500 per new job in South Carolina. In Indiana the credit is a negotiated

percentage of the individual income tax withholdings of new employees. In Montana the credit is one percent of total new wages paid. The advantage of such a credit is that it explicitly links the credit with wage payments. Rhode Island offers a 0.25 percentage point decrease in the corporate income tax rate if the jobs are maintained. This type of credit is more advantageous to firms with high tax liability.

Some states offer credits depending on where the employment growth occurs. In this case, firms receive a higher credit for jobs created in less developed areas of a state. Kansas offers $1500 for jobs created in metropolitan areas and $2500 for jobs created in nonmetropolitan areas. Georgia and Mississippi have a three tier structure.

The credit life for new jobs created varies from one year in North Carolina to 20 years in Michigan to permanent (as long as the jobs are maintained) in Rhode Island. In most states the corporation can take the credit for 5 to 10 years as long as the jobs are maintained. Although many states have increased the credit amount per job over the past several years, no state adjusts the credit amount for inflation. Even though the credit life may be 5 or ten years, the real value of a fixed credit per job created declines over time since there is no adjustment for increasing labor costs. A credit that is a proportion of wages is more advantageous to the firm because the credit amount will increase with wages over the life of the credit.

The maximum credit available also differs across states. Many states (Delaware, Georgia, Kansas, Mississippi, South Carolina, for example) limit the credit to half of corporate income tax liability. Maine limits the credit amount to $500,000 annually or $3.5 million in total. Oklahoma limits the credit to five percent of payroll or $25,000 depending on the industry. Rhode Island lowers the corporate income tax rate to a minimum of three percent. A maximum

credit that is a fixed dollar threshold is disadvantageous to firms whose credit is above the threshold because they receive less that the statutory credit per job created.

Many states also offer a carryforward of unused credit or make the credit refundable. With a carryforward, firms can use the credit against future tax liability. Each of these credit mechanisms has a different effect on firms. In Indiana, Louisiana and Ohio, the credit is refundable. With a refundable credit even firms with no tax liability can benefit from the credit, and all firms receive the statutory credit amount for each job created. A carryforward is useful to firms that consistently have a positive tax liability, but again, because of inflation and the time value of money this year's credit has less value if taken next year. Faulk (1998) provides information on the history and legal structure of Georgia's JTC and an overview of the effectiveness of federal employment tax credit programs.

III. State Tax Systems and Economic Growth

Various studies such as Plaut and Pluta (1983), Wasylenko and McGuire (1985), Mofidi and Stone (1990), ÓhUallacháin and Satterthwaite (1992), and Carroll and Wasylenko (1994) have examined the effects of state and local taxes on some measure of employment growth. These studies have shown that taxes, in general, are a small or insignificant determinant of employment change at the state or MSA level. While there have been numerous studies of federal employment tax credit programs[5], few studies have investigated the effect of specific state tax incentives, such as employment tax credits, on employment growth in individual firms.

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[5] Faulk (1998) provides an overview.

Previous empirical studies examining the relationship between state government policy and economic development has had two primary focuses. One is the business location decision, and the other is economic growth, measured as employment growth, income growth, investment growth, or the number of firms entering a state or MSA. Studies focusing on each of these dimensions have considered the effects of taxation, government expenditures or both. Numerous survey articles, including Wasylenko (1991, 1997), Ladd (1998), Newman and Sullivan (1988), Bartik (1991), evaluate such studies based on the econometric techniques and the data used. Some of the major conclusions of this literature are: (1) Taxes have a small, statistically significant effect on the interregional location decisions of firms; (2) Fiscal differences within a region (intra-regional differences) play a more significant role in the location decision of firms; (3) Expenditures on public services (incorporating how tax revenues are used) are an important determinant of economic growth; (4) As controls for fixed effect and public services are added to interregional studies, the estimated tax elasticity increases in absolute value which indicates that better data and more sophisticated estimation techniques matter; (5) The interregional elasticity of economic activity with respect to taxes is between –0.1 and –0.6 which means that a ten percent reduction in taxes leads to a one to six percent increase in business activity. Few studies have focused on the level of state tax expenditures or the effect of such expenditures on state economic growth. Analysis of general state economic development expenditures by deBartolome and Speigel (1997) has shown that they are a significant determinant of employment growth in the manufacturing sector.

Several studies have examined whether offering and taking tax incentives are rational decisions for state policy makers and firms, respectively. Gabe (1996) modeled the supply and

demand for tax incentives and found that the offers and acceptances of tax incentive packages support the utility maximization hypothesis of governments and the cost minimization hypothesis of firms, suggesting that the incentive process is rational. Wolkoff (1992) concludes that economic development decisions are rational given the interrelationship between subsidy decisions and informational asymmetries that exist between policy-makers and firms. Jenn and Nourzad (1996) show that this competition between states supports the "arms race" hypothesis where each state continually improves the incentives offered by adding more generous incentives, which again can be viewed as rational behavior. While offering incentives may be rational, there is little evidence to suggest that they create jobs that would not have been created in their absence.

Since few studies exist that explicitly examine state employment tax credit programs, a more detailed description of three such studies is provided. Pope and Kuhl (1996) analyze a proposed job creation tax credit in California. They survey firms to determine if a tax credit of 15 percent on the first $20,000 of wages paid for each new full-time employee would cause firms to increase their level of employment. They use an analysis of variance to determine which types of firms would be more responsive to the aforementioned tax credit. They find that smaller firms would be more likely to hire additional workers if the credit were available. A weakness of this approach is that firms have an incentive to claim that the proposed tax credit would cause them to hire additional workers even if they would have hired the workers in the absence of the credit.

The Gabe and Kraybill studies use data from a survey of firms that announced major projects in Ohio between 1993 and 1995. Major projects are defined as those that generate $1 million or more in investment, a 20,000 square foot expansion of facilities or 50 or more new

jobs. These firms are surveyed because they are potential applicants for Ohio's Job Creation Tax Credit. This tax credit provides a corporate income tax credit equal to a percentage of the income tax withholdings of new workers. The credit percentage is typically higher for firms that promise to create a large number of jobs, pay high wages, purchase intermediate goods from Ohio firms, or locate in distressed areas. Firms undertaking a location or expansion must apply for the credit, and the credit amount is negotiated. Their dataset consists of 494 establishments in their 1999a study (or 318 in their 1999b study) of which 156 (95) received the tax credit. Gabe and Kraybill (1999a) use a logit model to examine the characteristics (of the project and location) that influence a project's likelihood of receiving the tax credit from the state. Gabe and Kraybill (1999b) estimates two simultaneous system of equations models for the employment growth rate and the level of investment in new business establishments. One model controls for endogeneity of the tax credit the other does not. Their findings suggest that the Job Creation Tax Credit had a positive impact on job creation and capital expansion in Ohio businesses between 1993 and 1995.

