URBAN ECONOMIC DEVELOPMENT IN AMERICA: EVIDENCE FROM ENTERPRISE ZONES

DISSERTATION

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ABSTRACT

The objective of this research is to answer the questions:
1. Are enterprise zones efficient if adopted by high-unemployment areas?
2. What are the effects of the EZ or tax incentives on the unemployment rates of areas?

The research applies these questions to Ohio's enterprise zone program because of the policy debate in the various state enterprise zone programs regarding the zero-sum nature of such policies.

A theoretical model is developed that addresses the research questions. In the model I point to the cause of unemployment in the EZ. I show the relationship between the reservation wage and unemployment rate, following Jones (1989). I then show the general equilibrium response to the tax abatement provided in EZs, in a generalized framework incorporating capital mobility, following Harberger (1962). Because the framework considers the enterprise zone and the rest of the economy, it attempts to capture the effects as to what could happen in areas without the enterprise zone. I thus use the framework to analyze the impact of enterprise zones on the economy that adopts it.

In the empirical work, reservation wages are estimated as a function of unemployment rate and other variables, using the Panel Study of Income Dynamics (PSID), taking into account sample selection bias. The estimation indicates that the area's unemployment rate does not have a significant impact on the reservation wage of individuals residing in the area. Based on this estimation, reservation wages are predicted for Ohio's enterprise zones and net benefits from employment created in the enterprise zones of Ohio are estimated. The benefits are compared to the costs of the program (that include taxes foregone, other local incentives and infrastructure provided to firms by local governments under the program) under various scenarios.
The benefit-cost analysis shows that on average, the unemployment rate adjusted B-C ratio is less than 1, if only created jobs are taken into account. The efficiency loss under this assumption is estimated to be around $45 million. This implies that it is not a good strategy for all areas to adopt tax incentives to create employment. It could be beneficial for high-unemployment areas to use tax incentives because, when adjusted rather than absolute B-C ratios are used to assess net benefits from employment, high-unemployment areas perform better than other areas.

Finally the estimation of area unemployment rates using Census data for Ohio at the block group level, shows that tax incentives have a statistically significant impact in reducing the unemployment rate of areas. This shows that tax incentive programs are mostly successful in the objective for which they were created in the state. Moreover, the B-C analyses show that the net benefits from employment are likely to be higher than the costs of creating them if such programs were to be adopted by high-unemployment areas.
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CHAPTER 1

INTRODUCTION

1.1 Importance of Problem and Motivation for Research

Traditional urban development policies provide supply-side incentives to firms and consist of financial incentives such as Industrial Revenue Bonds (IRBs), property tax abatements, direct state loans, and non-financial incentives (such as customized industrial training), which are primarily targeted at branch plant recruitment (Bartik 1991). In contrast, new wave policies (Bartik 1991) or demand-side policies (Eisinger 1988) are mainly targeted at existing firms. Demand-side policies include services such as providing information regarding the existence of markets, export promotion assistance, assistance to small firms in the form of business incubators, hosting of trade fairs, support of high-technology programs, and other services which boost firm productivity.

Until recently, supply-side policies were believed to be ineffective. Two observations can be made from the literature with regard to these policies. First, the effect of tax incentives on firms' location decisions was unclear. This was because some empirical work (Papke & Papke 1986; McGuire 1986) showed that taxes affect firm location and investment decisions, but other theoretical work (Deich 1989; Seyfried 1990) showed the contrary. Second, it was argued that such traditional development policies are zero-sum or even negative-sum in their effects because they redistribute existing employment between areas, leaving total employment unchanged (Rubin & Zorn 1985; Netzer 1991).

As in the literature, there have been debates regarding the zero-sum nature of traditional urban development programs in the policy circles too. Specifically there are instances of policy debates with regard to enterprise zone programs. Enterprise zones are a tool of traditional urban policy. Enterprise zones are geographically targeted areas chosen for development and are designated on the basis of unemployment, poverty, population, age
of housing stock, and other criteria. Firms that locate in the area and create jobs are given tax credits, abatements and exemptions. The underlying assumption is that firms and employees in the zone area benefit because of a reduction in the price of capital and/or labor, and there is expanded investment and employment generation through deregulation.

In the various states which have launched their own state enterprise zone programs even without a federal program, tax incentive programs are extensive at the local government level. However, concern about the benefits of competition between locations has been at the forefront of policy debates in the states. For instance, recent legislative discussions surrounding the Enterprise Zone program in Ohio contained instances of “pirating” of businesses from neighboring Ohio urban areas (Byrnes & Sridhar 1996). The advantages to local control of these programs both in terms of effective targeting of incentives and the importance of meeting the competition of other states were also sighted in the debates. Whether these incentive programs and the resulting tax competition is conducive for actual development to occur, remains a debate in both the literature and policy circles. It may be thus noted that this policy debate is the policy version of the “zero-sum” game argument in the literature.

In addition, according to the provisions of Ohio Substitute Senate Bill 19 that restructured Ohio’s enterprise zone program in 1994, Ohio’s enterprise zone program was due to sunset in December 1997 if not renewed. More recently, the program was extended through June 30, 1999 in the budget bill effective July 1, 1997, in order to allow the Cleveland State Consortium time to conduct its effectiveness study in conjunction with the Economic Development Study Advisory Committee appointed by the Ohio legislature.

Thus the policy debate regarding Ohio’s enterprise zones and the more general debate regarding traditional incentive programs provide the motivation for this research.

As Eisinger (1995) points out, there is a return to industrial recruitment by states once again, which are pursuing demand-side as well as supply-side policies to promote their development. However, states rather focus their programs in response to political cues in the environment, than on the effectiveness of the policies themselves. So the conclusion reached
by Eisinger is that, irrespective of the rationale, states are turning back to traditional industrial recruitment as a way of promoting their development. This provides a useful background against which the research on traditional programs such as enterprise zones could be relevant. Below I provide a brief background to this research.

1.2 Background and Statement of Problem

In an attempt to resolve the controversy in the existing literature on traditional urban development programs, Bartik (1991), in one of the most comprehensive summaries of the econometric literature on taxes and firm location decisions, found that tax incentives affect firm location decisions. Specifically, the effect of taxes was greater at the intrametropolitan level where factors other than taxes were equal, than at the intermetropolitan level. Based on his summary of econometric work, Bartik (1991, 1992) found that the long-run (defined as 10 years or more) elasticity of business activity with respect to tax cuts at the intrametropolitan level lies somewhere in the range from -1.0 to -3.0. That is, if a small suburban jurisdiction within a metropolitan area raises its taxes by 1 percent, it can expect in the long run a reduction in its business activity from 1 to 3 percent. On the other hand, the elasticity of business activity with respect to taxes at the interstate or intermetropolitan level was in the range of -0.6 to -1.0 (Bartik 1991).

In addition, Bartik (1991) argued that supply-side policies such as tax incentives could be efficient and produce net benefits even though they redistributed employment from one area to another. This was primarily due to the high value unemployed persons placed in having a job in high-unemployment areas. He argued that if we defined the net benefits from a job to be equal to the wages paid minus the reservation wage, net benefits from jobs would be greater to persons in high-unemployment areas. This was because the reservation wage, the lowest wage at which unemployed persons would be willing to accept a job, of persons would be low in high-unemployment areas. Based on this, Bartik argued that if firm relocation occurred from low to high-unemployment areas, it could still produce greater net benefits to the economy as a whole. In this manner, Bartik's (1991) work attempted to show that such policies were not zero-sum in their effects.
The objective of this research is to answer the questions:

1. Are enterprise zones efficient if adopted by high-unemployment areas?
2. What are the effects of the EZ or tax abatement programs on the unemployment rates of areas?

I thus make an attempt to evaluate the efficiency and spatial implications of enterprise zones. The research here makes an attempt to apply these questions to Ohio’s enterprise zones because of the policy debate in Ohio as well as in the other states regarding the effects of such competition.

1.3 Contribution to the Literature

I carry Bartik’s research further by applying Bartik’s framework to one of the most debated urban development programs, enterprise zones, which rely on supply-side incentives and test whether or not net benefits from jobs are higher in high-unemployment areas. In addition, I attempt to show the general equilibrium response to the tax abatement provided in EZs, in a generalized framework incorporating capital mobility, following Harberger (1962). Because the framework considers the enterprise zone and the rest of the economy, it attempts to capture the effects of what could happen in areas without the enterprise zone. I thus use the framework to analyze the impact of enterprise zones on the economy that adopts it. Landers (1996) made an attempt to measure real benefits from enterprise zones, by examining the capitalization of tax abatements provided in Ohio’s enterprise zones, in commercial and industrial property values. Here I take a different approach in examining the impact of enterprise zones, and I attempt to take into account the effects on the entire economy of a geographically targeted program.

Further, I estimate the reservation wage as a function of the area’s unemployment rate and various other household characteristics, using panel data from the United States. This is the first study to estimate this relationship using data from the United States. Jones (1989) estimated the reservation wage as a function of the unemployment rate along with a number of other measures of the costs of unemployment, using a data set
from Great Britain, Sridhar (1996) estimated the reservation wage as a function of the unemployment rate, using only a single cross-section of the 1987 panel of the Panel Study of Income Dynamics.

Thus, based on the estimation, I predict reservation wages for Ohio’s enterprise zones. Therefore the focus of this research is intended to contribute to the empirical job search literature, in addition to the policy literature on enterprise zones.

There is a vast body of policy and empirical literature that evaluates enterprise zones. However few of these studies provide an analytical framework to understand the impact of enterprise zones on their economies. Ge (1995) and Seyfried (1990) develop an analytical model for examining the effect of the enterprise zone for their various direct and indirect impacts on the regional economies. However both concentrate only on the production sector for analyzing the effect of enterprise zones, and focus on cost minimization for firms when they locate in the enterprise zone. In addition, Ge (1995) also assumes that there is no unemployment in the UEZ, which is not realistic.

Thus none of the existing studies consider the efficiency implications of enterprise zones due to the reservation wage argument or construct an analytical framework to do this. The work here addresses this gap in the literature and develops a framework to analyze the adoption of urban development programs such as enterprise zones by high-unemployment areas and examines their efficiency. It also evaluates the impact of the zone on the rest of the economy, applying some of the standard literature on analyzing the effect of tax incentives. It then makes an attempt to apply the framework to Ohio’s enterprise zone program to empirically investigate its impact. It then becomes possible to infer policy implications for Ohio’s enterprise zone program based on the empirical work.

1.4 Overview of Dissertation

In Chapter 2, an introduction to enterprise zones in the United States and a brief summary of state enterprise zone programs is provided as background. I then review the literature on the evaluation of enterprise zone programs in the various states. Chapter 3
develops the theoretical model for examining the impact of enterprise zones on the economies that adopt them. It makes explicit the objectives and assumptions of the model, and then presents the model in parts by outlining the cause of disequilibrium in the labor market of the enterprise zone. The model then elaborates on the efficiency implications of employment creation in the zone through reservation wages and economic rents. In the next section, the model focuses on the general equilibrium response to the tax abatement in the enterprise zone and the rest of the economy. The chapter then summarizes the predictive power of the model.

Chapter 4 describes the focus of the study, Ohio's enterprise zone program. It describes the eligibility criteria for zone designation and the tax incentives (including state and local incentives) available to firms that locate in the state's zones. The next section in Chapter 4 discusses the politics of zone designation. This is followed by a section that discusses various firm relocation types and corresponding welfare changes, in response to the criticism that has been raised against the redistributive nature of such programs.

Chapter 5 explains the research methodology used for the estimation of reservation wages and evaluation of Ohio's enterprise zone program. It explains the representativeness of the PSID sample used in the estimation. It explains the sample selection problem and the procedure in which we can overcome the problem. The switching regression model is explained. Here I illustrate the econometric determination of the reservation wage. The chapter also describes the methodology to test the other hypothesis that emerges from the model, with regard to the relationship between unemployment rate and the existence of tax incentive programs, using data from Ohio's census block groups.

Chapter 6 contains the results from the switching regression consisting of the probit estimation of employment status of individuals, the wage and reservation wage estimations. I report the results of the estimation of the endogenous duration of search that enters the estimation of the final reservation wage function, taking into account sample selection.
Chapter 7 reports the results from the evaluation of Ohio's enterprise zone program based on the estimation results reported in Chapter 6. It summarizes the profile of enterprise zones and the non-enterprise zone areas (census block groups) in the state. The chapter then predicts reservation wages for Ohio's zones and summarizes the results of the survey that was sent to enterprise zone administrators in a sample of (44) distressed zones of the state. The survey was sent to obtain estimates of the costs of infrastructure to adjust the cost estimates consisting of property tax abatements and other incentives. Then the chapter summarizes the results from the estimation of economic rents from jobs created in Ohio's zones, followed by the benefit-cost analysis of the program. I present the benefit-cost analysis of the program in three different scenarios. The chapter then focuses on the results from the estimation of area unemployment rates as a function of the existence of tax incentive programs taking into account its endogeneity. It reports whether tax incentives were responsible for lowering the unemployment rate in Ohio's census areas (block groups) covered by the enterprise zone.

Chapter 8 evaluates the policy implications rising from the econometric estimation and other empirical results. It explains the relevance of the benefit-cost analysis. It focuses the policy implications of the work on selective designation criteria and the targeting of areas. It evaluates the implications for policy formulation based on the empirical results. Then the chapter summarizes the conclusions and points to further directions for research.
CHAPTER 2

LITERATURE REVIEW

2.1 Enterprise Zones in the United States

The enterprise zone program has been one of the most controversial topics in the literature as well as in the policy circles in the United States. The enterprise zone concept, in fact, originated in Great Britain in the late 1970s. Sir Geoffrey Howe, the Chancellor of Exchequer in the British government at the time, argued that excessive regulation and bureaucracy had led to the decline of Great Britain's economy. Howe advocated tax cuts to promote entrepreneurship that would create jobs.

Stuart Butler, a British-trained economist, was responsible for introducing the enterprise zone concept in the United States.³ Thirty-five of the 50 states in the country now have enterprise zone legislation. Several proposals were made for a federal enterprise zone legislation, and since 1979, several bills were brought before the United States Congress -- in 1979, 1980 (Kemp-Garcia Act), 1987, 1989 and 1992. In 1993, the long awaited enterprise zone legislation was passed as Title XIII of the Omnibus Budget Reconciliation Act of 1993, and empowered the designation of 65 urban and 30 rural communities in the country as enterprise communities.

However, even in the absence of a unifying federal program till very recently, several states in the United States boldly launched enterprise zone programs of their own, some with the hope, some without the hope of a federal program.

2.1.1 State Enterprise Zone Programs

Connecticut was the first state to implement an enterprise zone program in 1982. At present, 35 states plus the District of Columbia have enterprise zone programs. Table 2.1

³In 1989, Housing and Urban Development (HUD) Secretary Jack Kemp said that he actually took the enterprise zone idea from a US program Operation Bootstrap which spurred postwar development in Puerto Rico by cutting taxes and fostering industry (Guskind 1990, 47).
summarizes the state enterprise zone programs. The Table indicates the year in which the enterprise zone legislation was passed and the number of zones in the states that have authorized the program. Table 2.1 indicates that the largest number of zones were in the states of Louisiana (1,553 zones) and Arkansas (458 zones). Of the 26 states with enterprise zone programs in 1985, most required a competitive rather than automatic designation process to select eligible contenders (Eisinger 1988, 189). Thus it is possible to believe that states resorted to enterprise zones in an attempt to stimulate development in their distressed areas.

2.2 Summary of Policy and Empirical Literature

There is a vast body of policy and empirical literature that evaluates enterprise zones. Table 2.2 summarizes studies that have evaluated enterprise zones and tax incentives for regional economic development. These studies have evaluated enterprise zones in the various states -- Indiana, Illinois, Ohio, Kentucky, New Jersey and California (see Rubin & Armstrong 1989; Erickson & Friedman 1989; Seyfried 1990; Elling & Sheldon 1991; Redfield & McDonald 1991; Papke 1994; Landers 1996; Sridhar 1996; Dowall 1996; Boarnet & Bogart 1996).

Other studies have focused on case studies of specific enterprise zones (US Department of HUD 1986; US GAO 1988; Rubin & Wilder 1989; Dabney 1991; Staley 1991; Coopers & Lybrand 1993; Theirl 1994). In addition, there have been evaluations of incentives provided to particular firms (Marvel & Shkurti 1993). At a more general level, other literature has focused on policy recommendations that have to follow from the experience with economic development policy in the United States (Levitan & Miller 1992; Courant 1994; Bartik 1994; Bartik 1995; Eisinger 1995; LeRoy 1995). Wiinder (1996) provides a near comprehensive review of the literature on enterprise zones.

\[\text{In the case of all the programs, I have indicated only the year in which the enterprise zone legislation was passed for the first time. In a number of states, the laws were subsequently amended, and in a number of cases, the amendment was made to renew the expiring term of the zones and to redesignate them. However, I have not indicated in my table these subsequent proposals. All the information I have compiled in the table - the year in which the law was enacted, and the number of zones, relate only to the first attempt made by the states. It}\]
<table>
<thead>
<tr>
<th>State</th>
<th>Year of Legislation</th>
<th>Number of Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>1987</td>
<td>12</td>
</tr>
<tr>
<td>Arizona</td>
<td>1989</td>
<td>11</td>
</tr>
<tr>
<td>Arkansas</td>
<td>1983</td>
<td>458</td>
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<tr>
<td>California*</td>
<td>1984</td>
<td>25</td>
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<td>Colorado</td>
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<td>Connecticut</td>
<td>1982</td>
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<tr>
<td>Delaware</td>
<td>1984</td>
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</tr>
<tr>
<td>District of Columbia</td>
<td>1988</td>
<td>3</td>
</tr>
<tr>
<td>Florida</td>
<td>1984</td>
<td>30</td>
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<tr>
<td>Georgia</td>
<td>1982</td>
<td>12</td>
</tr>
<tr>
<td>Hawaii</td>
<td>1986</td>
<td>0</td>
</tr>
<tr>
<td>Illinois</td>
<td>1982</td>
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<tr>
<td>Indiana</td>
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</tr>
<tr>
<td>Kansas</td>
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</tr>
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<td>Kentucky</td>
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</tr>
<tr>
<td>Louisiana</td>
<td>1981</td>
<td>1553</td>
</tr>
<tr>
<td>Maine</td>
<td>1987</td>
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<tr>
<td>Maryland</td>
<td>1982</td>
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<td>Minnesota</td>
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<td>Mississippi</td>
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</tr>
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<td>Missouri</td>
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<td>Nebraska</td>
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<td>Nevada</td>
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</tr>
<tr>
<td>New Jersey</td>
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<td>New York</td>
<td>1987</td>
<td>19</td>
</tr>
<tr>
<td>Ohio</td>
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<td>Oklahoma</td>
<td>1983</td>
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<td>Oregon</td>
<td>1985</td>
<td>30</td>
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<tr>
<td>Pennsylvania</td>
<td>1982</td>
<td>45</td>
</tr>
<tr>
<td>Rhode Island</td>
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<tr>
<td>South Carolina</td>
<td>1987</td>
<td>3</td>
</tr>
<tr>
<td>Tennessee</td>
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<td>Utah</td>
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<td>15</td>
</tr>
<tr>
<td>Vermont</td>
<td>1986</td>
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<tr>
<td>Virginia</td>
<td>1982</td>
<td>18</td>
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<tr>
<td>West Virginia</td>
<td>1986</td>
<td>0</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>1988</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 2.1: Summary of State Enterprise Zone Programs
(Compiled from United States Department of HUD, State Enterprise Zone Update 1992).

*There are two enterprise zone programs in California. One is at Nolan and the other is at Waters. CA (N) refers to the Nolan program, and CA (W) to the Waters program.

should also be noted that the information from the Table is current as of 1992. The State Enterprise Zone Update, which is the source for the table, was not available beyond 1992.
<table>
<thead>
<tr>
<th>Paper</th>
<th>Objective</th>
<th>Data</th>
<th>Method</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Department of HUD 1986</td>
<td>Evaluate ten enterprise zones in nine states</td>
<td>Cumulative data on employment and investment for various years</td>
<td>Local officials' qualitative assessments &amp; analyses of quantitative data on zone employment &amp; investment</td>
<td>EZs important as an economic development strategy &amp; marketing tool</td>
</tr>
<tr>
<td>US General Accounting Office 1988</td>
<td>Evaluate the effect of three zones -- Hagerstown, Salisbury and Cumberland on the communities' employment</td>
<td>Employment data over 1980-87 and survey of employers</td>
<td>Interrupted Time Series (ARIMA)</td>
<td>Employment growth in the 3 zones not attributable to the existence of the EZ</td>
</tr>
<tr>
<td>Erickson &amp; Friedman 1989</td>
<td>Analyze the programmatic structures and effectiveness of state-sponsored EZ programs</td>
<td>Data collected by U.S. Department of HUD for 17 states on characteristics of zones, zone residents, firms, employment &amp; investment for 1985-87</td>
<td>Comparative statistical analysis</td>
<td>Programs in states quite diverse in terms of designation criteria &amp; incentives. More than 1/4th of zones had job growth rates greater than national average, the typical firms investing in the EZs being small. Relocations accounted for about 9% of firms in the EZs</td>
</tr>
<tr>
<td>Rubin &amp; Wilder 1989</td>
<td>Evaluate comparative advantage of the Evansville zone in Indiana</td>
<td>Annual data on state and industry employment for the period 1983-86</td>
<td>Shift-share analysis</td>
<td>A substantial proportion of jobs created in the zone due to comparative advantage of zone</td>
</tr>
<tr>
<td>Rubin &amp; Armstrong 1989</td>
<td>Evaluation of the New Jersey Urban Enterprise Zone (UEZ) Program</td>
<td>Data on jobs, payroll &amp; output in each UEZ for 1986-87 and 1987-88</td>
<td>Survey research and use of input-output model</td>
<td>Impact of UEZ program on New Jersey's economy and fiscal base positive, but does not reflect displacement of economic activity from other parts to NJ. continued</td>
</tr>
</tbody>
</table>

Table 2.2: Summary of Studies on Evaluation of Tax Incentives for Economic Development
<table>
<thead>
<tr>
<th>Paper</th>
<th>Objective</th>
<th>Data</th>
<th>Method</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seyfried 1990</td>
<td>Evaluate the impact of EZ on local economies</td>
<td>1970-87 data on Indiana enterprise zones; data on zones' employment, state employment, wages and the property tax rate</td>
<td>OLS estimation of zone employment growth rate and level as a function of state annual employment growth (measure of business cycle), a 3-year moving average of the property tax rate (measure of EZ), &amp; the ratio of the average county wage to the state wage (measure of wage differential)</td>
<td>Employment is quite inelastic with respect to tax credits, indicating that the enterprise zone's impact on employment is minimal, concuring with the theoretical results</td>
</tr>
<tr>
<td>Staley 1991</td>
<td>Evaluate role of the enterprise zone program in Dayton, Ohio</td>
<td>Annual data on employment &amp; investment for 1982-89</td>
<td>Case study approach; time-trend analysis of the Dayton enterprise zone data and interviewing</td>
<td>Rising prominence of job retention; large corporations constitute a major proportion of total investment; firms typically meet employment and investment pledges within 3 years of signing the agreement</td>
</tr>
<tr>
<td>Eiling and Sheldon 1991</td>
<td>Evaluate the performance of 47 enterprise zones in four states</td>
<td>Survey of 47 zone administrators</td>
<td>Regression of zone performance as a function of tax savings and other administrative factors such as staff time spent on zone activity</td>
<td>Zone performance a result of interventionist factors such as staff &amp; management activism rather than of traditional factors such as tax savings</td>
</tr>
<tr>
<td>Dabney 1991</td>
<td>Measure the attractiveness of enterprise zones to firms in eight states</td>
<td>Data on % change in number of business establishments for 1980-82, 1982-84</td>
<td>ANOVA</td>
<td>Negative for high-tech firms because amenities are poor in enterprise zones</td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>Paper</th>
<th>Objective</th>
<th>Data</th>
<th>Method</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redfield &amp; McDonald 1991</td>
<td>Evaluate the Illinois EZ program</td>
<td>Data based on field and telephone interviews conducted in 1989</td>
<td>Case study and survey research methods</td>
<td>EZ designation demand-driven rather than need-driven. Low awareness of program among firms located in zones, &amp; widely varying impact of tax incentives on investment decisions, and difficulty of performing B-C analysis</td>
</tr>
<tr>
<td>Levitan &amp; Miller 1992</td>
<td>To determine whether enterprise zones are solution for blighted areas</td>
<td>N.A.</td>
<td>Anecdotal evidence</td>
<td>Effective enterprise zone program requires direct expenditures in human capital</td>
</tr>
<tr>
<td>Coopers &amp; Lybrand 1993</td>
<td>Evaluate the Lake County enterprise zone, Ohio</td>
<td>State and local employment data for 1981-92</td>
<td>Benefit-cost analysis</td>
<td>EZ responsible for the comparative advantage jobs generated in the area</td>
</tr>
<tr>
<td>Marvel &amp; Shkurti 1993</td>
<td>Evaluate the development impact of Honda plant in Marysville, Ohio</td>
<td>Employment, income tax and local government cost data over 1977-90</td>
<td>Benefit-cost analysis</td>
<td>In terms of direct as well as indirect costs &amp; benefits, the benefits from Honda at the Marysville plant far exceeded the costs it created</td>
</tr>
<tr>
<td>Courant 1994</td>
<td>Identifying a &quot;good&quot; economic development policy</td>
<td>N.A.</td>
<td>Neoclassical theory</td>
<td>Grounds for subsidy selective such as in the case of preexisting taxes &gt; benefit taxes, when market failures exist, &amp; for stimulating labor demand in the inner city</td>
</tr>
<tr>
<td>Bartik 1994</td>
<td>Summarize implications of research for economic development policy</td>
<td>N.A.</td>
<td>Existing research and neoclassical theory</td>
<td>Targeted subsidies to distressed areas, emphasis on programs that improve firm productivity</td>
</tr>
<tr>
<td>Papke 1994</td>
<td>Analyze the effect of the Indiana enterprise zone program</td>
<td>Annual data on all variables for the period 1981-89</td>
<td>Estimation of unemployment claims, machinery &amp; inventory as a function of EZ designation, using jurisdiction-specific fixed effects and aggregate year effects</td>
<td>Zone designation initially reduces the value of depreciable personal property by about 13%, and reduces unemployment claims by about 19%, and increases the value of inventories by 8% than without the program</td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>Paper</th>
<th>Objective</th>
<th>Data</th>
<th>Method</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Their 1994</td>
<td>Evaluate Western Reserve enterprise zone in Ohio</td>
<td>Enterprise zone contract data over 1988-93</td>
<td>Summary statistics</td>
<td>The impact of the zone positive in terms of jobs and investment committed, and the manufacturing property tax base, and negative for school districts' revenues</td>
</tr>
<tr>
<td>Bartik 1995</td>
<td>Provide guide to economic development policy-making</td>
<td>N.A.</td>
<td>Literature survey</td>
<td>Recommendations for: pursuit of policy across entire labor market, strengthening of export base &amp; import substitution, front-loading of subsidy, consideration of quality of jobs that are created, public-private partnerships in economic development organizations, survey research &amp; pursuit of policy by distressed areas</td>
</tr>
<tr>
<td>Eisinger 1995</td>
<td>Explore the direction of changes currently going on in state economic development</td>
<td>NASDA data on budgets of economic development departments and development strategies of states for 1990-91 and 1992-93</td>
<td>Survey results</td>
<td>Although there is a return to industrial recruitment as well as the pursuit of entrepreneurial &amp; “third-wave” strategies by states, states focusing programs in response to political cues in environment, rather than focus on effectiveness</td>
</tr>
<tr>
<td>Ge 1995</td>
<td>Provide analytical framework for analyzing the effect of urban enterprise zones</td>
<td>N.A.</td>
<td>Theoretical model</td>
<td>Urban enterprise zones increase job opportunities, decrease the rate of unemployment and increases the agricultural wage rate in the region</td>
</tr>
<tr>
<td>LeRoy 1995</td>
<td>Highlight the importance of ending America's civil war over jobs</td>
<td>N.A.</td>
<td>Evidence from the states</td>
<td>Reforms suggested: emphasis on investments in education, proposal for a Multi-State Industrial Retention Commission (MIRC) against relocating firms, &amp; enactment of right-to-know laws and clawbacks</td>
</tr>
<tr>
<td>Dowall 1996</td>
<td>Evaluate the employment impact of California's enterprise zones</td>
<td>Employment data over 1986-1990</td>
<td>Shift-share analysis and survey of businesses</td>
<td>The results indicated that employment growth was lower than predicted in 11 of 13 areas studied. Only 23% of businesses surveyed indicated that they took advantage of the program</td>
</tr>
</tbody>
</table>

continued
<table>
<thead>
<tr>
<th>Paper</th>
<th>Objective</th>
<th>Data</th>
<th>Method</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynch 1996</td>
<td>Examine the effectiveness of state &amp; local tax incentives</td>
<td>N.A.</td>
<td>Review of literature</td>
<td>Increases in public spending rather than decrease in taxes affect economic growth in states, and there should be increased focus on public spending rather than provide tax incentives to relocating firms</td>
</tr>
<tr>
<td>Sridhar 1996</td>
<td>Examine the zero-sum game hypothesis with respect to enterprise zones, using argument from the literature on reservation wages</td>
<td>1990 data on employment generated in Illinois enterprise zones; 1987 data from PSID (for the U.S.) on reservation wage</td>
<td>OLS estimation of reservation wage as a function of the unemployment rate; cost-benefit analysis</td>
<td>Enterprise zones are positive-sum in their effects if they relocate jobs from low- to high-unemployment areas; benefits greater than costs when jobs relocate to high-unemployment areas; benefits lower than costs when jobs relocate from high- to low-unemployment areas</td>
</tr>
<tr>
<td>Landers 1996</td>
<td>Examine whether property tax abatements provided in EZs are capitalized into commercial/industrial property values</td>
<td>Data on value of commercial &amp; industrial property parcels located and those not located in Ohio EZs and tax abatements</td>
<td>Hedonic analysis</td>
<td>Tax abatements provided in Ohio EZs not capitalized into commercial or industrial property value. This result is attributed to the uncertainty on the part of firms because property tax abatements in Ohio’s EZs have to be negotiated and are not automatic upon zone designation or firm location</td>
</tr>
<tr>
<td>Wilder 1996</td>
<td>Summarize the existing literature on enterprise zones</td>
<td>N.A.</td>
<td>Summary of studies along 2 major dimensions of EZ programs: job &amp; investment impacts, &amp; program costs</td>
<td>EZs vary in their effects on investment and employment in declining areas. The variation is explained by features of program design and zone attributes</td>
</tr>
<tr>
<td>Boarnet &amp; Bogart 1996</td>
<td>Present new evidence on the effectiveness of UEZs in New Jersey</td>
<td>Data on municipal employment and property values from 1982-90</td>
<td>Estimation of municipal total, sectoral employment and property values for EZ applicants and qualifiers using jurisdiction-specific effects and aggregate year effects</td>
<td>No evidence that the UEZ program in New Jersey had a positive effect on total municipal or sectoral employment, or on municipal property values</td>
</tr>
</tbody>
</table>

N.A.: Not applicable.
2.2.1 Literature Review

2.2.1.1 Case Studies

Some of the studies that concentrate on specific case studies are designed more carefully than others, and take into account the counter-factual into account, and examine what could have happened in the absence of the specific enterprise zone, firm or incentive. An advantage of such an approach is that it rejects the assumption that incentives are responsible for firm location decisions. Marvel & Shkurti (1993) is an example that analyzes the impact of Honda’s location on Marysville, Ohio, where it located. A comparison of Union county (the county with Honda) with a group of comparison counties indicated that Union grew faster in terms of population, per capita income, total employment and retail sales over the period 1982-87 (after Honda had located). Over the same period, Union trailed in welfare expenditure increases, when compared to other counties. However, the unclear parts of the evaluation are, as the authors themselves agree, its generalizability to other programs or places. Moreover a large part of Honda’s success was due to the success of the Honda Accord, which could not be replicated.

The examination of ten case studies by US Department of HUD (1986)\(^3\) bases its conclusions and policy implications on interviews with local officials and their assessments as to why the firms that located there did so. This summary of case studies, although provides useful information based on survey research, does not rely on rigorous data or methodology to assess the impacts of the enterprise zones it examines. Theirl (1994) deals with the Western Reserve enterprise zone in Ohio, and does not adopt any summary measures to explain variation in the community’s performance, although it does take into account growth in population and manufacturing tax base for similar communities outside the zone and compares these measures to those within the zone.\(^4\)

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\(^3\) The ten zones on which the case studies are based are: Bridgeport, CT; Chicago, IL; Dayton, OH; Louisville, KY; Macon, MO; St. Louis, MO; Michigan City, IN; Tampa, FL; Thief River Falls, MN; York, PA.

\(^4\) It reports population increases in the four enterprise zone communities of more than 15\% over the period 1988-90 when compared to their growth of population over 1970-80, and also when compared to their counterparts outside the zone. Also the study reports more than 10\% (one community more than 125\%) increase in the manufacturing property base (measured in terms of manufacturing acres) of the zone over
The other studies adopting case study approaches do not take into account the counter-factual. Stailey (1991) uses data analyses and local officials' assessments to conclude that in the Dayton enterprise zone, firms typically met their pledges within 3 years of negotiating the contract. The study by Coopers & Lybrand (1993) finds that a substantial portion of the employment growth generated over the period 1980-90 in the Lake county enterprise zone (Ohio) was attributable entirely to local factors. The study makes the assumption that enterprise zone incentives were a substantial part of the local climate, which could be an unrealistic assumption given the fact that the enterprise zone under consideration was established only in 1988.

Rubin and Wilder (1989) placed their study of the Evansville zone in Indiana in the framework of shift-share analysis to factor the external growth stimuli and industrial composition out of the zone evaluation process. Rubin and Wilder considered as the Evansville program costs, foregone tax revenues due to inventory tax credits given to firms in the Evansville zone, which accounted for 94 percent of the program costs for the 1986 tax year. However their analysis of costs of the program is based on the period 1983-86, and it is not clear that inventory tax credits were an important part of the program in the earlier years also. However, given the results in Papke (1994) regarding Indiana's enterprise zone program, it is clear that the inventory tax credit has been an unusual form of incentive in Indiana's enterprise zone program. Thus, as with the Coopers & Lybrand study, we are left to assume that the Evansville zone was a major part of the explanation for the area's comparative advantage with Rubin & Wilder's results too.

2.2.1.2 State-level Evaluations

Rubin & Armstrong (1989) evaluate the New Jersey Urban Enterprise Zone program. They use the input-output model developed by the Bureau of Economic Analysis (BEA) for New Jersey in order to estimate the direct and indirect benefits from the enterprise zone program. In doing this, they use their survey of employers whose primary

1980-90, compared to similar communities outside of the zone, where this growth in property tax base was zero.

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reason for expanding/locating in the Urban Enterprise Zones (UEZs) was the program, as their most plausible assumption. Under this assumption, for every tax dollar given by the state, $0.70 in state and local tax dollars is generated, without the multiplier effects indicated by the input-output model. However, the problem with using a survey of employers who indicate that the incentives in the enterprise zone program was primarily responsible for their location there, is that such employers may have political interests in stating that the incentives are important to them even when they are not (Bartik 1994). If the direct effects themselves become questionable, the indirect effects become irrelevant to take into account.

As a more credible result, Dabney (1991) found that enterprise zones are not attractive for high-tech firms to locate because they lack the amenities (such as recreational facilities and a good public school system) preferred by high-tech firms. This result is more credible because enterprise zones are by definition blighted areas. In fact enterprise zones were originally conceived in the United States as a solution to blighted areas. Levitan & Miller (1992) examine this proposition using anecdotal evidence. They conclude that an effective enterprise zone program requires direct expenditures in human capital, as in New Jersey where firms reported that they could not hire zone residents and make use of the zone credits because the zone residents were not skilled enough to qualify for their jobs. This is endorsed in LeRoy (1995) who suggests as reform improvements in education, among others, for ending America's civil war over jobs. A more general conclusion reached in Lynch (1996) is that increases in public spending rather than decrease in taxes affect economic growth in the states, and policy should focus on spending rather than tax cuts.

It may be then questioned as to why the war on tax incentives should be studied at all, if the emphasis is shifting towards investments in education and other public services, as factors which could influence the location of firms. However, one answer to the continued importance of tax incentives can be found in Eisinger (1995). In this article in which Eisinger explores the direction of changes currently going on in state economic development, he concludes that there is a return to industrial recruitment among the states
which are also pursuing entrepreneurial and third-wave strategies. However, states rather focus their programs in response to political cues in the environment, than on the effectiveness of strategies. So the conclusion reached by Eisinger is that, irrespective of the rationale, states are turning back to traditional industrial recruitment as a way of promoting their development. This result provides a useful backdrop against which the research on traditional tools that is proposed here could be relevant.

In fact, Sridhar (1996) has examined the question of the zero-sum argument that has been raised against traditional economic development policy. It is useful to recapitulate the limitations of Sridhar (1996) in order to examine the questions proposed here.

1. Sridhar (1996) makes the assumption that (enterprise zone) incentives are responsible for firm location decisions. So the question as to whether the economic activity that actually occurred would have occurred in the absence of the enterprise zone is not considered. Given the conclusions of several studies that tax incentives may not affect the firm location decisions because tax costs are a small part of their costs, this limitation may be serious.

Moreover, if we take into account the evidence (for example, see Bartik 1991; 1994) that tax incentives, even if they have some effect on location decisions, it is only when at least two other conditions hold good:

i. When the level of public services is held constant;

ii. When the location decision being considered is at the intrametropolitan level, when all other factors are equal between locations.

We have already considered the public service assumption, and we know that states are still following tax competition (Eisinger 1995), despite the fact that increased public services may be a more powerful factor influencing firms. When we take condition (ii) above, the evidence is that tax incentives affect decisions at the intrametropolitan level, and if it does, it implies that firm relocations could be expected to occur from one part of the metro area to another, which is criticized by many as zero-sum. However, as Bartik (1991) argues, intrametropolitan locations may have efficiency implications if the part of the metro area to which a firm is moving, is a high unemployment area, and the economically distressed area may be justified in using tax incentives for promoting its growth (Bartik
This is because of the fact that the benefits of redistributing jobs to high-unemployment areas are likely to be higher because of lower reservation wages, defined as the lowest price at which an individual is willing to work. This is the case if the social benefits from a job (referred to as economic rent in labor economics) were defined to be equal to wages paid minus the reservation wage. The reservation wage is inversely related to the value placed on having a job. In a high-unemployment area, many individuals who place a high value on getting a job will remain unemployed for a long time and will have low reservation wages. In such cases, the net benefit of a job, the wages paid minus the reservation wage, is high. Conversely, given the wages paid, an individual with a higher reservation wage will derive less benefit from a job. Thus, Bartik argued that in a high-unemployment area, the benefits from a given number of jobs would be higher because of lower reservation wages and greater net benefits per job.

For these reasons, it is valid to consider the location decisions of firms even at the intrametropolitan level. Although this is taken into account in Sridhar (1996), it fails to consider the counter-factual, as may happen in the case of intermetropolitan location decisions, where tax incentives purportedly do not have any effects, even according to Bartik.

2. The second limitation is that there is no analytical framework underlying the evaluation except the framework provided by net benefits.

3. The other limitation is that Sridhar (1996) uses aggregate zone-level data for one year. It would be more useful to use micro-level (firm-level) data for multiple years.

In the research that follows I make an attempt to address these gaps in the literature by developing an analytical framework to evaluate the impact of enterprise zones on the economies that adopt it. I also make an attempt to make the estimation of the reservation wage more robust than other literature that deals with the subject. I further use the estimated reservation wages to compute economic rents at the level of the zone as well as the contract (firm) in Ohio’s enterprise zones for multiple years. The next chapter develops the analytical model that forms the basis for the empirical work and the policy implications that follow.
CHAPTER 3

ANALYTICAL FRAMEWORK

In this chapter, I develop an analytical framework to analyze the impact of the enterprise zone on the economy that adopts it. The objectives of the model to evaluate the enterprise zone are as follows:

1. To describe the consequences of disequilibrium in the labor market of the high-unemployment area before it is designated as EZ, and describe the cause of unemployment in the EZ.

2. To show that the area’s unemployment rate determines the reservation wage along with a host of other factors affecting the benefits and costs of remaining unemployed.

3. To examine whether economic rent accruing from jobs to job searchers in the EZ is higher.

4. To characterize the effect of the tax abatement on capital given in the EZ, on the EZ and the rest of the economy, taking into account full capital mobility.

3.1 Assumptions of Model

The model that follows is based on certain assumptions.

1. There are two areas in the economy: one designated as EZ and the other being the rest of the economy, which I refer to as the non-EZ area (or area Y). The non-EZ area may be considered as all areas that do not have an EZ program or other programs that abate taxes.