IV. The Benefit of Participation

The benefit of participation in an employment tax credit program is related to current and expected tax liability, the credit ceiling (50 percent in the case of Georgia's JTC), the reduction in the relative price of labor that is attributable to the credit, the discount rate associated with the credit, and the price elasticity of demand for labor. Each of these components affect the value of the credit to the firm. Previous work on employment tax credit programs, such as Hamermesh (1976, 1978, 1993), has focused on how wage subsidies affect

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the quantity of labor demanded[6], where an employment tax credit serves to reduce wage payments. These studies focus on the elasticity of demand for labor and ignore the problem of employers' failure to participate in the subsidy program.

The premise of this analysis is that employment tax credits are tied to the level of employment in a firm, and the tax credit effectively reduces the cost of labor to the firm. A reduction in the cost of labor changes relative factor costs, and will have two effects: (1) labor will be substituted for capital if output is held constant (substitution effect), and (2) if output is not held constant, the decrease in the price of labor will shift the firm's expansion path so that the profit-maximizing (cost-minimizing) condition is satisfied at a higher level of output (output effect) and higher quantities of labor. If all firms in an industry can take advantage of a lower price of labor, then the industry supply curve would shift out causing the price of the product to decrease. Given the limited number of eligible establishments that take the JTC and the limited effect of the JTC on labor costs, a decrease in price (of the good produced) probably does not occur.

The price elasticity of demand for labor measures a firm's responsiveness to a change in the price of labor. A firm's price elasticity of demand for labor will be greater in absolute value, *i.e.* a firm will be more responsive, if (1) the price elasticity of demand for the good being produced by the firm is large, and (2) the total cost represented by the expenditures on labor is a larger share of total cost than the expenditure of other inputs. In the former instance, a reduction in the price of labor that is passed on to the consumer in the form of lower prices for the firm's

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[6] Hamermesh (1978) discusses three types of subsidies for jobs: employment subsidies, wage subsidies, and hiring subsidies. Employment subsidies apply for the entire time a worker is with a firm. Wage subsidies are a fixed percentage of wages, a flat dollar amount or a fixed percentages of wages with a maximum. Hiring subsidies offset training and hiring costs for the initial period of employment in a firm. Employment tax credits are a form of wage subsidy.

output will increase the demand for that output. In the later case, a reduction in the price of labor has a large effect on total cost thereby encouraging the use of labor.

While the price elasticity of demand for labor is an important component, it is not the focus of the current analysis. There is another dimension that must be considered for a complete analysis of the firm's participation decision and the employment impact of the credit: a firm's tax liability. Firms with little or no tax liability have less incentive to participate in tax credit programs. Therefore, the participation decision is integrally related to a firm's current and future tax liability. For Georgia's JTC, the credit amount is limited to half of tax liability. Through this constraint, tax liability ultimately dictates the degree to which the credit reduces the price of labor relative to other factors of production. As a result, the annual credit that the firm claims on its Georgia corporate income tax return may not be directly related to the increase in employment. Because of this credit ceiling, the effective credit per job may be a small portion of the statutory credit, and the reduction in labor costs attributable to the credit may be small. It is the firm's responsiveness to this reduction in wages that determines the effectiveness of an employment tax credit in changing a firm's demand for labor. So, the employment impact of an employment tax credit is also related to a firm's tax liability. Each of these factors -- the level of tax liability and the credit ceiling – are important determinants of the participation decision and the employment impact of the credit.

Since firms can take the credit for five years if the new jobs are maintained and can carryforward unused credit for up to ten years, the discount rate associated with the present value of the credit is also a determinant of continued participation and the employment impact of the credit. The value of the credit does not increase with the wage level, so over time the credit

becomes a smaller proportion of wages. For example, at a four percent annual increase in the wage level, a $10,000 tax carryforward of this year's job tax credit is worth $9600 next year and $9245 the following year. The mechanism – credit, carryforward, or market forces -- through which the wage reduction is transferred to the firm affects a firm's response. In addition as discussed below, a wage reduction occurring through the tax system has certain costs associated with it that a wage reduction resulting from market forces does not share.

V. The Cost of Participation

Since the JTC lowers corporate income tax liability, we expect profit-maximizing firms to take the credit. Firms incur certain costs when participating in a tax credit program. In order to participate, the firm must know about the credit, meet the qualifications, and collect the information necessary to apply for the credit. If the cost associated with taking the credit is larger than the benefit received, then the firm will not take the credit. These costs fall into six categories: (1) search costs, (2) compliance costs, (3) costs associated with providing additional information to the government, (4) stigma costs, (5) hiring costs, and (6) additional federal tax liability.

Search costs associated with filing employment tax credits include costs of finding out about the credit and other tax abatement programs. A firm (or its designated tax advisor) must find out about the credit and determine if it is in an industry eligible to take the credit. Acquiring information about tax credits necessitates costly search by one or both parties. Either firms search for ways to reduce their tax liability or the government can develop a method to notify

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firms of their eligibility. Georgia does not have such a notification system. Because such activities are costly, firms may not continue to search until all tax abatement options are known.

One of the overriding findings in the literature on the New Job Tax Credit and the Targeted Job Tax Credit, two federal employment tax credit programs that began in the 1970s, is that only a small proportion of eligible firms actually take the credit. The low utilization rate apparently results from lack of knowledge of the programs. As Perloff (1982) reports, a Bureau of the Census survey for the NJTC showed that relatively few firms knew about the credit in the first year and that a significant proportion of the firms that did know about the credit were large (over 500 employees). Smaller firms (0 to 9 employees) were less likely to be aware of the program. Obviously, lack of awareness of the program limits the effectiveness of employment tax credits and indicates that firms do not consider it worthwhile to search for tax abatement.

Compliance costs can be divided into two components: startup costs and annual costs. Startup costs include the cost of learning about the credit, training staff, setting up new forms and systems to capture the information necessary to claim the credit. Annual costs are the year-to-year costs associated with claiming the credit. Firms that take the JTC (or their designated tax advisor) must obtain the necessary forms and gather information needed to fill out the forms. This information includes total employment and changes in employment for each establishment over a three-year period. Firms participating in the unemployment insurance program report information on monthly employment to the Georgia Department of Labor, so most firms already track the employment information necessary to file for the JTC. There are also internal coordination costs: within the firm personnel in charge of hiring decisions need to coordinate activities with personnel in charge of reducing tax liability. The firm must fill out the two-page

form for each establishment (within the firm) that is eligible to take the credit. For multi-establishment firms, the coordination costs both within and among establishments may become quite substantial.

In their analysis of Canada's scientific research and experimental development tax credit (one of the few studies that actually quantifies compliance costs), Gunz, Macnaughton and Wensley (1995) find that the average compliance cost for 55 firms surveyed was $2.5 million, which is 0.7% percent of the tax credit claimed. The average start up costs for claiming the credit in 33 firms surveyed was $32,556 or 84 percent of the average compliance costs and 0.4 percent of the tax credit claimed. Slemrod and Sorum (1984) estimate that in 1982 the total compliance cost of filing federal and state individual income tax returns is between $17 and $27 billion or 5 to 7 percent of tax revenue.

Costs associated with supplying additional information to the Georgia Department of Revenue may prevent an eligible firm from applying for the credit. Fear of audit (or other consequences of revealing additional information to the Department of Revenue) may be a deterrent. Additional personnel in the Georgia Department of Revenue view the corporate income tax returns of firms that take the JTC. This additional scrutiny may increase the probability of audit. In a tax evasion model, Rice (1992) shows that publicly traded companies are more likely to overreport income and suggests that these companies overreport income to avoid audits. Similarly, not taking the JTC is a means of overreporting taxable income. For Canada's scientific research and experimental development tax credit, Gunz *et. al.* (1995) find that the average audit cost per year for the firms surveyed is $6542 or 12.5 percent of compliance cost and 0.1 percent of tax credits claimed.

Positive or negative stigma associated with taking the JTC may explain in part why some eligible firms do not file for the credit: an eligible individual's or firm's unwillingness to take "handouts" may extend to the tax system. Howard (1997) identifies several of the federal tax expenditure programs including the targeted job tax credit as part of the "hidden welfare state." In addition, the public scrutiny of firms participating in tax abatement programs has increased over the past few years. Recent articles in the popular press have severely criticized tax abatements as a form of corporate welfare. For example, TIME magazine recently ran a four-part series on corporate welfare (Bartlet and Steele, 1998).

The stigma costs associated with corporate income tax credits are related to a firm's potential for audit in that there is a negative stigma associated with being audited and claiming a tax credit may increase the probability for audit. Stigma costs associated with participation in other government programs such as food stamps or AFDC or even the Targeted Job Tax Credit result from the visibility participation in these programs and negative associations related to characteristics of participating individuals. This type of stigma is not apparent with the JTC since minimizing tax liability is viewed as a good business practice, and there is no outside indication that a particular firm has taken the credit unless the firm explicitly reveals this information.

Hiring costs may explain the lack of participation in employment tax credit programs. If the credit induces a firm to hire additional employees, these employees must be interviewed and trained, and the appropriate paperwork must be completed. Such hiring costs may be larger than the potential credit. The number of jobs credited is closely associated with hiring costs. State employment tax credits focus on the number of jobs created. The same workers do not have to

be employed over the life of the credit, so if labor turnover is high, the firm has to replace workers in order to remain eligible for the credit. Under such conditions, hiring costs can be substantial. General Accounting Office (1991) reports that employers participating in the Targeted Job Tax Credit Program estimated that it cost between $600 and $1000 to recruit and train a new employee in the late 1980s. Barron and Bishop (1985) report that it takes firms between 11 and 13 hours to search for and hire employees in the manufacturing and wholesale industries. They also find that search and hiring costs are positively related to firm size (measured as employment) and the number of establishments within the firm. Because of these differential hiring costs, firms in different industries and of different sizes may find it more or less advantageous to participate in employment tax credit programs.

The relationship between the federal and state corporate income tax systems creates an additional cost of participating in state employment tax credit programs. State corporate income tax liability is deductible on the federal corporate income tax return. Since state corporate income tax credits reduce state tax liability, they increase federal corporate income tax liability. The magnitude of the increase in federal income taxes resulting from state income tax credits depends on the firms marginal tax rate. Since federal corporate income tax rates are higher than state corporate income tax rates, this cost may be substantial.

The costs and benefits associated with the decision to take the JTC are shown in Table 3. The low participation rate in the JTC program suggests that for many firms the costs associated with taking the credit are higher than the benefits attributed to the credit.

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Table 3. Costs and Benefits of Searching For and/or Participating in Tax Abatement Programs

	Search and Take	Search and Reject	Do Not Search
Costs	• Search Costs • Compliance Costs • Higher Probability of Audit • Hiring Costs • Higher Federal Tax Liability	• Search Costs • Value of Credit Foregone	• Value of Credit Foregone
Benefits	• Lower State Tax Liability	• Lower Compliance Costs • Lower Probability of Audit • Lower Federal Tax Liability	• No Search Costs • Lower Compliance Costs • Lower Probability of Audit • Lower Federal Tax Liability

VI. Analysis of the Employment Impact of Employment Tax Credits

Economic development professionals believe that tax incentives are necessary to attract new businesses and encourage expansion of existing businesses. In reality, little is known about the number of jobs actually attributable to specific economic development incentives. This section focuses on the magnitude of the employment growth (in participating firms) that is attributable to a state employment tax credit program. Who (local residents or in-migrants) gets the jobs that are attributed to employment tax credits is not considered here.

Jobs Attributable to the JTC

To evaluate the benefit of the JTC program, we would like to know the number of jobs created as a result of the program. To do this, we compare the level of employment growth in firms that participate in the JTC program with similar firms that do not participate in the program. (See the Appendix for the details of the estimation procedures.) Part of this difference in the level of employment growth is attributable to the JTC. Controlling for self-selection provides a better estimate of the number of jobs attributable to the program. Maddala (1983) shows two methods of evaluating program impact which control for self selection.

The first method is to compare the change in employment for a participating firm with the expected employment change if the firm had not participated. According to this calculation, for the 1993-95 period the total number of new jobs attributable to the JTC is 2301. This is 28.9 percent of the number of jobs credited, *i.e.* new jobs in participating firms. For the firms in the sample, the tax expenditure on the JTC over the 1993-95 period was just over $5 million, so the tax expenditure per new job created is $2176 over the 1993-95 period.