EZ firms produce good Z, and non-EZ area firms produce good Y. In reality, this assumption is consistent with the fact that certain areas specialize in the production of primarily certain goods. Rubin and Zorn (1985) show the comparative cost advantage different states in the United States have in different SIC category industries. Thus, based on comparative advantage, we could easily classify areas without loss of generality.
2. Goods Y and Z are produced by two factors of production, capital (K) and labor (L). In taking into account capital and labor, all conventional factors of production – land, labor, capital and organization – are implicitly taken into account in the model: land can be considered a special kind of capital (real capital), and organizational skills, a special case of labor.

$L_Z$ and $L_Y$ refer respectively to labor employed in the EZ and the non-EZ area firms. $K_Z$ and $K_Y$ refer to capital employed in the EZ and non-EZ firms respectively. $P_Z$ and $P_Y$ are the prices of the final goods Z and Y respectively. $P_{KZ}$ and $P_{LY}$ refer to the factor prices of capital and labor respectively in the EZ. Similarly, $P_{KY}$ and $P_{LY}$ refer to factor prices and refer to the price paid by users of capital and the price of labor (wage) in the non-EZ area. Because EZ areas are, in reality, blighted, it is assumed that $f_{1Z}$ (the marginal product of labor in the EZ) < $f_{1Y}$ (the marginal product of labor in the non-EZ area). This is due to differences in the use of capital across the areas. Specifically, $K_Z/L_Z$ < $K_Y/L_Y$, and for this reason, the marginal product of labor in the EZ is lower than in the other areas.

Because $f_{1Z} < f_{1Y}$, the labor market is not in equilibrium when the EZ is designated. The model elaborates on this. The capital market is in equilibrium so that $P_{KZ}=P_{KY}=P_K$. Consumers supply the factors in fixed amounts.

3. It is assumed that production is subject to constant returns to scale (CRTS) technology because CRTS has many interesting properties. The assumption of CRTS means that the average as well as the marginal products of the factors are dependent only on the ratio in which they are combined (Chiang 1984; Krauss and Johnson 1974), which, here is the capital-labor ratio.

In empirical work, studies have found that a majority of the two-digit SIC industries they studied were subject to CRTS. An interesting old example is Moroney (1967), in which, based upon estimates of production functions in 2-digit SIC manufacturing industries in the United States, he concluded that a majority of these industries were subject to CRTS. More recent examples relate to plant-level data. Bailey et al. (1992) used plant level data and found that the plants they examined were
characterized by constant returns to scale. Griliches and Ringstad (1971) argued that essentially constant returns were needed to rationalize the observed large dispersion of establishment sizes within a given industry (Basu and Fernald 1997). Basu and Fernald (1997) concluded that a typical 2-digit industry in the United States appears to have constant or slightly decreasing returns to scale.

Thus when we look at empirical work, it appears that CRTS may not be an unrealistic assumption to make with respect to industries in the United States.

4. Firms in the two areas are unequally factor intensive, or \( K_Y / L_Y > K_Z / L_Z \) (Y relatively capital intense) at any given feasible factor-price ratio. This assumption, along with CRTS, creates a production-possibility frontier that is uniformly concave to the origin.

5. The model allows for unemployment to exist.\(^5\) This is consistent with the way in which enterprise zones are designated on the basis of certain distress criteria that includes (high) unemployment. \( L_{ZU} \) is the number unemployed in the EZ. The total labor force in the EZ area is \( L_Z + L_{ZU} = N_Z \). The model allows for unemployment to exist in the non-EZ area too (let's say, the natural rate of unemployment), but it is less than that in the EZ so that it does not qualify for EZ designation. In the non-EZ area, the total labor force \( N_Y \) is equal to \( L_Y + L_{YU} \). \( L_{YU} \) is the number unemployed in the non-EZ area. The total labor force in the economy is \( N_Z + N_Y = N \).

6. Factors are paid according to the value of their marginal products in equilibrium. Taken along with the assumption that \( f_{LZ} < f_{LY} \), this assumption means that wages in the EZ in the initial equilibrium are lower than in the non-EZ area.

7. The government provides a subsidy on the use of capital as well as labor in the EZ. This is equivalent to a refund of taxes paid on capital and labor to firms in the EZ.

8. The prices of goods are defined such that the value of all goods in the original equilibrium is 1.
3.2 The Model

3.2.1 Disequilibrium in the Labor Market

The disequilibrium in the labor market of the EZ is due to its high unemployment rate, which, by definition, means that a large proportion of its labor force is unemployed.

Butler (1981), one of the pioneers of the EZ concept in the United States, argued that minimum wage legislation is the primary cause of unemployment in the United States and so relaxing this minimum wage constraint in the areas designated as EZs would alleviate their unemployment. However, this still does not explain why unemployment is concentrated in certain areas that get designated as EZs. Clearly then, the literature on EZs does not provide a model of unemployment in the EZs, i.e., does not explain the cause of unemployment in EZs.

This model makes an attempt to provide that explanation. Here I elaborate on the reasons for the unemployment status of the individuals in the EZ and unemployment rate of the area.

3.2.1.1 A Model of the Unemployment Rate

The model of unemployment that is developed here draws from the neoclassical assumption of high reservation wages. This is the explanation that individuals are unemployed if their reservation wages exceed market wages. Such an explanation appears reasonable for individuals in the EZ because of their high reservation wages relative to the market wage prevailing in the EZ.

The high reservation wages in the EZ is realistic because of the benefits of remaining unemployed in the United States (see Feldstein 1978). The income of the unemployed is high because they are most probably recipients of unemployment compensation and probably other non-market income such as welfare payments. These individuals are unlikely to find gainful employment given their skills. This causes them to remain unemployed. The literature on job search indicates that high reservation wages

\footnote{The section on disequilibrium in the labor market elaborates on why unemployment comes to exist in the model. In short, unemployment exists because of high reservation wages of labor in the EZ area when}
relative to market wages cause unemployment, especially when unemployment benefits are generous. Feldstein (1978) shows how a combination of a high marginal tax on earnings and no tax on unemployment compensation makes the private cost of unemployment small and causes an individual to remain unemployed.

To understand this effect, consider a situation in which each job searcher faces a distribution of wage offers with \( w' \) (his reservation wage) < \( E(w) \) (his expected wage) < \( w^* \) (the maximum wage given his skills). This may be graphically shown in Figure 3.1. In figure 3.1, the horizontal axis is the wage rate \( w(s) \) (wage given skills). The vertical axis is a frequency (refers to the number) of job offers available at the various wage rates. In the middle of the curve is shown the highest frequency and it decreases as we move away from the mean/median/mode. The curve that is thus obtained in the figure is the probability density function of the random variable called wage. It is normally distributed with mean at \( E(w) \). Given that the person finds a job, his/her expected wage is the weighted average of the job offers in the \( w(r) \) to \( w(s) \) range. This average wage is denoted by \( E(w) \) in figure 3.1, which shows that the mean is also the median and the mode.

We know that the individual would reject any job offer that offers \( w < w' \). Thus the area under the curve between \( w' \) and \( w^* \) represents the probability of the job searcher finding an acceptable job in any period (see Ehrenberg and Smith 1994). The higher this probability, the lower the expected duration of unemployment. The benefits (such as unemployment compensation) of remaining unemployed essentially decrease the area under this curve by increasing \( w' \) (moves it further to the right) and lengthens the duration of unemployment.

The unemployed in high-unemployment areas place a high value on the importance of having a job when compared to those in low-unemployment areas, as Bartik (1991) argues (see also Theodossiou 1992). They are willing to take up a job that offers income higher than their current income. But they are less mobile due to psychological ties to the area and costs of relocation. Therefore such individuals (who compared to market wages.
have high reservation wages relative to low market wages) tend to be concentrated in the EZ area.

![Figure 3.1: The Distribution of Wage Offers](image)

The market wage is low because profit-maximizing employers are willing to pay a wage only according to the skill of the workers. We know that by assumption 2 of the model that $f_L < f_Y$, i.e., the marginal product of labor in the EZ is less than in the non-EZ area. The literature on enterprise zones points to the blight in these areas, which, according to this model, is due to the low capital-labor ratio in the EZ. The low capital-labor ratio leads to low productivity in the EZ for those employed and potential low productivity for those who are unemployed. So the EZ labor force is eligible only for a lower market wage.

Thus this model offers an explanation as to why individuals with high reservation wages relative to low potential market wages tend to be concentrated in the EZ area. So prior to the designation of the area as an EZ, profit-maximizing employers do not have incentives to hire workers with low skills. It is likely too that these individuals are
recipients of unemployment compensation, and are unlikely to find gainful employment given their skills, although they do place a high value on the importance of having a job.

So formally, the unemployment status (US$_{ij}$) of an individual $i$ living in the $j$th area is determined by the difference between reservation and market wage.

$$US_{ij} = f(w'_{ij} - w_{ij})$$ \[3.1a\]

$w'_{ij}$ is the reservation wage and $w_{ij}$ is the market wage of the $i$th individual living in the $j$th area. The unemployment rate of the $j$th area may be summed over the unemployment status of $i$ individuals living in the $j$th area. It may be written as follows:

$$U_j = \frac{\sum_i US_{ij}}{Population}$$

So, substituting for US$_{ij}$ from [3.1a],

$$U_j = \frac{\sum_i f(w'_{ij} - w_{ij})}{Population}$$ \[3.2a\]

Thus the aggregate unemployment rate in the $j$th area is dependent on the extent to which reservation wages of individuals are higher than market wages in the aggregate. Specifically, [3.1a] and [3.2a] show that the unemployment rate of the EZ is high if the reservation wages of individuals are high relative to market wage in the area. Thus the high unemployment rate in the EZ is due to the low productivity of labor and their relatively higher reservation wages compared to the market wage.

Thus under conditions of high unemployment rate, EZ designation of the area acts as an important place-oriented policy to improve the blighted area in which tax abatements are provided to arrest the decline of the area. Tax abatements provide firms with incentives for investment. In the section on general equilibrium I show how the tax abatement in the EZ induces in-migration of capital into the EZ due to the shifting of resources to the EZ area from the other area. I elaborate on the general equilibrium effects of tax abatement provided to firms in the EZ, first explaining the relationship between the reservation wage and the local unemployment rate and the effect of new employment on economic rents in the EZ.
Next, I explain the relationship between the reservation wage and unemployment rate.

3.2.2 The Reservation Wage

It is useful to recognize in a model that allows for unemployment that the standard environment in which job search is modeled involves the search for a job from a known distribution of job offers. Various models of job search (Jones 1989; Addison & Siebert 1979; Ehrenberg and Smith 1993) show that the unemployed individual's decision to work is determined by the various costs and benefits of unemployment.

The model here follows Jones (1989) closely. As in Jones (1989), let \( \Theta \) be the instantaneous probability of receiving a job offer and \( F(w) \) be the distribution of job offers. From the viewpoint of the individual job seeker, the decision to work is a function of the benefits and costs (b-c) of remaining unemployed. b is the benefit level while remaining unemployed, and c is a measure of the costs of being unemployed. I assume that job seekers try to maximize their utility by maximizing the income they receive from a job. Such utility-maximizing behavior leads to the equation:

\[
rV = b - c + \Theta \int_0^\infty \max \{0, W(x) - V\} dF(x) \quad [3.1c]
\]

In [3.1c], \( r \) is the interest rate, \( V \) is the present discounted value of being unemployed, (b-c) refers to the net benefits of being unemployed. The latter part of the equation represents the capital gains derived from the income from a job, which is the maximum of the net income from a job (which is net of the value of being unemployed, \( V \)) if employment is found or zero. In such a situation, the optimal job search strategy displays the reservation wage property with the critical value being the reservation wage \( w' \) (also see Zuckerman 1984). The reservation wage, or the lowest wage at which the unemployed are willing to supply positive labor (accept a new job), obeys:

\[
rV = rW(w') = w' \quad [3.2c]
\]
[3.2c] shows that the reservation wage \( w' \) equals imputed search income.\(^6\) Substituting for \( rV \) from [3.2c] in [3.1c],

\[
w' = b - c + (\Theta/r) \int_{w'}^{\infty} \max(x - w') dF(x) \quad \text{[3.3c]}\]

Thus the reservation wage, as in [3.3c], equals the net benefits \((b-c)\) while unemployed, and a factor that depends on the expected wage in next employment adjusted for the arrival rate of job offers. Then it is possible to approximate [3.3c] in some linear fashion as in Jones (1989):

\[
w_i' = \alpha_0 + \alpha_1(b_i - c_i) + \alpha_2\mu_i + \alpha_3\Theta_i + \epsilon_i \quad \text{[3.4c]}\]

In [3.4c], \( b_i - c_i \) is the difference between benefits and costs of remaining unemployed for the \( i \)th individual, \( \mu_i \) is the expected wage in next employment, \( \Theta_i \) is the arrival rate of job offers as defined earlier, and \( \epsilon_i \) is a random error term. \( \Theta_i \) is a function of the various individual-specific characteristics as well as regional labor market conditions that determine the arrival rate of job offers. So

\[
\Theta_i = \sum_j \alpha_{3j} x_{ij}
\]

The unemployment rate of the area is an important indicator of the regional labor market conditions that determines the arrival rate of job offers for individual \( i \) and so of his/her reservation wage. So substituting for \( \Theta_i \) in [3.4c],

\[
w_i' = \alpha_0 + \alpha_1(b_i - c_i) + \alpha_2\mu_i + \alpha_3U_{ij} + \epsilon_i \quad \text{[3.5c]}\]

\( U_{ij} \) is the unemployment rate of the \( j \)th area \((j=Z,Y)\) in which the \( i \)th individual lives. [3.5c] is estimable.

Moreover, a hypothesis can also be formulated with regard to the relationship between the reservation wage and the area's unemployment rate. The actual experience

\(^6\) Alternatively, rather than measuring the reservation wage as a single point that I actually measure in the empirical work, the reservation wage can be identified as a locus of points at various hours of work, consistent with neoclassical labor theory. This is because the reservation wage could be declining with the hypothetical hours of work that is offered at the "new job". One could expect that the reservation wage increases with additional hours of work, to compensate for leisure lost. In the literature, there are few instances in which the hours of work as well as the reservation wage are taken into account in job search. Blau (1991) develops a model which predicts that a low-earnings job might be accepted if the hours were
of job searchers in high-unemployment areas shows that they are willing to accept lower reservation wages for some reasons: it is more likely than not that they are risk-averse. Although it is reasonable to expect that unemployed job searchers even in high-unemployment areas frequently begin their search with a high reservation wage, as time passes on, they are likely to lower their reservation wage for reasons of family or financial hardship (see Theodossiou 1992). Thus the reservation wage of unemployed searchers can be considered a gradually declining function of time spent in unemployment, which can be considered long in high-unemployment areas because they are risk-averse, or have family/psychological ties to the area or are not willing to bear the costs of relocation. The testable hypothesis that comes out of this is that unemployment rate of the area has a negative impact on the reservation wage of individuals residing in the area.

3.2.3 Economic Rent

As in standard labor economic theory, we can define economic rent \( b_{ij} \) as the extent to which actual wages are above the reservation wage. That is,

\[
b_{ij} = w_{ij} - w_{ij}', \quad j = z, y
\]

\( w_{ij} \) and \( w_{ij}' \) are respectively the wage and reservation wage of the \( i \)th individual in the \( j \)th area.\(^7\)

If the hypothesized relationship between the reservation wage and the area's unemployment rate were true, the reservation wage \( (w_{ij}') \) would be low in the EZ because of its high unemployment rate. Notice that the cause of unemployment for individuals in the high-unemployment area is high reservation wages, but this is relative to the market.

\(^7\)The important point here is that if hours are flexible and chosen by the individual, they will continue to increase work hours until, at the margin, the reservation wage = market wage. In this case, the economic rent is zero. An alternative assumption is that hours of work are not flexible. Under this assumption, there is an economic rent. Given that the number of hours are fixed per week at 40 and the individual's reservation wage is less than the wage, there is economic rent. Here I rely on the fixed hours hypothesis as a possibility, and so economic rents do accrue to individuals. This corresponds to the assumption of the reservation wage for a full-time job (40 hours a week) in the empirical work, where the reservation wage is measured as the lowest wage one is willing to take home as pay for a full-time job (as in the PSID).
wage. This is not inconsistent with the relatively low reservation wages in the high-
unemployment area when compared to the low-unemployment area (this refers to the
relationship between the reservation wage and unemployment rate of the area).

However, wages (w₂) in the EZ are also low (compared to the non-EZ area) due to
low capital-labor ratio in the EZ (see assumption 6 of model). If a similar hypothesis
were to hold in the non-EZ area, it would have higher reservation wage (w’₂) than the EZ.
However wages in the non-EZ area (w₂) are high by assumption 6. So it is difficult to
conclude whether the EZ or non-EZ area will benefit from higher economic rents. Thus,
it is an open question that can be tested in the empirical work as to whether economic
rents would be higher in high or low unemployment areas. Remembering, however, that
the relationship between the reservation wage and the unemployment rate is hypothesized
to be negative, meaning that reservation wages can be expected to be lower in high-
unemployment areas.

In the section on general equilibrium I show how the tax abatement in the EZ
induces in-migration of capital into the EZ due to the shifting of resources to the EZ area
from outside. I elaborate on the general equilibrium effects of tax abatement provided to
firms in the EZ, and the effect of new employment on economic rents in the EZ.

3.2.4 The General Equilibrium Response to the Tax Abatement

Harberger (1962) considers the effect (and the ultimate incidence) of a sector-
specific corporation income tax, taking into account its general equilibrium effects on the
entire economy. His analysis has become a standard framework for analyzing different
kinds of taxes in the literature. I adopt his analytical framework here to analyze the effect
of the property tax abatement provided to firms in EZs that is equivalent to a tax cut on
the use of capital in the EZ.

In addition to a subsidy to capital, most state enterprise zone programs (including
Ohio) also include a subsidy for labor. So I also include in the model a subsidy to labor.
An equal subsidy for labor and capital is the same as a subsidy for the good produced by
the sector. Therefore I decompose the subsidy to capital and labor into a subsidy for one
input (i.e., the tax abatement which is a subsidy to capital), and a subsidy for the output (produced by the EZ sector). The subsidy for the output results in a reduction in the price of the good produced by the EZ sector, which becomes \((P_Z - C_Z)\), where \(C_Z\) is the subsidy on the output.

The tax abatement, according to Harberger’s analysis, is equivalent to a tax cut which will have the immediate effect of creating a wedge between the price of capital between the EZ and the rest of the economy. Users of capital in the EZ pay a lesser price \((P_K - A_{KZ})\) for the use of capital, where \(A_{KZ}\) is the tax abated on capital invested in the EZ. The tax abatement has the effect of lowering the price of good \(Z\) that EZ firms produce because investors in the EZ can now produce and supply higher output at the same cost as before, due to the savings induced by the abatement. Investors in the non-EZ area firms still continue to pay the price on capital, \(P_K\), which includes the tax (there are no taxes abated in the non-EZ). It is likely at this point that firms in the non-EZ area will increase their supply of good \(Y\) by an amount that is sufficient to lower the price of \(Y\) on par with that of \(Z\). Whether or not the non-EZ area firms are able to do this depends on the demand elasticity for the good \((Z)\) produced by the EZ firms. The percentage change in the demand for \(Z\) as a result of the tax abatement, is formally derived below.

3.2.4.1 The Goods Market: Demand

In a two-good economy, one would expect the demand for goods to have some price elasticity and that \(Z\) and \(Y\) would be substitutes. To see this, let us characterize the demand equation for \(Z\) as follows, following Harberger:

\[
Z = f\left(\frac{P_Z - C_Z}{P_Y}\right) \quad [3.1d]
\]

[3.1d] shows that the demand for \(Z\) is a function of the price of \(Z\) and \(Y\). Totally differentiating the demand for \(Z\),

\[
dZ = \frac{\partial f}{\partial \left(\frac{P_Z - C_Z}{P_Y}\right)} \frac{P_y dP_y - (P_z - C_z) dP_y}{P_y^2} \quad [3.2d]
\]

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In order to express the change in percentage form, we divide [3.2d] by Z:

\[
\frac{dZ}{Z} = \frac{\partial Z}{\partial \frac{P_z - C_z}{P_Y}} \frac{1}{Z} \left[ \frac{dP_z}{P_Y} \frac{dC_z}{P_Y} - \frac{(P_z - C_z)}{P_Y} \right] \quad \text{[3.3d]}
\]

By assumption [8], the price of goods \((P_z - C_z)\) and \(P_Y\), are equal to 1, and [3.3d] can be written as:

\[
\frac{dZ}{Z} = \frac{\partial Z}{\partial \frac{P_z - C_z}{P_Y}} \frac{P_z - C_z}{P_Y} \left[ dP_z - dC_z - dP_Y \right] \quad \text{[3.4d]}
\]

In [3.4d], it may be noted that \(\frac{\partial Z}{\partial \frac{P_z - C_z}{P_Y}} \frac{P_z - C_z}{P_Y}\) is the demand elasticity for \(Z\) in terms of the relative prices \(\frac{P_z - C_z}{P_Y}\). So in simplified form, [3.4d] may be written finally as:

\[
\frac{dZ}{Z} = \varepsilon (dP_z - dC_z - dP_Y) \quad \text{[3.5d]}
\]

where \(\varepsilon = \frac{\partial Z}{\partial \frac{P_z - C_z}{P_Y}} \frac{P_z - C_z}{P_Y}\).