Another method is to calculate the expected growth in employment given that each type of firm participates in the tax credit program. This calculation subtracts the predicted employment change for nonparticipants if they had participated in the program from the predicted employment change of participants. With this calculation, the number of new jobs attributable to the JTC is 3299, which is 41.4 percent of the number of jobs credited. The tax expenditure per job is $1518 over the 1993-95 period. If these two calculations are considered the upper and lower bounds, then between 2301 and 3299 jobs or between 28 and 41 percent of the jobs credited can be attributed to the JTC. The cost per job is between $1518 and $2176. If

all of the jobs that were credited (7951 jobs) were actually attributable to the JTC, then the cost per job is $529. Through the JTC, the state reduced corporate income liability of participating firms by just over $5 million between 1993 and 1995, but $2.9 million to $3.6 million of this was a credit for jobs that would have been created in the absence of the JTC program.

While the number of jobs attributable to the program is low, the cost per job relative to the cost for other programs is also low. When compared to some of the large incentive packages that states have offered large corporations over the past several years, broadly applied programs such as employment tax credits appear to be as effective in terms of job creation as incentive packages offered to entice large corporations to locate in a particular state. For example, the incentive package that the state of Alabama offered Mercedes is estimated to have cost just short of $170,000 per job for 1500 jobs.[7] A few of the large incentive packages that states have offered specific companies since 1990 are shown in Table 4.

Whether these jobs go to the unemployed (local residents or in-migrants) or represent a redistribution of workers among plants or locations is not considered here. Bartik (1993) estimates that 60 to 90 percent of the jobs created by employment programs go to in-migrants in the long run. Blanchard and Katz (1992) estimate that nearly all jobs go to in-migrants in the long run.

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[7] The multiplier effect may be larger for a concentrated project like the Mercedes Benz plan rather than a more dispersed program like the JTC.

Table 4. Plant Locations Receiving Large Incentive Packages

Company	State (Year)	Incentive Package ($ in millions)	Announced Employment	Incentives/Job	Incentives/Jobs (1998 dollars)
Saturn (GM)	TN (1990)	70	3000	$23,333	$29,096
United Airlines	IN (1992)	300	6000	$50,000	$58,050
BMW	SC (1992)	170	1900	$89,473	$104,102
Mercedes	AL (1993)	253	1500	$168,666	$190,255
Dofasco	KY (1994)	140	400	$350,000	$384,650

Source: Brunori (1997) and author's calculations.

VII. Conclusion

The major conclusions of this report include the following:

- Tax liability has a small but positive effect on participation.

- Previous participation in the JTC program negatively influences the current level of employment in eligible firms claiming the JTC.

- Tier status has no effect on participation.

- Smaller firms are more likely to participate.

- Firms taking the JTC create between 28 and 41 percent or 2301 to 3299 more jobs than firms not taking the credit.

- During the 1993-95 period the tax expenditure on jobs that would have been created in the absence of the credit was between $2.9 and $3.6 million dollars or 59 to 72 percent of the total tax expenditure on the JTC.

APPENDIX

A switching regression model is used to estimate the employment impact of Georgia's JTC. A switching regression model is suitable for examining employment growth in firms that participate and do not participate in Georgia's JTC program. The switching regression model is a simultaneous system of three equations: two employment growth equations and a participation equation that serves as the "switch." Maddala (1983) provides an overview of switching regression models. The equations of the model are:

$$y_{1i} = \beta_1 x_i + u_{1i} \qquad \text{(1) Employment equation for participants}$$

$$y_{2i} = \beta_2 x_i + u_{2i} \qquad \text{(2) Employment equation for nonparticipants}$$

$$y_{3i}{}^* = \gamma_3 z_i + u_{3i} \qquad \text{(3) Participation equation}$$

$$\text{where } y_{3i} = 1 \text{ iff } y_{3i}{}^* > 0$$

$$y_{3i} = 0 \text{ otherwise.}$$

The error structure follows.

$$\begin{bmatrix} u_{1i} \\ u_{2i} \\ u_{3i} \end{bmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \Omega \right] \text{ where } \Omega = Cov(u_{1i}, u_{2i}, u_{3i}) = \begin{bmatrix} \sigma_1^2 & \sigma_2 & \sigma_{13} \\ \sigma_{12} & \sigma_2^2 & \sigma_{23} \\ \sigma_{13} & \sigma_{23} & 1 \end{bmatrix}$$

In equations 1 and 2, y_{1i} and y_{2i} are the annual change in employment in eligible firms that participate and do not participate in Georgia's JTC program. In equation 3, $y_{3i}{}^*$ is an unobserved latent variable representing a firm's propensity to participate in the JTC program, and y_{3i} is a dichotomous variable that indicates a firm's participation choice. The x_i and z_i are

vectors of explanatory variables. The propensity to participate in the JTC program is derived from the total gain from participation less any associated costs. The advantages of this specification are that it treats participation as endogenous and allows the effects of the explanatory variables to differ for participating and nonparticipating firms. The employment equations determine whether or not a firm's participation in the JTC program affects the level of employment. The participation equation (equation 3) indicates a firm's decision to take the JTC, and this information is used to test for and correct sample selection bias in the employment equation.

The estimating equations are shown below. The variables are defined in Tables 5 and 6.

(4) EMPLOYMENT CHANGE $= \beta_0 + \beta_1$ AGE$+ \beta_2$ INITIAL EMPLOYMENT $+$
$\quad \beta_3$ PLANTS $+ \beta_4$ RANK $+ \beta_5$ PREVIOUS PARTICIPATION $+$
$\quad \beta_6$ START UP $+ \beta_7$ LAMBDA $+ \varepsilon$

(5) PARTICIPATION $= \gamma_0 + \gamma_1$ TAX LIABILITY $+ \gamma_2$ TIER 1 DUMMY $+$
$\quad \gamma_3$ TIER 2 DUMMY $+ \gamma_4$ INITIAL EMPLOYMENT $+$
$\quad \gamma_5$ HEADQUARTERS LOCATION $+ \gamma_6$ PREVIOUS PARTICIPATION $+$
$\quad \gamma_7$ MANUFACTURING DUMMY $+ \gamma_8$ START UP $+ \gamma_9$ JOBS CREDITED $+$
$\quad \gamma_{10}$ RANK*YEAR95 $+ \varepsilon$

Equation 4 is estimated separately for participating and nonparticipating firms.

Table 5. Description of Variables Used in the Participation Equation

Variable	Description	Source
Participation Dummy	=1 if firm took the JTC (had a positive JTC) =0 if firm did not take the JTC or claimed zero JTC	Georgia Corporate Income Tax Returns and ES202 data
Tax Liability	Pre JTC tax liability on the Georgia Corporate Income Tax return (in 10,000s)	Georgia Corporate Income Tax Returns
Tier 1 Dummy	=1 if located in a Tier 1 county. =0 otherwise.	Georgia Corporate Income Tax Returns or ES202 data
Tier 2 Dummy	=1 if located in a Tier 2 county. =0 otherwise.	Georgia Corporate Income Tax Returns or ES202 data
Initial Employment*	The number of employees in the base year	Georgia Corporate Income Tax Returns or ES202 data
Headquarters Location	=1 if firm's headquarters is in Georgia =0 otherwise	Georgia Corporate Income Tax Return
Previous JTC	=1 if firms took JTC previously =0 otherwise	Georgia Corporate Income Tax Return
Manufacturing Dummy	=1 for manufacturing firms =0 otherwise	Georgia Corporate Income Tax Returns or ES202 data
Start up	=1 if the base year employment was zero =0 otherwise	Georgia Corporate Income Tax Returns or ES202 data
Jobs Credited	Number of jobs credited in a tax year	Georgia Corporate Income Tax Return
Rank*Year 95	Interaction of the rank of the county where firm is located and a year dummy	Author's calculation

* For multi-establishment firms, annual employment for all establishments in a particular firm that participates or is eligible to participate in the JTC program is used.

Table 6. Description of Variables Used in the Employment Growth Equation

Variable	Description	Source
Employment Growth	Employment change between period t and t-1	Georgia Corporate Income Tax Returns or ES202 data
Age of firm	Age measured as date of incorporation in Georgia less the income tax year	Georgia Corporate Income Tax Returns
Initial Employment	Employment level in the base year within the state of Georgia	Georgia Corporate Income Tax Returns or ES202 data
Plant	Number of establishments within firm (tax entity)	ES202 data
Rank	Tier ranking of county where firm is located (This is an indicator of the level of development of the county)	Georgia Corporate Income Tax Returns or ES202 data
Previous JTC	=1 if firm took JTC in a previous year =0 otherwise	Georgia Corporate Income Tax Returns
Startup	=1 if the base year employment was zero =0 otherwise	Georgia Corporate Income Tax Returns or ES202 data
Lambda	Inverse Mills Ratio	Calculated from the participation (probit) equation

Data

The data consist of tax and employment data for firms eligible to take the JTC. Data from corporate income tax returns of firms and establishment level data from the Georgia Department of Labor's ES202 dataset were used to create many of the variables used in the model.[8] The summary statistics for each of the variables of the econometric model are shown in Tables 7, 8 and 9. The "change in employment variable" for nonparticipating firms was calculated from the ES202 data. For participating firms, it was taken from the JTC schedule included with the corporate income tax return.

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[8] The ES202 data from the Georgia Department of Labor contains information on monthly employment levels, industry, unemployment tax payments, total wage bill and county for each business establishment in Georgia.

Nonparticipating firms were drawn randomly from a list of eligible firms identified using ES202 data from the Georgia Department of Labor. The average tax liability for firms taking and not taking the JTC is $517,466 and $116,125, respectively. The average tax liability of firms not taking the credit is significantly smaller than the tax liability of firms taking the credit at the 99 percent confidence level in a one-tailed test. Forty of the firms not taking the credit have zero tax liability.

As shown in Table 7, 46 percent of the firms in the sample participated in Georgia's JTC program between 1993 and 1995. Half of the firms in the sample had locations in Tier 1 counties, and just over 56 percent of the firms were headquartered in Georgia. Just over a third of the firms had participated in the JTC program in previous years. The vast majority of the firms (89 percent) were in manufacturing industries. A quarter of the sample were startups in the base year. The average tax liability of firms in the sample is just over $302,000.

The average participating firm had an employment increase of 68 workers. Employment increase ranged from −35 to 483. The −35 may seem counterintuitive. Consider a firm that increases employment by 50 workers but only needs to create 10 new jobs to qualify for the credit. If this firm reduces employment by 35 workers, it still qualifies to take a credit for 15 workers. Firms with an initial employment of zero are startups. Startups represent 12 percent of the sample of participating firms. For firms participating in the JTC program, 58 percent had previously participated.

Table 7. Summary Statistics of Variables Used in the Participation Equation

Variable	Mean	Standard Deviation	Minimum (Counts for Dummy Variables)	Maximum (Counts for Dummy Variables)
Participation Dummy	0.4635	0.5003	0 (81)	1 (70)
Tax Liability ($ ten thousands)	30.2178	82.2216	0	517.41
Tier 1 Dummy	0.5099	0.5015	0 (74)	1 (77)
Tier 2 Dummy	0.3509	0.4788	0 (98)	1 (53)
Initial Employment	300.9271	558.2	0	4540
Headquarters Location	0.5695	0.4967	0 (65)	1 (86)
Previous JTC	0.3046	0.4617	0 (105)	1 (46)
Manufacturing Dummy	0.8940	0.3088	0 (16)	1 (135)
Start up	0.2582	0.4391	0 (112)	1 (39)
Jobs Credited	52.6556	102.3155	0	834
Rank* Year 95	46.2875	51.5242	0	159
Obs.= 151				

Table 8. Summary Statistics of Variables Used in the Employment Growth Equation, Participating Firms

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable	68.2857	100.5274	-35	483
Age	18.6428	17.2954	0	67
Initial Employment	250.3714	352.3007	0	1259
Plant	5.6857	9.7185	1	52
Rank	46.4142	39.3461	1	158
Previous JTC	0.5857	0.4961	0	1
Startup	0.1285	0.3371	0	1
Lambda	0.3318	0.4007	0.111E-13	1.8201
Obs. = 70				

Table 9. Summary Statistics of Variables Used in the Employment Growth Equation, Nonparticipating Firms

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent Variable	99.1604	240.1943	-15	2062
Age	19.8888	19.0794	0	84
Initial Employment	344.6172	687.7551	0	4540
Plant	3.2469	6.7943	1	57
Rank	74.8168	42.6097	4	159
Previous JTC	0.0617	0.2421	0	1
Startup	0.3703	0.4859	0	1
Lambda	-0.2867	0.4533	-2.6798	-0.231E-28
Obs. = 81				

The summary statistics show that the average change in employment is larger for nonparticipating firms due, in part, to one firm that had a large change in employment. On average initial employment for nonparticipating firms is higher than for participating firms. Only six percent of the nonparticipating firms had participated in the JTC program previously while 37 percent of the sample are startups.