Equation [3.5d] shows that the percentage change in the demand for \(Z\) depends on elasticity of demand for \(Z\) in terms of relative prices. It should be noted that the elasticity appearing in [3.5d] is compensated because the marginal propensity to consume of households and the government are assumed to be equal so that the income effect in consumer demand exactly offsets that in government demand (see Myles 1995). Thus only the substitution effect is present.

If \(|\varepsilon| > 0\), the demand for \(Z\) (produced by the EZ firms) increases in response to a decrease in its price.
3.2.4.2 The Goods Market: Supply

For market clearance the percentage change in demand for Z must equal the percentage change in supply of Z. To determine the percentage change in the supply of Z, we totally differentiate the production function \( Z = f(K_z, L_z) \):

\[
dZ = \frac{\partial f}{\partial K_z} dK_z + \frac{\partial f}{\partial L_z} dL_z \quad \text{------------------}[3.6d]
\]

Expressing [3.6d] in percentage change form, and dividing the LHS and RHS by \( Z \) and \( f \) respectively,

\[
\left. \frac{dZ}{Z} \right|_{\text{Supply}} = \frac{\partial f}{f} \frac{dK_z}{K_z} + \frac{\partial f}{f} \frac{dL_z}{L_z} \quad \text{------------------}[3.7d]
\]

Multiplying and dividing through by \( K_z \) and \( L_z \),

\[
\left. \frac{dZ}{Z} \right|_{\text{Supply}} = \frac{\partial f}{f} \frac{K_z}{K_z} \frac{dK_z}{K_z} + \frac{\partial f}{f} \frac{L_z}{L_z} \frac{dL_z}{L_z} \quad \text{------------------}[3.8d]
\]

[3.8d] can be written as:

\[
\left. \frac{dZ}{Z} \right|_{\text{Supply}} = \theta_{Kz} \frac{dK_z}{K_z} + \theta_{Lz} \frac{dL_z}{L_z} \quad \text{------------------}[3.9d]
\]

In [3.9d], it may be noted that \( \theta_{Kz} \) is the share of capital income in the value-added, \( \theta_{Lz} \) is the share of labor income, in the value added for firms in the EZ.

[3.9d] shows that the percentage change in the supply of output by EZ firms depends on the shares of labor and capital income in the value-added for EZ firms.

3.2.4.3 The Factor Market: Firms' demand for factors

Because of a shift in demand for good Z, increased profits accrue to EZ firms that produce Z. So the non-EZ area capital will have an incentive to flow into the EZ, in order to equalize returns to factors in both the areas. What happens then depends on relative factor intensities, and the firms’ demand for factors in the two areas.
Following Harberger, changes in factor demands can be specified in terms of their direct elasticities of substitution. So I define elasticities of substitution, as in Tresch (1981):

\[ S_z = \frac{d \log \left( \frac{K_z}{L_z} \right)}{d \log \left( \frac{f_{lz}}{f_{lz}} \right)} \] [3.10d]

\[ S_y = \frac{d \log \left( \frac{K_y}{L_y} \right)}{d \log \left( \frac{f_{ly}}{f_{ly}} \right)} \] [3.11d]

\( S_z \) and \( S_y \) are respectively the direct elasticity of substitution between capital and labor, of firms in the EZ and non-EZ areas. With the marginal products in the EZ and non-EZ area firms equal to their respective price ratios, we can write:

\[ d \log \left( \frac{f_{lz}}{f_{lz}} \right) = d \log \left( \frac{P_k - A_{xz}}{P_{lz}} \right) \] [3.12d]

\[ d \log \left( \frac{f_{ly}}{f_{ly}} \right) = d \log \left( \frac{P_k}{P_{ly}} \right) \] [3.13d]

Then, substituting for the ratio of marginal products from [3.12d] in [3.10d], we have:

\[ d \log \left( \frac{K_z}{L_z} \right) = S_z d \log \left( \frac{P_k - A_{xz}}{P_{lz}} \right) \] [3.14d]

Similarly,

\[ d \log \left( \frac{K_y}{L_y} \right) = S_y d \log \left( \frac{P_k}{P_{ly}} \right) \] [3.15d]

Consider the left-hand side of equation [3.14d],

\[ d \log \left( \frac{K_z}{L_z} \right) = \frac{1}{K_z} \frac{d}{L_z} \left( \frac{K_z}{L_z} \right) = \frac{1}{K_z} \left[ \frac{L_z^2 dK_z - K_z dL_z}{L_z^2} \right] \]
\[
\left( \frac{dK_y}{K_y} \right) - \left( \frac{dL_\gamma}{L_\gamma} \right) = \frac{dP_K - dA_{K\gamma}}{P_K - A_{K\gamma}} - \frac{dP_{L\gamma}}{P_{L\gamma}} \tag{3.16d}
\]

Similarly for the price ratios,
\[
d \log \left( \frac{P_K - A_{K\gamma}}{P_{L\gamma}} \right) = \frac{dP_K - dA_{K\gamma}}{P_K - A_{K\gamma}} - \frac{dP_{L\gamma}}{P_{L\gamma}} \tag{3.17d}
\]

Because \( P_K = P_{L\gamma} = 1 \),
\[
d \log \left( \frac{P_K - A_{K\gamma}}{P_{L\gamma}} \right) = \frac{dP_K - dA_{K\gamma}}{1 - A_{K\gamma}} - dP_{L\gamma} \tag{3.17d}
\]
\[
\left( \frac{dK_x}{K_x} \right) - \left( \frac{dL_x}{L_x} \right) = S_L \left( \frac{dP_K - dA_{K\gamma}}{1 - A_{K\gamma}} - dP_{L\gamma} \right) \tag{3.18d}
\]
When we do this similarly for \( Y \), we get:
\[
\left( \frac{dK_y}{K_y} \right) - \left( \frac{dL_y}{L_y} \right) = S_Y (dP_K - dP_{L\gamma}) \tag{3.19d}
\]

Equations [3.18d] and [3.19d] show that the percentage change in the demand for capital over labor depends on the elasticity of substitution between the factors as well as change in their prices. Thus the relative growth of demand for capital and labor will differ. While factor markets continue to equate factor prices with values of marginal products, equilibrium is attained only when factor prices (wages and returns to capital) are equalized across the areas.

It may be noted here that reservation wages \( w'_{x} \) are lower in the EZ area because of its high unemployment rate (recall the hypothesized relationship between the area's unemployment rate and \( w'_{x} \) (the reservation wage)). As capital continues to flow into the EZ, demand for labor increases, as described above. This increases employment \( (L_x) \) in the EZ. However, it has to be noted that first-order effects always dominate. This means that firms that locate eventually in the EZ are more capital-intensive, although they also have increased demand for labor.\(^8\)

\(^8\) We should note that we are comparing firms with high capital-labor ratios to ones with low ratios.
With increasing employment in the EZ, there is a high probability that local residents get the jobs created by the new capital. This is because new jobs in the EZ are assumed to be allocated to unemployed on a random selection process. When the selection process for jobs is random, zone residents (even though they have few skills) have equal chance of being selected from the pool of unemployed, by employers who are now subsidized.

The assumption of a random selection process in the EZ when firms create jobs is supported by empirical evidence. Empirical work reports that on average, about 50% of jobs created in the EZ go to zone residents. In a collection of ten case studies of state-designated enterprise zones, the U.S. Department of HUD (1986) observed that 70% of jobs in the Bridgeport EZ in CT, 70% of jobs created in the Chicago EZ in IL, 46% of those created in the Macon EZ in MO, 19% in Michigan City, IN, 30% in the Tampa zone (FL) and 5% of the York zone (in PA) were held by zone residents. In the Louisville (Kentucky) zone, it was found that 31% of the jobs created were held by persons who were either lower income or zone residents. Erickson and Friedman (1989), based on a survey of local enterprise zone coordinators conducted by the U.S. Department of HUD, found that the mean share of jobs held by zone residents was over 61% with a median of over 68%. More recently, Immergluck’s (1997) data from the Chicago EZ indicated that the barriers between EZ residents and jobs are dependent on some factors. He found that local employment was much higher in Latino parts of the zone and in African American neighborhoods where there were more public sector jobs, very small firms and few manufacturers.

Thus, when a substantial portion of the jobs that are created go to zone residents the unemployment rate of the EZ decreases. With increasing use of capital and increase in the capital-labor ratio, labor productivity and industrial output rise. Some explanations for rising industrial output (apart from the increasing use of capital) could be due to improved managerial and organizational capabilities and enhanced labor efficiency through on-the-job training programs in the EZ area.
Thus at the optimum, the unemployment rate in the EZ is lower than in the initial equilibrium, and that in the non-EZ areas is the same as before. This is because of increasing demand for labor due to rise in the capital-labor ratio and rising productivity of labor in the EZ. We have to note that the non-EZ areas were operating at a natural rate of unemployment initially. Tobin (1972) estimated that a 5-6 percent natural rate of unemployment has been associated with more than 20 percent excess capacity in the capital stock. Thus the EZ acts only as a tool to direct the excess capacity of capital in the full-employment areas to high unemployment areas and serves to reduce their unemployment rate. It should be noted that the model says that capital moves across areas; this does not necessarily imply migration of firms. But the movement of capital causes an improvement in the total economy's overall well being, although a change in the price of capital initiated in one area due to the existence of the EZ, is transmitted to other areas.

3.2.4.4 Market Clearance

For market clearance, the goods and factor markets have to remain in balance. The following has to be true for the goods market to be in equilibrium:

\[ \frac{dZ}{Z} \bigg|_{\text{demand}} = \frac{dZ}{Z} \bigg|_{\text{supply}} \] \[3.20d\]

Because capital and labor are in fixed supply, the amounts of their in-migration into the EZ must be equal to the amount of their out-migration from the non-EZ region so that:

\[ dK_Z = -dK_Y \] \[3.21d\]

\[ dL_Z = -dL_Y \] \[3.22d\]

The above conditions show that what capital and labor the EZ gains must be equal to the amounts of the factors lost by the non-EZ area.
3.2.4.5 Comparative Statics: Change in Capital and Labor in the EZ

In order to obtain the change in the capital invested (dKz) and labor (dLz) in the EZ at the equilibrium as in Harberger’s model, I follow the procedure described in Myles (1995) most closely. After some manipulation, we end up with a system of three simultaneous equations that can be solved simultaneously for dKz, dLz, and dP_k. The simultaneous system that was used to solve for dKz, dLz, and dP_k is shown below in matrix form.

\[
\begin{bmatrix}
\frac{f_{Kz}}{K_z} & \frac{f_{Lz}}{L_z} & -\varepsilon(f_{Kz} - f_{Lz}) \\
\frac{1}{K_z} & \frac{1}{L_z} & -\frac{S_z}{(1 - A_{Kz})} \\
-\frac{1}{K_y} & \frac{1}{L_y} & -S_y
\end{bmatrix}
\begin{bmatrix}
dKz \\
dLz \\
dP_k
\end{bmatrix}
= 
\begin{bmatrix}
-\varepsilon dA_{Kz} f_{Kz} \\
-S_z \frac{S_z}{(1 - A_{Kz})} - S_z dP_{Lz} \\
-S_y dP_{LY}
\end{bmatrix}
\]

The simultaneous system, when solved, gives the solution for dKz, dLz, and dP_k. The exact expressions obtained for dKz and dLz (which are of greater interest because one of the important goals of EZs is to promote employment and investment growth in the designated areas) are quite cumbersome and so I do not report them here. It is reported in Appendix A. It is sufficient to note that the change in capital invested and labor, dKz and dLz, depend on the relative magnitude of certain parameters in equilibrium. At any rate the framework provided above indicates that the effect of the tax abatement on dKz, and dLz is testable.

More generally, the Harberger analysis, when applied to property tax abatements in EZs, indicates that the capital and employment impact of the tax cut on capital in the EZ depends on three sets of parameters:

1. Relative factor intensities of firms in the two areas
2. The elasticity of substitution between capital and labor in firms in the areas
3. The price elasticities of demand for goods Z and Y produced by EZ firms and non-EZ firms respectively.

The analysis also indicates that it is impossible to isolate the incidence of the tax cut given in the EZ just to the EZ alone. Because competitive factor markets equalize returns
to capital everywhere in the economy, if investors in the EZ enjoyed an increase in the return to capital, investors everywhere will experience the same increase as well. Moreover because goods and factor markets are interdependent, the changes could get transmitted to consumers in the form of changes in goods prices.

Thus Harberger's analysis describes how the migration of capital occurs in response to changes in the rate of return to capital across areas. The general equilibrium response to the tax abatement is shown in Figure 3.2 (on the following page). Figure 3.2 shows that the tax abatement (tax cut) on capital leads to in-migration of capital into the EZ. Depending on the elasticity of substitution between capital and labor ($S_z$), the new capital leads to increase in productivity, wages and employment. This affects the unemployment rate. The unemployment rate finally determines the reservation wage. The difference between wages and reservation wages determines economic rent.

More specifically, the testable hypotheses that emerge from the theoretical model are:

1. The relationship between the reservation wage and unemployment rate
2. The determinants of area unemployment rate being the EZ (or the existence of other tax incentive programs), the duration of the EZ program’s existence and labor in-migration into the area. It may be noted that the context for this test is laid out in figure 3.2. A reduction in the price of capital through tax abatements (that occurs only in EZ-designated or tax incentive areas) increases the capital-labor ratio in the EZ and increases labor productivity, raising wages and employment and affects the unemployment rate. Increasing wages encourage labor in-migration into the zone, which affects the unemployment rate by changing the allocation of employment created by zone firms. Thus, zone designation, the duration of the zone’s existence, and population in-migration into the area affect its unemployment rate according to the model.
Figure 3.2: The Impact of the Enterprise Zone (Tax Incentives) with Capital Mobility
Thus, in the empirical examination of the unemployment rate, I include a dummy for tax incentive programs, the duration of the zone’s existence, in addition to other controls as exogenous variables. The other control variables are skill differences (some skills have lower unemployment rates than others), and demographic characteristics (unemployment rates vary across various demographic groups) such as race, age, sex composition and educational attainment of the area.

In the empirical work, I empirically test these hypotheses that emerge from the theoretical model. The question as to whether or not $dA_{xz} > db_{xz}$, i.e., whether the cost of the abatement (EZ program) exceeds the economic rent that accrues to the individuals employed in the EZ at equilibrium forms the basis for the benefit-cost analysis in the empirical work.\(^9\)

3.3 Predictive Power of Model

It is a widely accepted view that a model should be judged by the accuracy with which it can predict what we observe as well as the realism of its assumptions. The predictive power of the model that is presented here depends on the realism of the assumptions.

First, the assumption of disequilibrium in the EZ before EZ designation is consistent with what we observe. EZs are in reality abandoned areas with high unemployment rate (when we take into account the designation criteria in most of the state enterprise zone programs). Hence for persons in the EZ, the job search behavior characterized by low reservation wages seems realistic due to reasons of family or other psychological reasons or costs of relocation.

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\(^9\) It may be noted that labor in-migration, although it affects the unemployment rate of the area, cannot be included as an exogenous variable in the regression because it also affects zone designation (see Chapter 4 for a description of Ohio’s EZ program). This poses the problem of multicollinearity in the estimation. Accordingly, measures of labor in-migration are included only as instruments in the 2SLS procedure as those determining zone designation, rather than as exogenous variables affecting the area’s unemployment rate.

\(^{10}\) The relevance of the benefit-cost analysis is discussed in Chapter 8 which deals with the policy implications of the work.
Further, the general equilibrium response to the tax abatement is to be expected because of the inherent mobility of capital in response to changes in its price until it is equalized across areas. Further, the effects could get transmitted to the goods market in both the areas as well. Thus the analysis indicates that it is impossible to isolate the incidence of the tax abatement to the EZ alone, which mirrors reality. A simple example of this in the model is the movement of capital. The model indicates that the migration of capital (not necessarily of firms) serves to lower the unemployment rate of the EZs, without changing that in the other areas.

Thus, when we begin with realistic assumptions regarding initial conditions in the EZ and study the implications of a tax abatement in the context of a theoretical framework, we obtain a set of hypotheses that seem plausible and testable. Given these facts, the model that is presented here is of sufficient generality that it is applicable to enterprise zone programs in most of the states.
CHAPTER 4
DESCRIPTION OF STUDY AREA

Enterprise zones are geographically targeted areas of development in which firms that locate, invest and create employment are given tax credits and abatements. Ohio was one of the first states to adopt the enterprise zone legislation as soon as the enterprise zone concept was introduced in the United States from Great Britain. In 1981, the EZ legislation was passed under the leadership of Governor Rhodes (see Hill 1994). This bill became effective on March 17, 1982, with the intent of creating employment in central cities with high unemployment rates. In late 1987 the legislation was amended to include “Rural Jobs and Enterprise Zones.” The expanded criteria included high rates of unemployment or population loss between 1970 and 1980. The intent was to include areas in the Appalachian that had persistent employment problems as potential zones for development.

The state of Ohio has embraced the enterprise zone program as a philosophy because it believes that:

1. Tax incentives help offset the high costs of business start-up activities
2. Zone incentives help to make Ohio competitive when compared to other sites
3. Firms can reinvest in plant and equipment and remain competitive in the long-run
4. Additional state-level corporate franchise tax (mostly for labor) benefits could be available for specific projects/firms if certain conditions are met.

The benefit to the community would be obvious:

1. To become more competitive in attracting new industry
2. To target the type of firm it wants

\[\text{11 All the facts regarding Ohio's Enterprise Zone Program here including reasons for adopting the program, criteria for zone designation and tax incentives are from a summary from the state's Department of Development.}\]

\[\text{12 This is so despite the fact that not much evidence exists on the proportion of the actual number of firms that are new versus existing in the zones.}\]
3. Enhance local employment opportunities by attracting new investment.

Tax incentives would provide a basis for a long-term relationship between the community and the business.\textsuperscript{13}

In general, most state enterprise zone programs in the United States specify certain criteria that include unemployment, poverty, income and age of housing for areas to be designated as enterprise zones. For instance, in the state of Illinois, enterprise zones are required to document size and distress criteria for Enterprise Zone designation. The size criteria in Illinois pertain to geographical area of the zone. It specifies that an enterprise zone must be a minimum of one-half square mile and may be up to 10 square miles, excluding lakes and waterways. However in Ohio size criteria refer to population requirements. The distress criteria for zone designation in Illinois are similar to those specified in Ohio. A proposed Enterprise Zone in Illinois must satisfy at least one of four criteria concerning poverty, unemployment, low income or population loss (see Sridhar 1996).\textsuperscript{14}

\textsuperscript{13} There are other tax incentive programs administered by Ohio’s Department of Development in which property owners can receive tax incentives in real property improvements. The most important and similar to the EZ program is the Community Reinvestment Area (CRA) Program. The CRA program is described in Appendix D. The Impacted Cities Program is one in which incentives are applicable only to non-profit organizations and not to businesses for job creation. So when dealing with the question as what happens to employment in areas without tax incentives, CRA is the only other program (other than the EZ) that could be in a non-EZ area and could indirectly encourage employment generation. The CRA program could potentially encourage job creation although the (pre-July 1994) CRA program does not explicitly require job creation commitments from commercial and/or industrial property owners. However, a good example is the Progressive Insurance Corporation which is the world headquarters of the firm, employing about 3,000 and is located in Mayfield, Ohio, and receives abatements to the extent of two-thirds of its property value under the CRA program. These are the types of CRA abatements I wish to include as being an EZ program.

Another program that involves tax incentives but that does not affect job creation is Tax Increment Financing (TIF). TIF is a mechanism to finance public infrastructure by redirecting new real property tax revenues to a targeted debt retirement fund. Generally a portion of the value of new real property improvements occurring on specified parcels are exempted within the formal local TIF authorizing legislation. While a portion of the value of the real property improvements is exempt, the property owner must agree to make a service payment-in-lieu of taxes equal to the amount of real property taxes the improvement would have generated had the property not been exempted. The TIF authorizing legislation must declare that the specified real property improvements have a public purpose, which could include job creation. But according to the Department of Development, formal job creation commitments are rare in TIF contracts.

\textsuperscript{14} The distress criteria specified by the Illinois Department of Commerce and Community Affairs (DCCA) for zone designation are as follows:

1. The poverty criterion is met if the poverty rate for each census tract that contains any part of the Enterprise Zone is at least 20 percent, as of the 1990 federal census.
2. The low income criterion is met if at least 70 percent of the households in the zone have incomes equal to or less than 80 percent of the median household income of the community in which the zone is located.
Enterprise zone programs in most states specify similar criteria for areas to be designated as zones. At least 19 states used either unemployment or a poverty measure as distress standards\textsuperscript{15} and several states used population loss as well (Eisinger 1988). Ohio's enterprise zone program also fits within this broad framework the other states have adopted.

4.1 Description of Ohio's Enterprise Zone Program

In order for an area to be designated as an enterprise zone in Ohio, local communities must identify the EZ's geographic area. The defined area must meet minimum population requirements and have a single continuous boundary. In addition to minimum population requirements, certain other distress criteria, if relevant, may also be fulfilled by an area. I elaborate on these criteria specified by state's Department of Development, below.

Once the zone area is defined, local legislative authorities participating in the creation of a zone must submit a petition to the state Department of Development along with the local legislation, a map of the zone, a written description of the boundary, and if necessary, the required information documenting distress.

In Ohio's enterprise zone program, there are two types of zones that are allowed: Full-authority zones and limited authority zones. Full authority zones are distress-based. They have to satisfy at least one of six distress criteria. The six distress criteria qualifying a distress-based zone are:

1. 125% of the state average unemployment during the most recent 12 months
2. At least 10% population loss between 1970 and 1990\textsuperscript{16}

\textsuperscript{3} The unemployment criterion is met if the zone has an annual average unemployment rate of at least 120 percent of the state's average unemployment rate for the 12-month period ending the prior June 30.

\textsuperscript{4} The population loss criterion is met if the Enterprise Zone suffered a population decrease of 20 percent or more between 1980 and 1990 as determined by the 1990 federal census.

\textsuperscript{15} In Connecticut, for instance, a city must have a census tract with 25% of its population dependent on welfare or earning incomes below the poverty line. Alternatively, a city qualifies if one census tract exhibits an unemployment rate 200% higher than the state average (see Eisinger 1988).

\textsuperscript{16} It may be noted that population loss (or conversely, population gain) is a factor that affects the area's unemployment rate according to the theoretical model. However since this criterion also influences zone designation, it cannot be considered as an exogenous factor that affects the area's unemployment rate. So
3. Prevalence (minimum of 5%) of vacant or demolished commercial or industrial facilities
4. 51% of the population is below 80% of the area’s median income
5. Specific vacant industrial facilities (zone incentives apply only to those facilities)
6. Income weighted tax capacity of the school district is below 70% of the state average.

It is just sufficient for the limited authority zones to demonstrate minimum population requirements to be designated as zones. This requirement is that EZs proposed within counties of a population greater than 300,000 must have a minimum population of 4,000. EZs proposed within counties of a population less than 300,000 must have a minimum population of 1,000.

As of December 1997, there were 44 distress-based zones and about 278 limited authority zones in the state. Because of the types of zones allowed in the state, most of the counties in the state have at least some of their parts designated as enterprise zones.\textsuperscript{17} If the objective criteria that pertain to an area indicate that the area is distressed or meets minimum population requirements, they have to be granted designation according to the law, which does not offer much discretion to the Ohio Department of Development in granting zone designation.\textsuperscript{18} On the other hand, some of the limited authority zones meet the distress requirements, but have not applied for full zone designation. Both full-authority zones and limited authority zones can offer tax incentives to firms that locate there. However intra-state relocation into a limited authority zone has the oversight of the state in that the Department of Development has to issue a special waiver for the

\textsuperscript{17} Ohio's program contrasts sharply with New Jersey's UEZ program that allows limited designation. So far there are only 10 zones in New Jersey. However, in Ohio, all areas that meet at least one of six distress criteria or that meet minimum population requirements can potentially apply, and applicants cannot be rejected zone designation on the basis of arbitrary criteria. According to the Ohio Department of Development, three counties - Columbiana, Geauga and Holmes counties were the only ones in the state that had not applied for zone designation even though they were potentially eligible, based on their distress criteria. Two of these counties have documented use of the Community Reinvestment Area program under which part or all of these counties can offer tax incentives to firms. That leaves one county that does not provide tax incentives to firms.

\textsuperscript{18} See the section on the politics of zone designation for an alternative view, as in Hill (1994).
relocation. In general, limited authority zones cannot consider intrastate relocation projects.

4.1.1 Tax Incentives

Once a community receives Enterprise Zone Certification, state law permits local officials to negotiate a tax incentive agreement with a prospective firm. The Enterprise Zone Agreement is a contract between the community and the firm. This contract includes usually the commitment that is being made by the firm with regard to investment, employment and payroll, the amount of the investment that is to be granted exemption, and is executed prior to the beginning of the project. The community and firm must be in agreement on all the details before continuing with the project or the abatement. Local legislative authorities entering into agreements with firms are required to notify the affected local boards of education. Only after formal approval of the agreement by these affected boards of education can the enterprise zone agreement be executed.

Ohio law states that the amount and term of the tax exemption are to be negotiated between local officials and the firm. However, the law states the limits of the incentives. It permits municipalities to exempt real\(^{19}\) and/or personal property\(^{20}\) assessed values of up to 75% for up to 10 years, or an average of 60% over the term of the agreement on new investments in buildings, machinery/equipment and inventory and improvements to existing land and buildings for a specific project. The state’s Enterprise Zone law permits unincorporated areas to exempt real and/or personal property assessed values of up to 60% for up to 10 years or an average of 50% over the term of the agreement on new investments in buildings, machinery/equipment and inventory and improvements to existing land and buildings for a specific project. However, maximum exemption levels may be exceeded with approval by the affected Board of Education.

\(^{19}\) Real property refers to any real estate, and buildings on it.

\(^{20}\) Personal property refers to all tangible personal property such as machinery, equipment, and inventory.
In addition municipalities that levy a local income tax are required by the law to enter into an income tax sharing agreement with the affected boards of education on all projects that create payroll exceeding $1,000,000. If no agreement can be reached, the income tax is shared equally between them.

Only firms that satisfy certain criteria can qualify for the local tax incentives. They must make a substantial investment in real and personal property. A project to be considered as an expansion must make a minimum investment of 10% of the value of the existing plant and facility. The law also permits renovations if they exceed 50% of the facility’s value. Retail operations are not eligible for tax incentives in enterprise zones.

In addition to local incentives, a firm that is in compliance (i.e., met its investment, employment and payroll commitments) with an existing Enterprise Zone Agreement, may be eligible for state tax incentives under the Enterprise Zone Program.

4.1.1.1 State Labor Incentives

The local tax incentives are called Tier I incentives and the state-level tax incentives are known as Tier II incentives. Tier II of the act becomes operational after the Tier I incentives have been granted (and complied with). Even here the incentives are not automatic. Each firm must apply for this Tax Incentive Qualification Certificate. If it meets the requirements stated below, it is eligible for additional incentives and credits against corporate taxes (US Department of HUD 1986):

1. It has expanded, renovated or established or occupied a primarily non-retail facility in a zone pursuant to an agreement with a municipality or a county;

2. It has hired new employees to fill non-retail positions at the facility at least 25% of whom were a resident of the county in which the project is located for at least 6 months and were at least one of the following: unemployed,\(^\text{21}\) eligible for CETA (Comprehensive Employment Training Act); a recipient of AFDC (Aid to Families

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\(^{21}\) Net benefits from employment are only likely to be higher if the jobs are held by the unemployed because of lower reservation wages. However it should be noted that there is no a priori expectation from the theoretical model with regard to this because of possible low wages and reservation wages for unemployed in the zone.
with Dependent Children; General Relief or unemployment compensation benefits; handicapped; or a resident of a zone for at least a year of a zone located in the county in which the enterprise’s facility is located;\textsuperscript{22}

3. Its average employment in the municipality in which the zone is located annually exceeds its maximum employment in the municipality during the year before it became eligible for zone program benefits;

4. It has not closed a facility or reduced employment elsewhere in the state for the primary purpose of establishing, expanding, renovating or occupying a facility in the zone.

Specifically Tier II incentives may include the following:

1. Compensation paid to employees having one of five characteristics listed above are excluded from the computation of the enterprise’s corporate franchise tax or income tax liability.

2. A tax credit for reimbursement of certain expenses paid to employees with characteristics above for day-care services up to a maximum of $300 per child per year. The credit is available for up to 24 months.

3. A tax credit for expenses of certain training programs for certain employees, up to a maximum of $1,000 per employee.

4.1.2 The Politics of Zone Designation

It is possible to believe that the criteria for zone designation are objective and the Ohio Department of Development does not have much discretion in granting zone designation to eligible areas. However Hill (1994) argues that the politics of zone designation in Ohio is such that virtually most of the municipalities in the state qualify for zone designation under certain criteria. According to him, under the criterion that at least 51% of the population must be below 80% of the area’s median income for the municipal corporation in which the zone is located, virtually a part of every municipality in the state qualifies to be a zone, even though the entire area has fairly high income.

\textsuperscript{22} This is a case in the theoretical model in which the zone’s unemployment rate is reduced.
Moreover, the criterion relating to vacant industrial structures indicates that virtually every industrial area that has some vacant buildings that were previously occupied, can manage to be designated as a zone, even though it is a "greenfield" site.

Hill's (1994) main criticism appears to be that non-distressed areas of the state also get qualified as zones. The thesis of the argument I have presented in the earlier chapter examines if economic rents are likely to be higher when distressed high-unemployment areas are allowed to compete for new firms. Remember that assumption 5 of the model allows for unemployment to exist. A pocket of high unemployment in the middle of an affluent suburb designated as a zone, has a defense to offer tax incentives to persuade firms to locate there if the economic rent from employment is likely to be higher in the distressed pockets. This is likely to be the case if job offers are made by EZ firms to zone residents that are unemployed and reservation wages vary more than wages across areas.²³

A related criticism that Hill has of Ohio’s EZ program is one of firm relocation from a neighboring area to an adjoining area. The following types of relocations may be considered:

4.1.2.1 Relocation Type 1

A firm relocation occurs from a low-unemployment non-zone area to a high-unemployment zone area.

In this situation, the economic rent that accrues to persons depends on how the relocated employment is allocated to individuals in the area. The following scenarios may be considered:

1. The same employees continued to work in the firm (a firm that moves from a suburb to another adjoining suburb) after the relocation.

2. Job offers are made to in-migrants.

²³ Remember that the model in the earlier chapter is applicable only when unemployed residents get the jobs created by the zone firms in high-unemployment areas. Unemployed persons in these high-unemployment areas are presumed to have lower reservation wages when compared to their low-unemployment counterparts.
3. Job offers are made to zone residents who are changing jobs.
4. Job offers are made to zone residents who are unemployed.

In scenario 1, the economic rent that accrues to individuals in the EZ (and the welfare change) is zero because the jobs are held by persons who were employed before. This is because their reservation wages are likely to be equal to the wage on their last job and wages in the present job (otherwise they would not take it up).

If job offers are made to in-migrants (as in scenario 2), the economic rent that accrues to them could be higher if they were previously unemployed because of their lower reservation wages than those in the low-unemployment area. However, if the in-migrants are changing jobs (i.e., were employed in their past location), the economic rent is determined by the difference in their past and current wages in the job offered by the EZ firm (their reservation wage stays constant over the period). Also job offers to immigrants does not reduce the unemployment rate of the EZ area.

In the case that the job offers are made to residents who are changing jobs (scenario 3), there is no change in the unemployment rate of the area. The economic rent in such cases is equal to the difference between past and current wages, because the reservation wage is likely to remain constant over a time period. So in this case only if the EZ firm is a more skilled firm offering higher wages (than pre-existing firms) can economic rents be higher than before.

In case jobs are offered to zone residents that are unemployed (scenario 4), economic rent is likely to be higher than before because of their low reservation wages (if there is greater variation in reservation wages than wages across areas), indicating an increase in societal welfare. This also reduces the unemployment rate of the EZ.

4.1.2.2 Relocation Type 2

Firm relocation occurs from a high unemployment zone area to a low-unemployment zone area.

For this type of relocation, the four scenarios considered above may be applied. The first three scenarios hold in this case. Only in scenarios 2 and 4 (when job offers are
made respectively to immigrants and unemployed zone residents in the low-unemployment area), the economic rents will be smaller than when the relocation occurred from a low- to a high-unemployment area. This is because in a low-unemployment area, the unemployed are hypothesized to have higher reservation wages (than the unemployed in high-unemployment areas) because the labor market is in equilibrium and they also command higher wages (presumably due to higher capital-labor ratio than the EZ). However, it is not clear whether economic rents (the difference between wages and reservation wages) will be lower or higher than before the relocation. All we can say is that there probably is a distortion arising from having an EZ in an area whose labor market is in equilibrium.

4.1.2.3 Relocation Type 3

A firm relocation from a high-unemployment zone area to a low-unemployment non-zone area. This case involves similar effects as relocation type 2 in all the 4 scenarios without the distortion of zone designation in a low-unemployment area.

4.1.2.4 Relocation Type 4

A firm relocates from a low-unemployment zone area to a high-unemployment non-zone area. This relocation has the same advantages as discussed in relocation type 1. In this case unemployed residents of the non-zone area, if they get jobs, are likely to obtain higher net benefits from their employment (scenario 4) than their counterparts in the low-unemployment area because of their presumed lower reservation wages (and if reservation wages vary more across areas than wages).

4.1.2.5 Relocation Type 5

Firm relocates from high-unemployment non-zone area to a low-unemployment zone area. This is a case if the non-zone area has high unemployment and it did not apply for zone designation in order to avoid the bureaucracy of getting designated as a zone. The low-unemployment area gets designated as a zone because it met merely population
requirements (the limited authority zones of the state). In this case the net benefits to the state are likely to be lower in any of the four scenarios.

4.1.2.6 Relocation Type 6

Firm relocation occurs from a low-unemployment zone area to a high-unemployment zone area. Here the scenarios are the same as in relocation type 1 except that this case involves a welfare distortion because of zone designation to a low-unemployment area.

Other relocation types that one may envision are when firm relocations occur from one distressed (high-unemployment) to another distressed (high-unemployment) area. Yet another type of relocation that could occur is from low-unemployment to low-unemployment areas. Here the change in welfare is determined by variation in wages and unemployment rates across the areas, because economic rents depend on reservation wages (presumed to depend on the area’s unemployment rate) and wages. As long as there is greater variation in unemployment rates and reservation wages across areas than in wages, economic rents are likely to be higher when firm relocation occurs from low to high unemployment areas.

4.2 Data on Ohio's Enterprise Zone Program

Unemployment rates do not exist by enterprise zone in Ohio, but the Census reports unemployment rates by census tract and block groups within census tracts. Self-reports of personal employment at the block group level are available for 1990 for Ohio (post-EZ period). However a limitation of using census data is that the employment data are available only every 10 years. Even while dealing with decennial data, there are several difficulties of comparison of census tract and block group data across 1980 and 1990.

First, block groups exist only in census tracts and not all areas of the country were tracted till 1990. The areas that were not tracted in 1980 were called as Enumeration Districts.
There is no way in which one can reasonably compare the Enumeration Districts of 1980 to the census tracts and block groups of 1990. Second, even where the same areas were tracted in 1980 and 1990 they are not comparable because their areas frequently changed. These two issues make comparison of 1980 and 1990 census block group data less meaningful.24

For these reasons, I have confined my attention to self-reported employment data at the census block group level for the state of Ohio for 1990, in order to arrive at unemployment rates by zone. This can be done by overlaying a map of EZs over that of census tracts. This enables one to tell which zones are comprised of which census tracts and block groups. Because unemployment status and other demographic characteristics are commonly available in census block group (STF3A) files, this makes it possible to predict reservation wages for Ohio's zones, based on zone unemployment rates and other characteristics.

Data files from the Ohio Department of Development contain data on zone number, agreement number, agreement date, expiration date, company name, their SIC code, whether firm relocated within/from out of Ohio, their various commitments with respect to jobs created, retained, payroll from employment created and retained, investment, amount of investment granted exemption, terms (period) of the exemption and the actual performance figures for the same variables and property (real and personal property) taxes paid and foregone, corporation taxes paid and the recommendation made...

24 Another source of employment data is the ES-202 program, which is a cooperative program involving the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor and the State Employment Security Agencies (SESAs). This produces a comprehensive tabulation of employment and wage information for workers covered by State unemployment insurance laws. The advantage of this employment data, when compared to the Census, is that it is available annually. Publicly available files under the program include data on monthly employment and quarterly wages, by industry, at the 4-digit Standard Industrial Classification (SIC) level, by county, by ownership sector, for the entire United States. The data are also aggregated to annual levels, to higher industry levels (3-digit, 2-digit, industry division and totals), and to higher geographic levels (national, State, and Metropolitan Statistical Area (MSA)). However, it is not possible to compute zone unemployment rates based on ES202 because it provides data only on employment by industry, by various geographical areas, but not on the unemployed. Moreover, zone areas being designated by local governments according to distress criteria (or other criteria as in Ohio), are not congruent with any administrative jurisdiction for which data are routinely collected. So even with a map of the jurisdictions for which ES202 employment data are available, it is not possible to compute zone unemployment rates.
by the Tax Incentive Review Council which monitors each firm’s contract for compliance. All these performance data which are available are cumulative and include information on all projects from 1982 as of the end 1995. So while these data are themselves obtained from the 1995 annual report compiled by the Ohio Department of Development, it includes information on all active prior projects.

The new payroll generated from new and retained employment can be made net of the predicted reservation wages to arrive at an estimate of economic rent from employment created in zones. The change in economic rent ($db_t$) due to new employment can then be compared to the costs of the enterprise zone program ($dA_{kz}$) in every zone. At a disaggregated level, economic rents can also be calculated for every contract (firm) in the zones.

Economic rents will be compared to the cost of the program. The value of real and personal property taxes foregone to the local governments will be considered a measure of the cost of the enterprise zone program because it represents costs of the program to the local government. Because a number of EZs also provide infrastructure to firms, the cost of such provision is also a cost of the program to local governments. Because no centralized database exists of the cost of infrastructure provision at the state level, data on these costs are obtained through a survey of local zone administrators.25

In the next chapter, I describe how I will test the hypotheses that emerged from the theoretical model for the estimation of reservation wages, and predict them for Ohio’s zones. Finally I show how I do the estimation of area unemployment rates, using data from the 1990 Census for Ohio.

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25 The survey that was sent to EZ administrators is shown in Appendix C.
CHAPTER 5

EMPirical work: Research Methodology

In the empirical work, I test the hypotheses that emerge from the theoretical model to answer the questions that were raised in the research. In this chapter, I describe the methodology for doing the estimation of reservation wages and area unemployment rates. I describe the methodology for testing these hypotheses below.

5.1 Reservation Wage and Unemployment Rate

One of the important hypotheses that emerged from the theoretical model to answer the question of whether or not enterprise zones are efficient if they are adopted by high-unemployment areas, was that the individual’s reservation wage depends on the local unemployment rate, along with other factors. This relationship is to be estimated. Data from the Panel Study of Income Dynamics (PSID), a panel data set on the socio-economic characteristics of 6,000 American families,\textsuperscript{26} is used to estimate reservation wages as a function of the unemployment rate and other variables. In addition to the local unemployment rate, the other independent variables in the estimation of the reservation wage will include factors indicated by equation \([3.5c]\) of the model. These are factors that affect the various costs and benefits of unemployment such as unemployment compensation, the duration of job search, past wages, education, and socio-demographic characteristics such as sex, age, race, marital status, and number of children in the household.

5.1.1 The Panel Study of Income Dynamics

The PSID is a nationally representative sample of cross-sectional units that have been followed over time since 1968. By using PSID, I intend to examine primarily how
reservation wages vary with the local unemployment rate (of county of residence of respondents). Because the county of residence of respondents is not revealed by the PSID due to reasons of confidentiality,\textsuperscript{27} it is important to at least have some knowledge of how many counties in the nation were represented. Table 5.1 shows the frequency distribution of unemployment rates for counties of residence reported in the data set by the (737) respondents included in the reservation wage estimation (see the next chapter). According to the 1980 documentation, 776 counties in covering the 50 states (except Vermont) the nation are represented in the PSID.\textsuperscript{28} Although some counties in the nation can have the same unemployment rates, Table 5.1 nevertheless provides a picture of how many different unemployment rates are represented.