The treatment of multi-establishment firms requires a more detailed explanation. The term "firm" refers to the tax entity within the state of Georgia. A single firm may have several establishments (or plants). Of the 151 firms used in the participation equation, 22 (15 percent of the sample) had more than one establishment which claimed or was eligible to claim the JTC between 1993 and 1995. Plant locations outside the state of Georgia are not considered in this analysis. Several of the variables used in the participation equation were constructed for multi-establishment firms. Initial employment is the sum of the employment in each establishment during the base year. The startup dummy is equal to one if any of the establishments within the firm is a startup. The rank variable is the average rank of the counties where each of the establishments is located. The Tier 1 dummy is equal to one if a majority of the qualifying establishments are located in Tier 1 counties. In case of a tie, the Tier level of the largest establishment is used. In the employment equation, total employment is the sum of each establishment's employment, and the employment change is measured as the difference in total employment between years t and t-1. The age of the firm is measured from the date of incorporation in the state of Georgia which is available on the corporate income tax return. The age of each establishment is unknown. The plant variable is the number of establishments within each firm. The startup and rank variables are defined as in the participation equation. See Faulk

(1999) for a detailed discussion on the choice of variables included in the model and the expected effects.

Data and Estimating Equation

Bartik (1991) identifies two weaknesses in past evaluations of specific economic development programs: (1) the scope and funding of programs are often small relative to the target area and therefore not likely to affect job growth; (2) it is difficult to determine what would have happened without the program, *i.e.* there is no counterfactual. Since there is no counterfactual, he suggests comparing changes in a target area with a control area or using micro data on assisted businesses and a control group of unassisted businesses to examine the effects of specific programs. The later of Bartik's suggested approaches is used here.

This study uses microdata for eligible firms that participated and did not participate in Georgia's Job Tax Credit program between 1993 and 1995. This time period was used because it was the most recent period available at the time the data was collected. These years are particularly suitable for analyzing the effects of employment tax credits since neither an economic recession nor a rapid economic expansion was underway. Data for one state are used because there is no centralized source of information on the various states' employment tax credit programs.

A firm's decision to participate in an employment tax credit program depends on the cost and benefits of participation while the employment impact of the credit depends on the net value of the credit over the credit life. An employment tax credit reduces the cost of labor. To benefit from the credit, a firm must increase employment by some minimum amount, have a positive tax liability, and incur participation costs. A firm that is eligible to take the credit will participate in the tax credit program if the benefit of participating is greater than the cost and will continue to

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hire additional units of labor in response to the credit if the incremental change in profit attributable to the credit is positive (the value of the tax credit is greater than the cost of participating).

Estimation Results

Participation Equation

As discussed previously, only 19 percent of the firms that create the required amount of employment actually participate in Georgia's JTC program. The use of microdata permits an examination of firm characteristics that influence the costs and benefits of participating in an employment tax credit program. The parameter estimates for the participation equation are shown in Table 10. The marginal effects, which show how the probability of taking the JTC changes when firm characteristics are slightly altered, are shown in Table 11. These results generally support the hypothesis that participation depends on the benefits and costs.

The probit model estimates show that tax liability is a significant, positive but small influence on the firm's likelihood of taking the JTC. For firms in which the effective tax credit is less than the statutory credit (43 firms or 61 percent of firms participating in the JTC program), the value of the credit increases as tax liability increases. Firms with a larger tax liability receive a larger effective credit rate and should be more likely to participate. As the marginal effects in Table 11 indicate, changes in the pre-credit tax liability of the average firm has a relatively small effect on a firm's probability of taking the JTC. According to these results, a $10,000 increase in tax liability increases the probability of filing for the JTC by 0.83 percentage point. Employment tax credits provide a lower tax rate to participating firms. If taxes are not one of the primary considerations in the location and expansion decision, as shown in Ledebur and Hamilton (1986), the effect of tax liability on participation should be small.

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Table 10. Probit Parameter Estimates of the Participation Model

Variable	Parameter Estimates	Standard Errors	T-ratio
Intercept		1.2456	0.235
Tax Liability	0.0218*	0.0086	2.529
Tier 1 Dummy	-0.8442	0.9722	-0.868
Tier2 Dummy	-0.9821	0.8163	-1.203
Initial Employment	-0.0023*	0.0008	-2.900
Headquarters Location	1.3040*	0.3928	3.320
Previous JTC	0.9820*	0.3795	2.587
Manufacturing Dummy	-0.6869	0.6538	-1.051
Start up	-0.9523*	0.4492	-2.120
Jobs Credited	0.0221*	0.0043	5.053
Rank/Year 95 Interaction	-0.0116**	0.0061	-1.907
Obs.= 151			
Goodness of Fit: The joint predictions for the model were 75/81 for JTCD=0 and 61/70 for JTCD=1. The total predictions were 84/81 for JTCD=0 and 67/70 for JTCD=1.			
Log likelihood function = -41.10547			

* Significant at the 95% confidence level in a two-tailed test.
** Significant at the 90% confidence level in a two-tailed test.

Table 11. Marginal Effects of Participation in the JTC Program

Variable	Effect on the Probability of Taking the JTC	Standard Errors	T-ratio
Tax Liability	0.0083*	0.0030	2.759
Tier 1 Dummy	-0.3244	0.3751	-0.865
Tier 2 Dummy	-0.3774	0.3161	-1.194
Initial Employment	-0.0009*	0.0003	-2.871
Headquarters Location	0.5011*	0.1491	3.361
Previous JTC	0.3773*	0.1451	2.600
Manufacturing Dummy	-0.2639	0.2519	-1.048
Start up	-0.3659*	0.1773	-2.064
Jobs Credited	0.0085*	0.0016	5.236
Rank/Year 95 Interaction	-0.0044**	0.0023	-1.908

Note: Marginal effects are calculated at mean values of the independent variables.
* Significant at the 95% confidence level in a two-tailed test.
** Significant at the 90% confidence level in a two-tailed test.

The tier level of the county in which the firm is located is not a significant influence on a firm's likelihood of taking the JTC. Even though 68 percent of participating firms are located in Tier 1 counties, firms located in less developed counties are not more likely to participate in the JTC program when other factors are taken into account.[9] Even though the credit amount per job is higher and the job creation threshold is lower in less developed counties, perhaps they are not high/low enough to encourage participation. Gabe and Kraybill (1999a) find that neither wages nor the level of unemployment in a county, both measures of the level of development of the county, are significant determinants of receiving Ohio's Job Creation Tax Credit. Recall that wages and unemployment are also determinants of a county's Tier rank. Neither Georgia's JTC nor Ohio's Job Creation Tax Credit provide evidence that businesses located in less developed areas are more likely to participate in or receive employment tax credits.

The model estimates show that the size of the firm is negatively related to a firm's likelihood of taking the JTC, which implies that smaller firms are more likely to take the JTC. The marginal effects indicate that firm size has a relatively small effect on the average firm's probability of taking the JTC. A one worker increase in initial firm size decreases the probability of taking the JTC by 0.09 percentage point. The result that smaller firms are more likely to participate may be explained in part by two factors: the location of the firm and the relative costs of participating for firms of different sizes. Firms located in less developed counties are more likely to be smaller relative to firms in more developed counties. The average size of firms located in Tier 1, 2 and 3 counties is 200, 304 and 661 workers, respectively. On the one hand, smaller firms may have fewer resources to devote to finding tax abatement. On the other hand, they may have more of an incentive to discover abatement programs since taxes may be a larger

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[9] Of the startups, 33 percent (13 firms) are located in Tier 1 counties.

proportion of total costs. Also, smaller firms may face credit rationing or other financial constraints that make tax credits more valuable to them. In addition, larger firms experience greater difficulty coordinating information needed to claim the JTC, which increases the cost of taking the credit. In a smaller firm, the same person is more likely to be in charge of hiring and taxes, so coordination costs are lower. Gabe and Kraybill (1999a) and Pope and Kuhl (1996) also find that smaller firms are more likely to participate in an employment tax credit program.

The model estimates show that firms that previously took the JTC are more likely to take the JTC in the current year. The marginal effects indicate that previous participation has a relatively large effect on a firm's probability of taking the credit. The model estimates indicate that the difference in the parameter estimate for firms previously participating in the JTC and those not participating is 0.982. Past participation is a good predictor of current participation. Since firms have already incurred the cost of finding out about the credit and developing the appropriate systems to track information necessary to claim the credit, they should continue to participate.

The model estimates show that the likelihood of taking the JTC increases with the number of jobs that are creditable. The marginal effects indicate that a one-unit increase in the number of creditable jobs increases the probability of taking the JTC by 0.8 percentage point. The number of jobs creditable is the number for which the firm can potentially take the credit before tax liability is considered. Recall that the maximum JTC is limited to half of a firm's tax liability, so the amount of the credit available to the firm is not necessarily directly related to the number of jobs that are creditable in each firm. Also recall that in this analysis firms with no tax liability are considered nonparticipants in the JTC program. In a similar vein, Gabe and Kraybill

(1999a) find that the likelihood of receiving Ohio's Job Creation Tax Credit increases with the number of new jobs that each establishment agrees to create.

The model estimates show that firms headquartered in Georgia are more likely to take the JTC.[10] As the marginal effects indicate, changes in headquarters location has a relatively large effect on a firm's probability of taking the credit. The model estimates indicate that the difference in the parameter estimates for eligible firms headquartered in the state and those not headquartered in the state is 1.304. As discussed earlier, details on how to file for the JTC and information on the credit amounts and Tier structure are not readily available. Perhaps firms headquartered in the state are more likely to have information about tax abatement. An alternative explanation is that firms headquartered in the state are more likely to increase employment in the state, qualify for the credit, and therefore apply for it.

The manufacturing dummy is not a significant influence on a firm's likelihood of taking the JTC. Even though 89 percent of the sample are manufacturing firms, when other variables are taken into account, this is not a significant determinant of participation. In their study of Ohio's Job Creation Tax Credit, Gabe and Kraybill (1999a) use a larger dataset and include 18 industry dummies as explanatory variables to determine if business establishments in certain industries are more likely to receive a tax credit. None of the industry variables are significant. For the Georgia and Ohio employment tax credit programs, at least, industry does not appear to be a significant influence on the likelihood of participation.

The model estimates show that startup firms are less likely to take the JTC. One reason for this result is that startups have a much lower tax liability than existing firms. The average tax liability of startups is much lower than the tax liability of non startups at $92,435 and $375,212,

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[10] As discussed earlier, the direction of causality is uncertain.

respectively. The tax liability of startups is significantly less than that of non startups at a 99 percent confidence level in a one-tailed test. Of the startup firms, 43.6 percent (17 firms) have no tax liability. Of the 22 startups with positive tax liability, 13 (59 percent) did not take the JTC. The model estimates indicate that the difference in the parameter estimates for startups and nonstartups is –0.9523.

The model results show that there is a negative relationship between the interaction variable and the likelihood of taking the JTC. As the rank of the county in which the firm is located increases, the firm is less likely to take the credit in 1995. In this year firms in counties with a higher rank (Tier 3 counties) are less likely to take the JTC relative to firms in other counties. Since 1995 is the first year that firms in Tier 3 counties could take the credit, many eligible firms in these counties may not have known that they were eligible. Additional years of data need to be included in the sample before we can conclude that the JTC increases employment in Tier 1 and 2 counties relative to Tier 3 counties.

Employment Equations

The analysis of the employment impact of employment tax credits seeks to determine if both the level of employment growth and the determinants of growth are different for participating and nonparticipating firms. Tables 12 and 13 show the parameter estimates for participating and nonparticipating firms, respectively.

Initial employment serves as a measure of firm size. In the case of the JTC, model estimates show a positive relationship between firm size and employment growth for both participating and nonparticipating firms. This indicates that the level of employment growth increases with the size of the firm. For participating firms, as firm size increases by ten workers, employment growth increases by 1.2 workers. For nonparticipating firms, as firm size increases

Table 12. Parameter Estimates of the Employment Growth Model, Participating Firms

Variable	Parameter Estimate	Standard Errors	T-ratio
Intercept	166.9129	42.0778	3.967
Age	0.9722	0.7888	1.233
Initial Employment	0.1244*	0.0351	3.535
Plant	-2.8692**	1.2729	-2.254
Rank	-0.4353	0.3385	-1.286
Previous JTC	-105.6650*	30.7695	-3.434
Startup	48.8624	37.4289	1.305
Lambda	-156.4427*	38.4746	-4.066
Obs. = 70	R-sq. = .5059		

Note: The final step of Heckman's procedure was implemented using GLS.
* Significant at the 95% confidence level in a two-tailed test.
** Significant at the 90% confidence level in a two-tailed test.

Table 13. Parameter Estimates of the Employment Growth Model, Nonparticipating Firms

Variable	Parameter Estimate	Standard Errors	T-ratio
Intercept	2.1278	74.3880	0.029
Age	-1.9236	1.4938	-1.288
Initial Employment	0.0808**	0.0440	1.834
Plant	2.5104	4.0243	0.624
Rank	0.7081	0.7063	1.003
Previous JTC	-29.9452	135.3078	-0.221
Startup	118.4625**	61.8667	1.915
Lambda	-14.9497	77.1772	-0.194
Obs. = 81	R-sq. = .1290		

Note: The final step of Heckman's procedure was implemented using GLS.
** 90% Confidence level in a two-tailed test.

by 10 workers, employment growth increases by 0.8 workers. The magnitude of the parameter estimate is larger for participating firms, suggesting that size has a larger effect on employment growth in participating firms than in nonparticipating firms. This might seem to conflict with the finding that smaller firms are more likely to take the credit. However, even though larger firms are less likely to take the credit, among firms taking the credit, larger firms create more jobs than larger firms that do not take the credit. As discussed earlier, the purpose of the JTC is to increase employment. The level of employment growth is the appropriate measure to use in evaluating the impact of the program. Pope and Kuhl (1996) also find that smaller firms would be more responsive to the proposed wages paid tax credit in California. Wren (1998) finds that small firms that receive direct financial assistance create more jobs than large firms that receive the same type of assistance do.