<table>
<thead>
<tr>
<th>Range of Unemployment Rate (%)</th>
<th>Frequency (%)</th>
<th>Cumulative Frequency (Cumulative %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%-2%</td>
<td>5 (0.68)</td>
<td>5 (0.68)</td>
</tr>
<tr>
<td>2%-3%</td>
<td>33 (4.47)</td>
<td>38 (5.15)</td>
</tr>
<tr>
<td>3%-4%</td>
<td>56 (7.59)</td>
<td>94 (12.74)</td>
</tr>
<tr>
<td>4%-5%</td>
<td>106 (14.36)</td>
<td>200 (27.10)</td>
</tr>
<tr>
<td>5%-6%</td>
<td>103 (13.96)</td>
<td>303 (41.06)</td>
</tr>
<tr>
<td>6%-7%</td>
<td>103 (13.96)</td>
<td>406 (55.01)</td>
</tr>
<tr>
<td>7%-8%</td>
<td>125 (16.94)</td>
<td>531 (71.95)</td>
</tr>
<tr>
<td>8%-9%</td>
<td>110 (14.91)</td>
<td>641 (86.86)</td>
</tr>
<tr>
<td>9%-10%</td>
<td>36 (4.88)</td>
<td>677 (91.73)</td>
</tr>
<tr>
<td>10%-11%</td>
<td>23 (3.12)</td>
<td>700 (94.85)</td>
</tr>
<tr>
<td>11%-12%</td>
<td>11 (1.49)</td>
<td>711 (96.34)</td>
</tr>
<tr>
<td>12%-13%</td>
<td>9 (1.22)</td>
<td>720 (97.56)</td>
</tr>
<tr>
<td>13%-14%</td>
<td>3 (0.41)</td>
<td>723 (97.97)</td>
</tr>
<tr>
<td>14%-15%</td>
<td>6 (0.81)</td>
<td>729 (98.78)</td>
</tr>
<tr>
<td>15%-16%</td>
<td>2 (0.27)</td>
<td>731 (99.05)</td>
</tr>
<tr>
<td>16%-17%</td>
<td>2 (0.27)</td>
<td>733 (99.32)</td>
</tr>
<tr>
<td>17%-18%</td>
<td>0 (0)</td>
<td>733 (99.32)</td>
</tr>
<tr>
<td>18%-19%</td>
<td>0 (0)</td>
<td>733 (99.32)</td>
</tr>
<tr>
<td>19%-20%</td>
<td>4 (0.54)</td>
<td>737 (100.0)</td>
</tr>
</tbody>
</table>

Table 5.1: Frequency Distribution of Unemployment Rates for Counties of Residence of Respondents Represented in the PSID and used in the Reservation Wage Estimation

\textsuperscript{26} This data set is published by the Survey Research Center, which is part of the Institute for Social Research at the University of Michigan.

\textsuperscript{27} The state of residence is the lowest level of geography revealed for respondents in the PSID. For counties within states, county codes for all respondents are zero for confidentiality reasons.
Table 5.1 shows that there is sufficient variation in the unemployment rates of the counties of residence (represented in the PSID and) used in the reservation wage estimation when sample selection is taken into account. It must be noted that the sample of (737) counties of residence for which the frequency of unemployment rates are reported in Table 5.1 are those used in the estimation of reservation wages in Table 6.4. Naturally, a large number of counties have unemployment rates between 4 and 9 percent, consistent with a mean of 7.1 percent for the sample.

The PSID consists of two original 1968 samples -- the national cross-section and the Census (the poverty sample). The Census cases were the real focus of the study when it first began as part of the War on Poverty, with the national cross-section included as a basis for comparison. About 40 percent of the families that were interviewed by the Survey Research Center (SRC) had been interviewed previously in 1966 and 1967 by the Bureau of the Census as part of the Survey of Economic Opportunity (SEO). About 2,500 of the 30,000 families interviewed in the SEO were selected by the SRC to be included in its sample. These families had incomes in 1966 equal to or below twice the federal poverty line at that time.29 A cross-section of dwellings in the United States was added to the above sample so that families at all income levels were represented.30 In 1968, interviews were taken with 4,802 families by SRC, 1,872 of these were from the SEO selection frame and 2,930 were from its cross-section samples. The data were re-weighted in 1972 to account for differential response loss since 1968 and sampling problems with newly formed families having panel and non-panel members.

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28 Fourteen foreign countries were also represented.
29 The selection formula used by the SRC was $2,000 + N(1,000)$ where $N$ was the number of individuals in the family (see PSID 1972 documentation, Volume I).
30 In order to determine the weights for the 1968 study, three sets of probabilities had to be calculated:
   i. The probability of obtaining an interview in the SRC cross-section sample; this was nothing but the product of the initial selection rate and response rate.
   ii. The probability of obtaining an interview in the reinterview sample; this was more complicated because of the use of subsamples by the Census as well as by the SRC. It was calculated as: Initial selection rate for Census sample * Census subsampling rate * SRC subsampling rate * Receiving rate * Response rate.
   iii. The probability of obtaining an interview in the combined sample was calculated as the sum of the probabilities calculated in (i) and (ii) above minus the product of their probabilities.
The sample that is chosen here from the data set includes only those families that maintained the same household head from 1980-87. The sample consists of a part of both the original samples—national cross-section and the poverty sample. But because of re-weighting of the data by SRC, and the use of weights appropriate for each family in the estimation, the inclusion of both the samples does not affect the estimation results.

5.1.1.1 Sample Selection Bias

The reservation wage question was asked of respondents in the PSID consecutively for 8 years from 1980-87.\textsuperscript{31} In the data set, values for the reservation wage are reported only for unemployed persons. So even if we wanted to extend the estimation of reservation wages to include the employed, such a hypothesis would not be testable.\textsuperscript{32} Thus, the reservation wage is observed only for those who were unemployed at the time of the survey. Wages are not observed for these individuals. Wages are observed for those employed at the time of the survey. For these people wages > reservation wage. For persons out of the labor force (defined as housewife, permanently retired, disabled, or

\begin{flushright}
\textsuperscript{31} In the PSID, responses to the question, “What is the lowest wage you would be willing to take home as pay?” is measured as the reservation wage of the individual in a new job. There is here an implicit assumption that a “new job” is a full time job. If we were to take into account the observation in footnote 8 (dealing with the theoretical model) that the reservation wage can be expected to vary with hours of work (since presumably leisure becomes important after, say, 40 hours of work a week), the measurement of reservation wage with reference to merely a full-time job could be a limitation.

However this is not a limitation of just the data set that I am working with. I checked the empirical literature on reservation wages and found that the reservation wage question contains no reference to the hours of work in the hypothetical job. They refer to lowest wage before or after deductions or (as in the case of Heywood & White 1990) the lowest wage they would’ve to be paid per hour to get them to return to their primary occupation. The only two papers that examine the issue of hours of work along with reservation wages in job search are Holzer (1986) and Blau (1991). Holzer (1986) reports black-white reservation wage differentials controlling for weeks worked, although he measures the reservation wage as in the other literature. Empirically Blau (1991) finds that workers are clearly not indifferent between alternative combinations of weekly hours and earnings.

So it at least appears that the attempt to frame reservation wage in the context of standard theory may be quite new or at least sparse in the literature. Thus the hours of work in addition to reservation wages could be a potential extension that is possible to the work that is done here.

\textsuperscript{32} In the PSID, values for the reservation wage are reported only for unemployed persons. Values for the reservation wage are 0 in the data set for respondents who are employed, and for those out of the labor force (retired, permanently disabled, housewife, or student).\end{flushright}
student, in the PSID) data on wages or reservation wages are not observed. So, in the data set,
for unemployed: reservation wage > wages – reservation wages observed.
for employed: wages > reservation wage – wages observed.

The above observation regarding the data set indicates that there is the possibility of sample selection bias if estimation of the reservation wage were confined to the unemployed due to data unavailability. In such a case, the reservation wage to be predicted is misleading because the data would be incidentally censored, or nonrandomly selected. In econometrics, the problem called censoring occurs when we account for the fact that we want to observe reservation wages, but an actual figure is observed only if the individual is unemployed. Due to the serious consequences of nonrandom sampling on the properties of the estimators, various alternative estimation techniques have been devised to take account of this problem.

5.1.1.2 The Switching Regression Model

The model here can be summarized as:

\[ w'_i = (\text{reservation wage}) = \beta_1 X_1 + u_i; \text{ } w'_i \text{ is observed only if } w'_i > w_i \]

\[ w_i = (\text{wage}) = \beta_2 X_2 + u_2; \text{ } w_i \text{ is observed only if } w_i > w'_i \]

This model can be estimated as a switching regression model as suggested by Maddala (1983; see also Lee (1978)). The model under consideration is a switching regression model because data on wages and reservation wages are switched (observed) in the data set depending on whether or not the respondent is employed or unemployed. If an individual respondent is employed, then only the wage is observed for him/her; the reservation wage is not. On the other hand, if a respondent is unemployed, there is a valid response only for the reservation wage for these individuals. Wages are not observed for

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33 For persons out of the labor force (housewife, student, retired, permanently disabled), all demographic data are available in the PSID. However wages or reservation wages are not observed for them.
34 Censoring occurs when values of the dependent variable are unobserved for certain values of other variables. Truncation is a case in which values of dependent as well as independent variables are unobserved. However here we might recognize that the problem is one of censoring rather than truncation.
them (although their past wages are observed). Thus values of the wage and the reservation wage are “switched” depending on the employment status of the individual.

The following are the steps involved in the estimation of a switching regression model. In the first stage of the estimation, a probit equation such as

\[ Z_i = \gamma X_i + \epsilon_i \]  

is estimated by forming an indicator

\[ I_i = 1 \text{ if } w_i > w_i' \text{ (employed)} \]
\[ I_i = 0 \text{ if } w_i' > w_i \text{ (unemployed)} \]

by using the entire sample (i.e., that includes the employed as well as the unemployed).

As mentioned earlier, persons out of the labor force (defined as housewives, students, retired, permanently disabled) are not included in this probit estimation.\(^{35}\)

In the probit equation (5.1) above, \( X_i \) refers to a vector of household characteristics that determine employment status. The theoretical model (equation [3.1a]) indicates that the (un)employment status of the individuals depends on the difference between the reservation wage and market wage. So substituting for the determinants of the market wage and the reservation wage, these would be socio-economic characteristics such as education, work experience, race, sex, marital status, number of children, unemployment compensation, reservation wage, and the area’s unemployment rate. The specification of the probit equation would be as follows:

\[ I_i = \alpha_0 + \alpha_1 \text{ education} + \alpha_2 \text{ experience} + \alpha_3 \text{ race} + \alpha_4 \text{ sex} + \alpha_5 \text{ age} + \alpha_6 \text{ marital status} + \alpha_7 \text{ number of children} + \alpha_8 \text{ unemployment rate} + \alpha_9 \text{ measures of unemployment compensation} \]  

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\(^{35}\) These persons cannot be included in the probit estimation because their employment status is neither 0 nor 1 (they are missing), since by definition, they are out of the labor force at least as of the survey date. So these persons are omitted from the probit estimation. If their employment status were made to be equal to 0 (meaning they are not employed) and included in the probit estimation, these persons would be included in the reservation wage estimation because, by definition, the reservation wage estimation is done only for persons for whom the sample selection criterion is 0. In this case, persons out of the labor force would have a 0 value for the reservation wage, which is not correct.

For this reason, in the future chapters in which I use the reservation wage estimates to predict reservation wages for Ohio’s zones and estimate economic rents from employment, I implicitly assume that EZ hires do not affect those out of the labor force.
This estimation gives estimates of $\gamma_i$ (which is a probability of employment (or unemployment) for every individual).\textsuperscript{36}

From the probit stage of the estimation, we compute the Inverse Mills' ratio (the sample selection correction factor), for each observation. More specifically, the sample selection correction factor is calculated as:

$$\hat{\lambda}_w = \frac{\Phi(\gamma_i)}{\Phi(\gamma_i)}$$

if the sample selection criterion (which in my case is employment status) = 1 (working) (p.607, LIMDEP manual). If $z=0$ (unemployed), the sample selection correction factor is calculated as:

$$\hat{\lambda}_r = \frac{\Phi(\gamma_i)}{\Phi(\gamma_i)}$$

$\phi$ and $\Phi$ are respectively, the density and distribution function for a standard normal variable (which here is $\gamma_i$). The predicted probability of employment ($\gamma_i$) is assumed to have a standard normal distribution. $\hat{\lambda}_w$ and $\hat{\lambda}_r$ are the sample selection correction factors computed for the estimation of wages and reservation wages respectively. After the computation of this ratio, we thus estimate the wage and reservation wage as a function of the $X_i$s and $\lambda_i$s for the respective samples.

Thus, in the second stage, we specify two different equations: one for the reservation wage (case in which $w'_i > w_i$) and the other for the wage (that in which $w_i > w'_i$). I thus use a switching regression model to get estimates of $w_i$ and $w'_i$ for the respective observations in the employed and unemployed sub-samples. Then, based on the estimates for the sub-samples, wages and reservation wages are predicted for

\textsuperscript{36} This is computed as: $\gamma_i = \alpha_0 + \alpha_1 \text{education} + \alpha_2 \text{experience} + \alpha_3 \text{race} + \alpha_4 \text{sex} + \alpha_5 \text{age} + \alpha_6 \text{marital status} + \alpha_7 \text{number of children} + \alpha_8 \text{unemployment rate} + \alpha_9 \text{exogenous measures of unemployment compensation}.$
everyone in the sample (employed and unemployed). Then I go back and estimate the
structural probit model and estimate the employment status as a function of the wage and
the reservation wage for the full sample (consisting of the employed and the
unemployed).³⁷

First the wage equation may be specified as:

\[ w_i = \mu_0 + \mu_1 \text{education} + \mu_2 \text{experience} + \mu_3 \text{experience squared} + \mu_4 \text{race} + \mu_5 \text{sex} + \lambda w - \]

following the literature on the hedonic estimation of earnings equations (see Ehrenberg &
Smith 1993). \( \lambda_w \) is the correction factor that takes into account the fact that the wages are
observed only for the employed.

The reservation wage equation can be specified as:

\[ w_i^r = \alpha_0 + \alpha_1 \text{age} + \alpha_2 \text{education} + \alpha_3 \text{experience} + \alpha_4 \text{race} + \alpha_5 \text{sex} + \alpha_6 \text{marital status} + \]
\[ \alpha_7 \text{children} + \alpha_8 \text{unemployment compensation} + \alpha_9 \text{duration of search} + \alpha_{10} \text{duration of search squared} + \alpha_{11} \text{unemployment rate} + \alpha_{12} \text{past wage} + \lambda_r \]

In [5.4], \( \lambda_r \) is the correction factor that takes into account the fact that reservation wages are
observed only for the unemployed.

In [5.4], it may be noted that the time unemployed (duration of search) on the
RHS is endogenous. This is because the reservation wage and the number of weeks for
which an individual looks for work are endogenous. Higher reservation wages can cause
persons to look for employment longer, and the longer the period of search, the higher
could reservation wages be. Because of its endogeneity, the predicted value of the
duration of search is used as an exogenous variable in [5.4].

The actual duration of search in the PSID is measured as the number of weeks for
which a person has been looking for work. The question is asked only of unemployed
respondents, and it is zero in the data set for the employed, housewives, retired,
permanently disabled or student. It is true that some of the employed that want to change
jobs could be looking for employment (and could have a value for the number of weeks

³⁷ In order not to distract the reader from the results of the primary hypotheses, I report the results from this
full sample structural probit estimation in the Appendix.
looking for work other than 0). However, it is not plausible that all the employed have a value for the duration of search other than zero, and it is not a regularity that can be observed with the employed in general. So the duration of search (number of weeks looking for work) is validly zero for the employed. This is to say that the number of weeks looking for work can be estimated by OLS for the full sample, and this will not bias the coefficients.\textsuperscript{38} The predicted value of the duration of search is substituted in the reservation wage equation, as shown in [5.4] above. I acknowledge the biases in the standard errors that result from substitution of predicted values in the primary equation, rather than simultaneously estimating it, as pointed out by Greene (1993).\textsuperscript{39}

The duration of search can be specified as exactly the same variables as the reservation wage.\textsuperscript{40} So in order to ensure identification, dummies for years (1980-87) will be included as exogenous variables in the duration of search equation. These will be included as measures of the macro-economic conditions of the economy that influence the individual's duration of search exogenously.\textsuperscript{41} In addition, three other exogenous measures of unemployment insurance payments by state will be included as exogenous variables that determine the duration of search (these also determine the reservation wage, as in 5.4). These are: the minimum and the maximum weekly unemployment insurance benefit amounts allowable under state laws and the waiting period for the eligibility of these benefits.

\textsuperscript{38} It is to be noted that values of reservation wage are also zero for employed in the data set. However it is to be noted that 0 is not a valid value for the reservation wage even for the employed, because the reservation wage is a hypothetical value for which all persons (employed and unemployed) in the labor force (those willing to work) have a valid response. So for the estimation of reservation wages, it is not valid to assume a valid 0 value for the employed and do the estimation for the full sample. So sample selection bias has to be taken into account in the estimation of the reservation wage. This is not required in the estimation of the duration of search variable for reasons explained in the text.

\textsuperscript{39} In other words, this estimator will be consistent, but not efficient.

\textsuperscript{40} However, for reasons explained later, the reservation wage will not be included as a regressor in the duration of search equation. This is because data on reservation wages are not observed for everyone and in order to do the estimation on the full sample, I will use factors that rather determine the reservation wage as explanatory variables rather than the reservation wage itself, in the duration of search estimation. Thus the duration of search is a reduced form estimation.

\textsuperscript{41} The year dummies are defined as 1 if an observation is in a particular year and 0 otherwise. Eight (0-1) dummies (for years 1980-87) are thus created for each observation.
Thus the econometric determination of the reservation wage is only more
complicated than indicated by the theoretical model (equation 3.5c)\(^{42}\) which shows that the
reservation wage is a function of the benefits and costs of remaining unemployed for the
individual. It may be noted that the benefits of remaining unemployed for individuals in
the United States translate into income such as unemployment compensation.\(^{43}\) These
benefits allowable under state law influence the period for which an individual remains
unemployed which in turn affects their reservation wages. The costs of remaining
unemployed are the financial hardship of remaining unemployed for long periods of time,
in areas of high-unemployment, especially for those that are married and have a family. It
is easy to see that there are costs to job search too.

Figure 5.1 shows the econometric determination of the reservation wage taking
into account the endogenous relationships among the benefits and costs of remaining
unemployed. The figure shows that the reservation wage is determined by and determines
the duration of search. The past wage is exogenous and affects the duration of search as
well as the reservation wage of an individual, along with other exogenous factors that
include education, work experience, race, age, sex, marital status and number of children
in the household. Each individual takes the area’s unemployment rate as given which
affects his/her reservation wage. Thus the wage and the reservation wage together
determine the individual’s unemployment status. The wage is determined by certain
exogenous factors.

Thus, based on the two-step procedure, it is possible to take into account any bias
arising from sample selection. This estimation would indicate by how much a person’s
asking (reservation) wage could be expected to change with every one-percent increase in
the unemployment rate. Now the estimate of \(\beta\) measures the direct effect of the

\(^{42}\) Equation [3.5c] is: \(w_i' = \alpha_0 + \alpha_1(b_i - c_i) + \alpha_2\mu_i + \alpha_3U_j + e_i\), where \(w_i'\) is the reservation wage, \(b_i\) is the
benefit, \(c_i\) is the cost, \(\mu_i\) is the expected wage in next employment (here measured by the past wage) of the
ith individual and \(U_j\) is the unemployment rate of the area \(j\) in which the ith individual resides.

\(^{43}\) However, the actual amount of unemployment compensation received is endogenous because only
unemployed receive this. So a measure of the receipt of these payments permissible under state law would
be an appropriate exogenous variable. So above I have indicated the three measures of the exogenous
unemployment rate and other characteristics on the reservation wage, whereas the \( \lambda \) takes into account the influence of the characteristics on the reservation wage if the person is unemployed. Thus the marginal effect of unemployment rate on the reservation wage has two parts: one due to its influence on the probability of unemployment for an individual, and the other due to its direct influence on the reservation wage itself (see Greene 1993).

![Diagram of Reservation Wage](image)

**Figure 5.1: The Econometric Determination of Reservation Wage**

The reservation wage estimation can be used to predict reservation wages for Ohio’s zones and then to estimate economic rent (or net benefit) from the employment (which is the wage paid minus the reservation wage) generated in Ohio’s enterprise zones.

5.2 Estimation of Unemployment Rate

5.2.1 Need for Test

Here I want to find out what the effect of tax incentive is on an area’s unemployment rate, or in other words, what the area’s unemployment rate would have been without the enterprise zone or other tax incentive programs. That is, do unemployment rates vary across areas that have and those that do not have a tax incentive

variable that are chosen to represent unemployment compensation in the duration of search and reservation wage equations.
program? One of the major weaknesses of the literature on enterprise zones seems to be that they ignore what happens in the absence of the EZ or other tax incentives.

Thus in this part, I estimate the aggregate unemployment rates for Ohio's census block groups as a function of the tax incentive dummy and other variables. I describe the methodology for estimation in the empirical section below.

5.2.2 **Empirical Description of the Estimation**

To recall a few details from the theoretical model, the unemployment rate for the individual's area of residence (which here is the county) is determined by the difference between the reservation wage and the market wage (equation [3.1a] of the model). Equation [3.2a] aggregates it over individuals. What is implied in [3.2a]\(^{44}\) for its implementation is that the unemployment rate of every area reported in the Census (here, for Ohio) is to be estimated as a function of the reservation wage and market wage for all individuals in the area. The data on demographic characteristics (that determine the wage and the reservation wage) in the Census, are based on all individuals in an area. However questions such as unemployment status (on the basis of which I have computed the unemployment rates for areas) are based on only a sample of individuals who are interviewed in every area. However the Census uses weighting procedures for the data that take into account the loss in efficiency that results from sampling a part of the population.\(^{45}\) As a result, the estimates of the Census from the sample are consistent with

\[
U_j = \frac{\sum f(w' \eta - w \eta)}{\text{Population}},
\]

\(^{44}\) Equation 3.2a is:

\(^{45}\) The estimates in the Census data for each person or housing unit were obtained from an iterative ratio estimation procedure resulting in the assignment of a weight to each sample person or housing unit. The procedure used to assign weights was performed in geographically defined "weighting areas" having a minimum sample of 400 persons. Within a weighting area, the procedure was applied to these groups: 17 household-type groups; groups with a sampling rate of 1-in-2; households/nonhouseholders; 180 aggregate age-sex-race-Hispanic origin categories. The weighting was done in four stages as follows:

1. The first step was to assign an initial weight to each sample person record. The weight was approximately equal to the inverse of the probability of selecting a person for the census sample.
the complete count figures for the population and housing unit groups in the state and is representative of the entire state even though based on a sample.

The theoretical model that is developed here points to factors that affect an area's unemployment rate. First, it indicates that the aggregate unemployment rate of an area is dependent on factors that determine the reservation wages and market wages in the aggregate – primarily demographic factors such as the percentage of college graduates, mean age, percent male, African American, in the areas. In addition, data show that the unemployment rate can be different for groups with different demographic characteristics (see Ehrenberg & Smith 1993). So if an area had a disproportionately higher percentage of African Americans or older persons, the area's unemployment rate could be different than an area with a different demographic mix.

However, theoretically, all of the effects of the enterprise zone do not appear in the wage or the reservation wage equation. So in addition to variables that determine the reservation wage and the market wage, we have to take into account these factors. One of these is obviously the EZ itself. The expectation from the theoretical model is that the areas with the EZ (or other tax incentive programs) see a decrease in their unemployment rate through the subsidy to capital by increasing firms' demand for labor as a result of rising productivity due to the rising capital-labor ratio. Thus if the coefficient on the tax incentive dummy were found to be negative and significant then it may be concluded that the EZ or tax incentive programs did decrease the unemployment rate of the area.

We also have to control for the time period for which the EZ in the area has been in existence. The theoretical model indicates that increasing capital-labor ratio in the EZ

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2. In stage II, the stage I adjusted weights were again adjusted by the ratio of the complete Census count to the sum of the stage I weights for sample persons in each stage II group (groups with different sampling rates).
3. In stage III, the stage II weights were adjusted by the ratio of the complete census count to the sum of stage II weights for sample persons in stage III group (householder/nonhouseholder).
4. At stage IV, the stage III weights were adjusted by the ratio of the complete census count to the sum of stage III weights for sample persons in each stage IV group (age/sex/race/hispanic origin). The weighting procedure for housing units was essentially the same as that for persons, except that vacant units were treated differently. The procedure for occupied housing units was done in 4 stages (same as for persons), but that for the vacant units was done in a single stage (with three categories: vacant for rent; vacant for sale; and other vacant).
due to the subsidy to capital increases market wage (higher than individuals’ reservation wage). This enables individuals in the EZ to take up employment. The rising productivity at the aggregate level reduces the unemployment rate of the area by increasing the demand for labor. Thus the expected sign on the duration of the existence of EZ variable is negative, which implies that the area would have a lower unemployment rate the longer the EZ is in existence. This effect does not enter the wage or reservation wage equation, making it necessary to control for it by separately including the variable.

Finally we would like to control for the skill and occupational mixes of the various areas because different skills and occupations have different unemployment rates. So I will include measures of the manufacturing base of the area and also of the distribution of various skills in the area to test for their effect on the unemployment rate of the area. The determination of area unemployment rates is shown in Figure 5.2.

![Diagram](image)

**Figure 5.2: The Determination of Area Unemployment Rate**

Figure 5.2 shows that the area’s unemployment rate is determined by the difference between aggregate reservation and market wages which are determined by some exogenous factors. Enterprise zone designation and the unemployment rate are

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46 For instance, an area with large proportions of computer science graduates may have a lower unemployment rate.
determined simultaneously because high unemployment rate is one of the criteria for zone designation in the case of distress-based zones (chapter 4 contains a description of Ohio’s zones).\textsuperscript{47} In addition, the duration of EZ existence in an area and the area’s industry mix also determine the area’s unemployment rate.

It may be argued that the duration of the existence of the EZ is also endogenous as the EZ dummy itself.\textsuperscript{48} My discussions with the DOD indicate that the timing of zone designation chosen by areas is a nonrandom process. Specifically they seemed to depend on factors such as pro-growth coalitions, political support, bureaucratic, and institutional structures needed to implement the EZ incentives in the communities which are, however, not measurable in this context (i.e., data are not available on these characteristics at the zone level). However we may consider these factors exogenous to the model because they do not appear in the theoretical model. One observation that should be made is that the duration of EZ existence in the current sample is random with respect to the unemployment rate. This is because there are still a large number of census block groups with higher unemployment rates than zones that are not still designated as zones (for instance, see Table 7.2 in Chapter 7 that summarizes a profile of non-EZ census block groups in the state). So because political, institutional and bureaucratic factors are exogenous (because they do not enter the theoretical model) the duration and its squared are exogenous in the estimation too.

The overlaying of the state’s enterprise zones and census block groups enabled me to obtain data on unemployment rate and tax incentive programs in Ohio’s census block groups. This makes it possible to test the question: what would happen to the unemployment rates of areas with and without tax incentives. Or, do tax incentives cause the unemployment rate of an area to be different.

In a pooled regression of the unemployment rate for every census block group in the state with and without tax incentive programs, a dummy for presence of a tax

\textsuperscript{47} I explain the procedure to alleviate this problem shortly.

\textsuperscript{48} The duration for which an area is a zone can vary when the areas either get designated early or expire early. In my sample, the problem of determining what factors determine duration is purely a function of
incentive program for each census block group can be included as a regressor, as in Papke (1994), along with other variables that have to be controlled for. Thus the basic model could be given by:

$$U_i = \text{Dummy for zone designation (or other tax incentive programs)} + \text{Duration of EZ}_i + \text{Industrial composition of EZ}_i + \text{Occupational mix in EZ}_i + \text{Demographic characteristics}_i + \epsilon_i \quad [5.5]$$

[5.5] should be estimated by two-stage least squares because of the endogeneity of zone designation. In [5.5], $U_i$ is the unemployment rate in the $i^{th}$ census block group, calculated on the basis of self-reported unemployment status and labor force information. The dummy for zone designation equals 1 if the census block group has a zone or other tax incentive program, 0 otherwise. The rest of the variables are self-explanatory.

The duration of period for which the EZ has been in existence is measured as the time period since certification of the zone till 1990. For zones that were certified in

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what determines early and late EZ designation (without worrying about when they expired) since in my sample expired zones are excluded. See footnote 50 for an explanation of why this was done.  

49 I looked at the literature to see how not only merely a treatment effect, but also an effect of how long the treatment has been in effect impacts the outcome variable of interest. Here is what I found from a literature search on treatment effects models with regard to how the duration of the treatment has been handled:  
1. Most of the literature looks at the sample selection model with references to Barnow's work (e.g., Leigh 1994 in which he looks at the impact of vehicle inspection laws (which are not random across states) on fatalities) and others are surveys of the literature on sample selection (Shehata 1991 estimates a switching regression model consisting of probit and sample selection models similar to what I have done for the estimation of reservation wage) and treatment problem (Friedlander et al 1997; Winship & Mare 1992; Moffitt 1991). I went to some articles these articles refer to and this is what I found: 
2. Some literature (Ashenfelter 1977) looks at the effect of the treatment by including explicit year dummies for several years previous to the period the treatment actually came into effect. Although this is one way of handling duration, this is a before-and-after effect of the treatment (which in this case was the effect of a post-schooling training program on participants’ earnings). 
3. An econometrica paper (Ham & Lalone 1996) estimates an employment rate hazard model (for participants in an employment training program). In the hazard model estimation, the duration of employment and unemployment spell and their squared are used as independent variables along with other control variables. 
4. Another paper (by Korenman & Neumark 1990) employs the treatment effect dummy (which in their case is marital status of individuals) as well as the duration of the effect (number of years of marriage) and its squared in one of their specifications for examining the effect of marriage on earnings. Thus there appears to be some literature that treats this kind of model as a hazard model for which however a more exhaustive literature survey and a major extension of the research that us proposed here is needed. 
50 It should be noted that zones that are once certified can expire if the project the community was interested in required zone designation for a short period of time or for other reasons such as decrease in its unemployment rate which disqualifies it from distress conditions. The fact that some areas were EZ at the
1990, because I know in which month a zone was certified, the time-period in 1990 is the fraction of the year that it was in being (for example, zones certified in June 1990 were in place for 0.5 years and so on). There were a number of zones that were certified after 1990 and the duration variable for these zones takes the value 0.

In the overlaying of the enterprise zone map and census map for the state, I have found that out of the 11,621 census block groups that the state is comprised of, about 8,000 block groups are zones, leaving the rest to be non-zone areas. About 1,000 census block groups have tax incentive programs called Community Reinvestment Areas (CRAs) in areas other than EZs. In determining which non-EZ areas are truly non-tax incentive areas, it is important to distinguish whether or not in these areas industrial and/or commercial property were given abatements under the CRA program that could have possibly resulted in job creation. Recollect that one of the assumptions (assumption 1) of the theoretical model is that non-EZ areas may be considered as all areas that do not have an EZ program or other programs that abate taxes. This distinction has been made in

beginning of the EZ period in the state (post-1982) but are not at present could greatly complicate the analysis. This is because if, for example, say an area was an EZ from 1982 to 1989, but is so successful, that it is no longer an EZ. If a regression of unemployment rate is done on being a current EZ, it would miss the impact from 1982-89, i.e., if the expired zones were included in the data set and they expired before 90, then the duration variable would show the wrong effect for them. However it should be noted that if the number of decertifications is small there would be no problem. In my sample, of the 322 zones in the state, only 8 were decertified. I have excluded these zones in my sample. Only those EZs that existed as of June 1996 were mapped into the GIS file by the DOD. So because of the exclusion of the expired zones, this does not pose a problem for the estimation.

This happened to be the case because the GIS map I had of Ohio's zones was current as of 1996, whereas the census block group map I had of the state was current as of 1990.

For the non-EZ block groups, the duration variable takes a 0 value. Since even for zone areas, 0 is used to represent if it was not in place in 1990, this is a valid representation of the non-EZ areas too since at that time they were not designated a zone. In other words, if the question is: how long has this place been an EZ? If it is not an EZ now or ever, the answer is obviously 0.

I found out whether or not CRA and EZ areas overlap by talking to the 282 CRAs in the state of Ohio (all certified in the pre-1994 period). I did not take into account CRAs that were certified after 1994 because I was concerned about the overlap of CRA and EZ areas in 1990. I am looking at unemployment rate for census block groups in 1990 and whether this was affected by the presence of a tax incentive program at that time. So all areas that contain CRAs or EZs were considered as having a tax incentive program in place. Thus when my discussions with the communities indicated that in areas that had both the CRA and the EZ, the CRA was outside the enterprise zone, I identified the census tract numbers for these cities from the census STF3A files and included them as areas having tax incentive programs. Thus areas that had non-overlapping CRAs and EZs and those that did not have EZ, but used the CRA for purposes of job creation (provided CRA abatements to industries) were included as having a tax incentive program. Appendix D contains a description of the CRA program.
order to examine the question. So the non-EZ areas in the estimation are considered as those areas in which no tax incentives (including CRA incentives) are provided to commercial/industrial property that resulted in job creation. However it is possible for abated residential property to exist in non-tax incentive areas, according to the way in which the empirical examination is designed here. Although abatements to residential property could result in job creation, I do not account for these incentives here. However the tax abatements granted in a majority of the CRAs of the state are for commercial and industrial uses (based on my discussion with the CRA administrators of the state). So not accounting for residential incentives of the CRA program will not affect the results to a great extent.

In total, out of the 11,621 block groups in the state, 9,099 (78%) have an EZ or CRA (that created employment) and the remaining 2,522 block groups (22%) are non-tax incentive areas. In the next section, I explain the methodology for estimation of the unemployment rate. I explain how we can handle the treatment effects problem caused by the endogeneity of zone designation in a regression of the unemployment rate as a function of zone designation and other exogenous variables.

5.2.2.1 Treatment effects problem

The treatment effects problem refers to a sample selectivity problem. The problem refers to one in which zones are designated because of high unemployment, reversing the causality in a regression of the unemployment rate as a function of zone designation. Put in simple terms, the problem is one of endogeneity of zone designation in a regression of the unemployment rate as a function of zone designation and other variables. This is a potential problem because zones in Ohio are designated if they satisfy at least one of 6 criteria, of which high unemployment rate (125% of state average) is one.

5 It might have been clearer if I had included a separate dummy for a CRA and another for an EZ in the estimation (explained in the next section). However, the reason why I lump the CRA with the EZ dummy is because I know which (block group) areas contain only EZ (because the EIZs are mapped into a GIS file). But I do not know which areas are only CRAs in terms of census block groups (because the map of CRAs has not yet been prepared by the Ohio Dept. of Development). All I know is this: when the EZ and CRA
To recall a brief description of zones in the state, there are two types of zones that are allowed: *Full-authority zones* and *limited authority zones*. *Full authority zones* are distress-based. They have to satisfy at least one of 6 distress criteria. The six distress criteria qualifying a distress-based zone are:

1. 125% of the state average unemployment during the most recent 12 months
2. At least 10% population loss between 1970 and 1990
3. Prevalence (minimum of 5%) of vacant or demolished commercial or industrial facilities
4. 51% of the population is below 80% of the area’s median income
5. Specific vacant industrial facilities (zone incentives apply only to those facilities)
6. Income weighted tax capacity of the school district is below 70% of the state average.

The treatment effects problem can be alleviated by using the above characteristics as instrumental variables in two-stage least squares estimation of the area's unemployment rate as a function of zone designation. In the procedure, the characteristics that determine zone designation are used as instruments for estimating the unemployment rate.

As can be seen, the data available determine what are used as instruments that determine zone designation. Unemployment rates for the county (in which the census block group is located) at time of zone designation (1982) are used as an instrument. In reality, an area's high unemployment rate is one of the distress conditions required for its certification as a distress-based zone (see chapter 4). However, because the area's unemployment rate is the dependent variable in the 2SLS estimation, I use the county's unemployment rate at time of designation as the instrument that affects zone designation. This solves the problem because county is at a different level of aggregation and its unemployment rate undoubtedly influences zone designation, making it desirable as an instrument.

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areas coexist, when they overlap and when they do not. This is based on my discussions with the 282 or so CRA administrators in the state.
The poverty rate is calculated as the number of persons in the block group that had 1989 incomes below the poverty level to the ratio of all persons in the block group. This is used as a measure of the income criterion (51% of the population is below 80% of the area’s median income) required for zone designation. The percentage of vacant housing units is calculated as the ratio of vacant housing units in the area to all housing units (occupied and vacant). This is used as a measure of the prevalence of vacant demolished commercial or industrial facilities in the area, because only data on residential structures are reported in the census at the block group level.\textsuperscript{55}

Finally, I use two measures of net migration into the area\textsuperscript{56} -- one at the census tract level and the other at the county level -- as instruments that determine zone designation. At the census tract level, I include a dummy for population loss over the period 1980-90.\textsuperscript{57} It may be expected that areas with population loss will also be the ones that experience little in-migration. At the county level, I use the net change in population over 1980-90.\textsuperscript{58} Because these are both measures of population change that affect the possibility of zone designation, I include them as instruments.

Thus [5.5] is estimated by two-stage least squares by including as instruments all these factors that affect zone designation.

\textsuperscript{55} It should be noted that all these variables are converted to a percentage by multiplying the calculated rate by 100.

\textsuperscript{56} A gross measure of in-migration into an area would be to use the percentage in-migration of households over 1985-90 into the area, since the period acts as a good expectation for in-migration to have occurred after the EZ program came into being in the state in 1982. The variable, if it were to be used, is measured in the Census STF3A files (census data at the block group level) as the number of households that moved into their current housing unit over the period 1985-90 to all households living in the area in 1990. However what are used as measures of in-migration into the area are net measures, as may be clear.

\textsuperscript{57} Since the areas of census tracts changed over 1980-90 (making direct computation of net change in population at the tract level impossible), I used an approximate thumb rule to arrive at this dummy. If a census tract in 1980 was further sub-divided in 1990 (into a larger number of block groups, this is usually done if a tract grew over the period) or if its population increased over 1980-90, the population loss dummy for the census tract was determined as being 0. Otherwise it was determined as being 1 meaning that population loss occurred either because the tract lost population over 1980-90 or the tract sub-divisions (block groups) decreased, indicating population loss.

\textsuperscript{58} In order to arrive at net population change for the county, I subtracted the county population for 1980 from that for 1990. So if this variable is positive, the county gained population over 1980-90, otherwise it lost.
Thus, in this part, the effect of the enterprise zone (apart from the benefits defined by the relationship between reservation wages and unemployment rate) on the area’s unemployment rate is examined, after taking into account the endogeneity of zone designation. This moves us toward a more general description of the effects that can be expected from urban development programs like enterprise zones that have also, acted as innovative laboratories for experimenting with local involvement and the implementation of state enterprise zone programs.
CHAPTER 6

RESULTS FROM THE RESERVATION WAGE ESTIMATION

In this chapter I report the results from the reservation wage estimation. Figure 5.1 in the previous chapter showed the econometric determination of the reservation wage. It is in fact efficient to estimate the endogenous duration of search variable shown in Figure 5.1 simultaneously with the reservation wage. However the econometric software\(^{59}\) that permits the estimation of switching regressions does not permit this. So the duration of search variable is estimated in its reduced form and its predicted value is substituted in the reservation wage equation. I acknowledge the biases in the standard errors that result from substitution of predicted values in the primary equation, rather than simultaneously estimating it, as pointed out by Greene (1993).\(^{60}\)

The model of sample selection (the switching regression) is estimated in three stages. In the first stage, a probit equation is estimated of every individual's employment status as a function of various characteristics that determine employment status. Then a wage equation is estimated for those that are employed (because wages are observed in the data set only for the employed), as a function of exogenous characteristics and the sample selection correction factor that is computed at the probit stage. The reservation wage equation is estimated for those that are unemployed (reservation wages are observed only for the unemployed), as a function of various exogenous characteristics, the predicted value of the duration of search and the correction factor. Finally the structural probit model (of individuals' employment status) is estimated for the entire

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\(^{59}\) The software that is being used for the estimations and switching regressions is LIMDEP.

\(^{60}\) As pointed out earlier, the estimator obtained by substituting the predicted values in the equation is consistent but not efficient.
sample (of employed and unemployed). I have reported the results from this structural probit estimation in the Appendix B in Table B.1.