Other studies have examined the employment growth *rate* of large and small firms. Gabe and Kraybill (1999b) find a negative relationship between establishment size and its employment growth rate. Regression analysis using the employment growth rates as the dependent variable had little explanatory power.

For firms taking the JTC, employment growth is negatively related to the number of plants. As the number of plants increases, the change in employment decreases by almost three workers. For eligible firms that do not claim the JTC, the number of plants is also negative but not significant.

Previous JTC participation is a negative and significant determinant of employment growth for firms claiming the JTC. The employment change above the job creation threshold (δ in the theoretical model) decreases between tax years. See Table 2 for the minimum job creation threshold in each Tier. For example, a firm in a Tier 1 county may create 15 jobs and take the

credit. (The firm needs to create 10 jobs to qualify.) If the firm reduced employment by 4 jobs in the next year, it can still claim the credit for 11 jobs rather than 15. This indicates that on average firms taking the JTC reduce employment in successive years, but this reduction is not large enough to remove the firm from the program.

For participating firms, the coefficient on the Inverse Mills Ratio is negative and statistically significant, indicating that sample selection bias does exist. The covariance between the error terms in the two employment equations is negative. This indicates that, for participating firms, the unobservables affecting participation are negatively related to the unobservables affecting employment growth. For nonparticipating firms, the coefficient is negative but insignificant, indicating that sample selection bias is not present in this sample. This result for nonparticipating firms provides some evidence that these firms did not participate in the JTC program because they did not know about the program and did not incur the search costs to find out about the credit rather than their making a conscious decision not to participate. Using a similar model, Gabe and Kraybill (1999b) also find a negative and significant coefficient on the Inverse Mills Ratio for firms receiving Ohio's Job Creation Tax Credit.

Being a startup in the base year is not a significant determinant of employment growth for firms that took the JTC. It is significant for firms that did not take the JTC. Startups that did not take the credit had an average employment change of 162.5 workers, while startups that took the credit had an average employment change of 79.5 workers. This unexpected result can be explained in part by the way that the startup variable is defined. Recall that startups include both the opening of a new plant by an existing firm and the opening of a new firm. For nonparticipating firms, eleven of the 30 startups were the opening of a new plant by an existing

firm which is likely to have a larger level of employment than a startup that is a new firm. For participating firms, only one of the startups was the opening of a new plant by an existing firm.

For firms eligible to take the JTC, age of the firm is not a significant determinant of the level of employment growth. Gabe and Kraybill (1999b) show a similar result for age. This finding is contrary to several studies of firm growth rates, which have shown that younger firms tend to have a higher growth *rate* than older firms do (Evans (1987a, 1987b).

The model shows that rank is not a significant influence on employment growth for either participating or nonparticipating firms. Bartik (1991) suggests that jobs created in areas with high unemployment are more valuable than jobs created in areas with low unemployment and argues that for state and local incentives to produce national benefits, at the very least, places with higher unemployment should offer greater incentives than places with low unemployment so that jobs are redistributed from places with lower unemployment to places with higher unemployment. If the JTC induces such a change, establishments located in Tier 1 counties -- those counties with highest unemployment and poverty rates, the lowest manufacturing wage and per capita income -- would be more likely to create jobs in response to the JTC than establishments in other counties. The model estimates do not support this expectation. These results support the findings of Fisher and Peters (1998), who find that taxes and incentives provide no clear inducement for firms to locate in areas with higher unemployment.

In sum, the determinants of employment growth are different for participating and nonparticipating firms. The large differences in the parameter estimates for the two sets if firms suggest that there are structural differences in the growth patterns of participating and nonparticipating firms. Variables that have good explanatory power for employment growth of participating firms have little explanatory power for nonparticipating firms. One explanation for

this difference is that nonparticipating firms are less efficient than participating firms are. Nonparticipating firms do not take a tax credit for which they are eligible. The coefficient on the inverse mills ratio is measured with less precision but is smaller for nonparticipating firms relative to participating firms. This suggests that the hiring decision and participation are not correlated for nonparticipating firms. These firms are not reacting to the credit. It may be that nonparticipating firms do not know about the credit. An alternative explanation is that they are unwilling to incur the search costs to find out about the credit; perhaps because they believe that the cost of finding out about tax abatement is substantial relative to the credit. In this case, the firm has a higher tax liability than necessary as a result of not taking the credit. Finally, a nonparticipating firm may know about the credit and not take it because the participation costs are higher than the credit.

The estimation technique used to caculate the employment impact is taken from Madalla (1983). The first method is to compare the change in employment, y_{1i}, for participant i and the expected potential employment change without the program for a participant with characteristics X_i and Z_i, as defined in the econometric model. Under the normality assumption, the change in employment due to participation is

$$y_{1i} - E(y_{2i} \mid y_{3i} = 1) = y_{1i} - X_i \beta_2 + \sigma_{2\varepsilon} \frac{\phi(Z_i \gamma)}{\Phi(Z_i \gamma)} \, .$$

The change in employment is the summation over all participants. This calculation subtracts the predicted employment change if participants had not participated from the observed change in employment of participants.

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Another method is to calculate the expected growth in employment given that each type of firm participates in the tax credit program.

$$E(y_{1i} \mid y_{3i} = 1) - E(y_{2i} \mid y_{3i} = 1) = X_i(\beta_1 - \beta_2) + (\sigma_{2\varepsilon} - \sigma_{1\varepsilon})\frac{\phi(Z_i\gamma)}{\Phi(Z_i\gamma)}$$

This calculation subtracts the predicted employment change for nonparticipants if they had participated in the program from the predicted employment change of participants.

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ABOUT THE AUTHOR

Dagney Faulk is Assistant Professor of Economics at Indiana University Southeast. Prior to that she was Research Associate in the Fiscal Research Program at Georgia State University. She has worked at USAID, The World Bank and the U.S. Department of Housing and Urban Development. She has published on topics related to state and local public finance and urban economics. She holds a Ph.D. from the Georgia State University.

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