6.1 Variable Definitions

DRESWG = Deflated reservation wage for household head in dollars and cents per hour (base year: 1982-84 = 100)
HAGE = Age of household head
GCH = Grades completed by household head
HYRC = Highest year of college completed by head
WCOLDEG = Whether or not head has college degree (1 = Has degree; 0 = Does not)
WADVDEG = Whether or not head has advanced degree (Master’s; Ph.D.) (1 = Has degree; 0 = Does not)
WEXP = Number of years of head’s work experience (includes part-time and full-time work experience)
WEXP SQ = Work experience squared
BLACK = Whether/not head is black (1 = Yes; 0 = No)
HHISP = Whether/not head is Hispanic (1 = Yes; 0 = No)
MALE = Whether head male/female (Male = 1; Female = 0)
WKSILL = Number of weeks in previous year for which illness prevented head from going to work
DMINWBA = Deflated minimum weekly benefit of unemployment insurance payable according to state laws (taken from the Unemployment Benefits Handbook)
DMAXWBA = Deflated maximum weekly benefit of unemployment insurance payable according to state laws (taken from the Unemployment Benefits Handbook)
WAITWK = Number of weeks for which an unemployed person has to wait before becoming eligible for benefits of unemployment insurance, according to state laws (taken from the Unemployment Benefits Handbook)
UNRT = Unemployment rate for county of residence of head
DPWG = Deflated wage for unemployed head’s past job (if it ended previous year) in dollars and cents per hour when s/he left the job (1982-84 = 100)
MARSTAT = Head’s marital status (1 = married; 0 = single, separated, divorced or widowed)

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61 The final probit estimation I refer to here is a structural equation, meaning that I estimate individuals’ employment status as a function directly of their wage and reservation wage (recall that wages and reservation wages are predicted for the full sample based on the subsample estimations). I expect the wage and reservation wage to have opposite and significant signs.

The probit estimation that is reported in this chapter (in Table 6.2) is a reduced form equation because I have substituted for the wage and reservation wage variables that determine the wage and the reservation wage.

62 If the job ended before previous year, the value for the past wage is coded as 0.
EMPSTAT=head's employment status (1=employed; 0=unemployed; Missing=Not in labor force – housewives, permanently disabled, retired, or student)
NKID=Number of children living in household
NWKRK=Number of weeks for which head has been looking for work
PNWKWRK=Predicted value of NWKRK
DWAGE=Deflated (1982-84=100) hourly wage in dollars and cents per hour
ρ=Calculated as 1- ½ * Durbin-Watson statistic by LIMDEP.

\[ \lambda_i = - \frac{\phi(y_i)}{\Phi(y_i)} \]

where \( \phi \) and \( \Phi \) are respectively, the density and distribution function for a standard normal variable, where \( i \) = wage, reservation wage (i.e., the correction factor is calculated and included in the estimations by LIMDEP for the wage and the reservation wage equations).

6.2 Estimation of Duration of Unemployment

The PSID data for which weighted means are reported in Table 6.1 show that a majority of the household heads that were followed over 1980-87 in the PSID were white (90%) males (84%) who were married (69%). It can also be seen that a majority of them had about 13 grades of school completed on average. The average work experience (including both part-time and full-time experience) was around 18 years.

The mean reservation wage for the unemployed was around the minimum wage (around $4.64 in constant 1982-84 dollars). On average, the unemployed had been looking for work for about 30 weeks.

The OLS estimation of the duration of search (number of weeks for which looking for work) (in Table 6.1) is performed on the full sample of 23,419 observations. Estimation is done on the full sample of employed and the unemployed because the employed have their duration of search (number of weeks for which looking for work) as validly zero. The duration of search is estimated in reduced form.\(^{63}\)

\(^{63}\)This means that the reservation wage is not included in the estimation of the duration of search even though the reservation wage affects it. This is because the reservation wage in the data set is zero for all employed. But the estimation of the duration of search is to be performed on the full sample consisting of employed and unemployed. So I have included in the estimation of duration of search factors that rather influence the reservation wage, namely the area's unemployment rate, past wage, and exogenous measures of receipt of unemployment benefits according to state law, and other demographic characteristics that
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-2.5008 (0.3772)***</td>
<td></td>
</tr>
<tr>
<td>Grades completed</td>
<td>-0.0650 (0.0148)***</td>
<td>12.89 (2.72)</td>
</tr>
<tr>
<td>Work experience</td>
<td>-0.1177 (0.0073)***</td>
<td>18.66 (11.91)</td>
</tr>
<tr>
<td>Whether African American</td>
<td>1.2991 (0.1239)***</td>
<td>0.10 (0.30)</td>
</tr>
<tr>
<td>Whether male (1)/female (0)</td>
<td>0.4304 (0.1317)***</td>
<td>0.84 (0.37)</td>
</tr>
<tr>
<td>Marital status (1=Married; 0=Other)</td>
<td>-0.4020 (0.1117)***</td>
<td>0.69 (0.46)</td>
</tr>
<tr>
<td>Number of children in household</td>
<td>0.0969 (0.0352)***</td>
<td>0.97 (1.17)</td>
</tr>
<tr>
<td>Past wage*</td>
<td>0.0036 (0.0047)</td>
<td>$3.79 (5.67)</td>
</tr>
<tr>
<td>Unemployment rate for county of residence</td>
<td>0.0191 (0.0121)</td>
<td>7.11 (2.99)</td>
</tr>
<tr>
<td>Age</td>
<td>0.0924 (0.0071)***</td>
<td>42.08 (12.00)</td>
</tr>
<tr>
<td>Waiting period (in weeks) for unemployment benefit eligibility under state law</td>
<td>0.2675 (0.0936)***</td>
<td>0.83 (0.38)</td>
</tr>
<tr>
<td>Minimum weekly unemployment benefit allowable under state law</td>
<td>-0.0016 (0.0032)</td>
<td>$27.21 (10.91)</td>
</tr>
<tr>
<td>Maximum weekly unemployment benefit allowable under state law</td>
<td>0.0064 (0.0009)***</td>
<td>$167.13 (37.25)</td>
</tr>
<tr>
<td>Dummy (1) if year=1984 (0) otherwise</td>
<td>0.8124 (0.1088)***</td>
<td>0.13 (0.34)</td>
</tr>
<tr>
<td>Dummy (1) if year=1985 (0) otherwise</td>
<td>1.2665 (0.1147)***</td>
<td>0.12 (0.32)</td>
</tr>
<tr>
<td>Dummy (1) if year=1986 (0) otherwise</td>
<td>1.2501 (0.1116)***</td>
<td>0.13 (0.33)</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td>29.33 (31.26)</td>
<td>29.33 (31.26)</td>
</tr>
<tr>
<td>R²</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>23,419</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.1: OLS Estimation of Duration of Unemployment
Dependent Variable: Number of Weeks Looking for Work

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affect the duration of search as well the reservation wage. These are variables on which data are available in PSID for everyone in the full sample.
***Significant at the 1 percent level; the high level of statistical significance for the variables, is partly a reflection of the large sample.
**Significant at the 5 percent level
* Significant at the 10 percent level

a. Because the past wage is observed in the data set only for the unemployed (that too only from 1984-87), I used the current wage for the employed persons as a measure of the past wage.

b. This mean is for the unemployed persons only. (The sample contains employed, unemployed and persons not in labor force, i.e., housewives, permanently disabled, retired or student).

c. The entire sample consists of 35,639 observations (4,530 family heads followed over 8 years). Out of these, 25,255 were employed, 1,964 were unemployed, and 9,020 were out of the labor force. Thus are lost 9,020 household heads that were not in the labor force (were either students, retired, permanently disabled, or "housewives"). In addition because the estimation is weighted, I had to delete all observations with family weight equal to zero. Lastly, the estimation also does not take into account observations for each at least one of the independent variables included in the estimation is missing. A major factor is the past wage, which is missing for the unemployed for the first four years (1980-83). This leaves me with 23,419 observations used in the estimation.

The results in Table 6.1 show that the results conform to expectations. Higher maximum weekly benefits of unemployment insurance allowable under state law increase the duration of unemployment by less than a day. This is similar to the results Feldstein and Poterba (1984) and Heywood and White (1990) have found.

Minimum weekly benefits allowable under state laws do not have a significant impact on the duration of search. The waiting period for receipt of unemployment benefits has a positive and statistically significant (but the wrong) sign in the estimation which means that the longer the waiting period is for receipt of unemployment benefits according to state law, the longer is the duration of job search. However this is not a test of any major hypothesis and so the wrong sign is not of much consequence.

Past wages have the expected impact on the individual's duration of job search indicating that higher past wages increase the time for which one looks for work. However the effect is not significant. Those with higher grades of school completed and
higher work experience spend less time (about a day) less than their counterparts looking for work. African Americans spend longer time looking for work to the extent of more than a week when compared to others. Those that are married spend (about a day) less time looking for work. Men and those with children spend longer time looking for work, to the extent of an extra 4 days and about a day respectively. The unemployment rate for the county of residence for respondents has the expected effect (but is not significant) indicating that individuals in higher unemployment areas look for longer time to find a job, to the extent of less than a day when compared to those living in low-unemployment areas. Finally, the year dummies for 1984, 1985 and 1986 are positive indicating that these years were those in which longer times were spent looking for work. Particularly the duration of search was higher to the extent of more than a week for those looking for work in 1985 and 1986 than in 1984.64

6.3 Probit Estimation of Employment Status

The probit equation estimates the probability of employment for the individuals in the full sample.65 It should be noted that the probit equation of individuals' employment status is estimated in reduced form.66 This implies that the reservation wage is not included in the probit estimation (recall that the theoretical model indicates that the individual's reservation wage affects his/her employment status). Instead I have substituted in the estimation of employment status, factors that affect the reservation wage. This includes all demographic characteristics (marital status, age, sex, race,

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64 When I made an attempt to include dummies for all years from 1980-87 in the estimation, I always ended with only these three variables that had variation for the estimation to be run. The dummies for the other years always ended up being 1 for all observations or 0 for all in the estimation. However this should be obvious given footnote c to Table 6.1.

65 Those that were not in the labor force – housewives, students, permanently disabled, and retired -- are not included in the probit estimation. So a potential extension to the switching regression that is estimated here is to have a third category on the basis of which we could switch. However no valid values of the wage or reservation wage are observed for these individuals. See footnote 32, page 59.

66 This is because as with the estimation of the duration of search, the reservation wage is observed in the data set only for the unemployed, but the probit estimation is done on the full sample (consisting of the employed and the unemployed, recollecting that persons out of the labor force are left out of the probit estimation). The advantage to the reduced form estimation approach is that data on factors that determine the reservation wage (but not the reservation wage itself) are observed for everyone in the data set.
children), and measures of unemployment benefit allowable under state law, on which data are available for everyone (employed and unemployed) in the sample, unlike the reservation wage which is observed only for the unemployed.

Table 6.2 presents the maximum likelihood estimates for the full (unemployed and the employed combined) sample.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maximum Likelihood Estimates (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>2.5275 (0.1998)***</td>
<td></td>
</tr>
<tr>
<td>Grades completed</td>
<td>0.0602 (0.0076)***</td>
<td>12.57 (2.72)</td>
</tr>
<tr>
<td>Work experience</td>
<td>0.0377 (0.0028)***</td>
<td>18.68 (11.92)</td>
</tr>
<tr>
<td>Whether African American (1=Yes; 0=No)</td>
<td>-0.5309 (0.0525)***</td>
<td>0.10 (0.30)</td>
</tr>
<tr>
<td>Male (1) Female (0)</td>
<td>-0.2511 (0.0634)***</td>
<td>0.84 (0.37)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0263 (0.0028)***</td>
<td>42.10 (12.01)</td>
</tr>
<tr>
<td>Marital status (Married=1; divorced, separated, single=0)</td>
<td>0.3914 (0.0578)***</td>
<td>0.69 (0.46)</td>
</tr>
<tr>
<td>Number of children in household</td>
<td>-0.0748 (0.0182)***</td>
<td>0.97 (1.17)</td>
</tr>
<tr>
<td>Unemployment rate of county of residence</td>
<td>0.0218 (0.0071)***</td>
<td>7.12 (2.99)</td>
</tr>
<tr>
<td>Maximum weekly unemployment benefit allowable under state law</td>
<td>-0.0030 (0.0005)***</td>
<td>$167.08 (37.22)</td>
</tr>
<tr>
<td>Minimum weekly unemployment benefit allowable under state law</td>
<td>-0.0084 (0.0017)</td>
<td>$27.22 (10.89)</td>
</tr>
<tr>
<td>Minimum waiting period for unemployment benefit eligibility</td>
<td>-0.3301 (0.0646)***</td>
<td>0.83 (0.38)</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td></td>
<td>0.98 (0.14)</td>
</tr>
<tr>
<td>N</td>
<td>23,814</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.2: Switching Regression: Probit Estimation of Employment Status
Dependent Variable: Whether Employed (1) or Unemployed (0)

a. It may be noted that the sample is based on the unemployed and employed. Those not in the labor force (9,020) are not in the estimation. The sample is larger than that used in the duration of search.
estimation because of greater number of independent variables in the duration of search equation. Remember that estimation can be performed only on the observations for which no data are missing on any of the independent variables included in the estimation.

It may be noted that Table 6.2 presents the results of the estimation of equation [3.1a] in reduced form. The results in Table 6.2 from the probit estimation broadly concur with predictions from the theoretical model. Higher education (indicated by grades of school completed) and experience are associated with higher probability of employment, which is to be expected. The estimation shows that men, older individuals and African Americans are less likely to be employed than their counterparts. Married individuals are more likely to be employed whereas those with children are not likely to be employed. The unemployment rate for the county of residence of respondents has the wrong sign indicating that individuals that live in high unemployment areas have greater likelihood of being employed. The higher the maximum weekly unemployment benefit allowed under state law, the less likely individuals are to be employed, which is to be expected, similar to what Feldstein and Poterba (1978) have argued. The higher the minimum waiting period for unemployment benefit eligibility according to state law, the less likely are individuals to be employed, contrary to expectation. We would expect that longer waiting periods for eligibility of unemployment benefits according to state law would rather cause individuals to find employment. The minimum amount of unemployment benefit does not have a statistically significant impact on the reservation wage and hence on employment status, although we would have expected it to have a statistically significant negative effect on employment probability (by increasing the reservation wage), other things constant.

6.4 Estimation of Wage

It may be noted that the samples used in the estimation of the wage and reservation wage equations are sub-samples of those used in the probit estimation.
Because the log form of the wage has been frequently used in the literature on earnings equations, I tested for linearity versus loglinearity of the wage and the reservation wage by performing the test suggested by Davidson and Mackinnon (1981). But the test was inconclusive. However, in order to be consistent with the literature (for instance, Jones 1989) and also to avoid obtaining negative values for the lower percentiles of the reservation wage distribution, I decided to use the log versions of these two variables.

The results from the estimation of the wage equation are shown in Table 6.3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-1.6078 (0.0692)***</td>
<td></td>
</tr>
<tr>
<td>Grades completed</td>
<td>0.1590 (0.0044)***</td>
<td>12.90 (2.72)</td>
</tr>
<tr>
<td>Whether college degree *</td>
<td>0.4156 (0.0245)***</td>
<td>0.28 (0.45)</td>
</tr>
<tr>
<td>Whether advanced degree *</td>
<td>0.0462 (0.0313)</td>
<td>0.08 (0.27)</td>
</tr>
<tr>
<td>Work experience</td>
<td>0.0348 (0.0018)***</td>
<td>18.81 (11.83)</td>
</tr>
<tr>
<td>Work experience squared</td>
<td>-0.005 (0.0004)***</td>
<td>493.97 (572.96)</td>
</tr>
<tr>
<td>Whether African American (1=Yes; 0=No)</td>
<td>-0.1674 (0.0306)***</td>
<td>0.09 (0.29)</td>
</tr>
<tr>
<td>Whether Hispanic (1=Yes; 0=No)</td>
<td>-0.0624 (0.0487)</td>
<td>0.02 (0.15)</td>
</tr>
<tr>
<td>Male (1)/Female (0)</td>
<td>0.0958 (0.0210)***</td>
<td>0.84 (0.36)</td>
</tr>
<tr>
<td>$\lambda_w$</td>
<td>0.7893 (0.2236)***</td>
<td>0.05 (0.05)</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td></td>
<td>$2.89 (3.49)^b$</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>23,076</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.3: Switching Regression Model with Sample Selection: Estimation of Wage Sample Selection Criterion: Employed Dependent Variable: Logarithm of Current Wage (Observed only for Employed)

a. I checked and found that data reported by the respondents for these two variables are consistent, i.e., persons that had an advanced degree also reported that they had a college degree. So if there is a 1 on advanced degree, there is also a 1 on the college

\[ ^{67} \text{Equation [3.1a] shows that the unemployment status of the ith individual residing in jth area is a function of the difference between the reservation wage and the market wage of the individual.} \]

\[ ^{68} \text{Of the 23,814 observations that are used in the probit estimation, 23,077 are employed and are used in the wage equation estimation. The remaining 737 are unemployed and are used in the estimation of the reservation wage equation.} \]
degree. But the reverse need not be true—persons with 1 on college degree can have 0 on advanced degree.

b. The mean and standard deviations were in log form, being 1.06 and 1.25 respectively. I took their antilogs in order to convert them to dollars.

The results in Table 6.3 are consistent with results from the hedonic models of earnings and education (see Ehrenberg and Smith 1993) as well as with the empirical regularities that have been observed by the Bureau of the Census (1991). The Bureau of Census found that more education was associated with higher pay when controlled for hours of work (similar results were found even when the hours of work were not controlled for).

Educated individuals (those with higher grades of school completed and college degrees) have respectively 16 and 41 percent higher earnings than their counterparts. However having an advanced degree (Master's or Ph.D.) does not necessarily imply higher wages than a college degree does alone. The effect of advanced degree on wages is statistically not significant. Every extra year of work experience increases the wage by about 3 percent. The experience-squared term can be interpreted as indicating diminishing marginal returns from experience. African Americans in the sample had about 17 percent lower wages than household heads from other races. Hispanics in the sample did not have wages significantly different from other races. Finally, men have about 10 percent higher wages than women. The sample selection correction factor $\lambda_\omega$ is significant. The positive coefficient on the sample correction factor means that we observe only the upper sections of the wage distribution given the socio-economic characteristics that determine the wage (see Lee 1978). The positive value results from the individual's selection of the employment status that pays him/her better than if he were to be unemployed.
6.5 Estimation of Reservation Wage: Results from Sample Selection

The results from the estimation of the reservation wage, when sample selection is taken into account, are shown in Table 6.4. Table 6.4 shows that the area's unemployment rate does not have a statistically significant effect on the reservation wage of individuals residing in the area, although its coefficient is negative, as expected. Jones (1989) found that there was a decline in the reservation wage by about 1.2 percent for every one-percent increase in the unemployment rate of the area, using data from Great Britain. I found a correlation of −0.0029 between the unemployment rate and reservation wage.

Table 6.4 shows that the only significant variables that affect the reservation wage are the duration of search and the individual's past wage. The sign on the duration of search shows that the individual's reservation wage is a declining function of time spent in unemployment, consistent with the observation made by Theodossiou (1992). Specifically the estimate shows that for every one extra week spent looking for work, the reservation wage declines by about 13 percent. Jones (1989) included the hours respondents spent looking for a job over the past seven days in various methods of job search. He also included an interview variable that indicated the number of interviews respondents had with employers in the current employment spell. He found that the hours variable did not have a significant impact, whereas the interview variable was negative and significant in one of the specifications of his model.

Table 6.4 shows that higher past wages increase reservation wages. The sign on the past wage implies an elasticity of nearly 0.55. This is consistent with what we would expect. Jones (1989) found an elasticity of about 0.25 on the past wage although he anticipated a much higher elasticity.

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69 The estimates reported in Table 6.4 are from the robust covariance matrix corrected for possible covariance between the independent variables.

70 However Jones (1989) did not take into account the endogeneity of the duration of search in the determination of the reservation wage. These are from his OLS and 2SLS estimation results (Tables 5-6, Jones 1989).
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-13.973 (12.71)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.0709 (0.0624)</td>
<td>39.82 (11.05)</td>
</tr>
<tr>
<td>Grades completed</td>
<td>-0.1559 (0.1428)</td>
<td>11.76 (2.47)</td>
</tr>
<tr>
<td>Work experience</td>
<td>-0.1119 (0.0899)</td>
<td>12.43 (13.82)</td>
</tr>
<tr>
<td>Whether African American (1=Yes; 0=No)</td>
<td>1.4125 (1.254)</td>
<td>0.31 (0.46)</td>
</tr>
<tr>
<td>Male (1) / Female (0)</td>
<td>0.6344 (0.6223)</td>
<td>0.71 (0.45)</td>
</tr>
<tr>
<td>Marital status</td>
<td>-0.9112 (0.9353)</td>
<td>0.46 (0.50)</td>
</tr>
<tr>
<td>Number of children</td>
<td>0.1602 (0.1825)</td>
<td>1.15 (1.33)</td>
</tr>
<tr>
<td>Predicted value of duration of search*</td>
<td>-0.1353 (0.0798)</td>
<td>1.92 (1.67)</td>
</tr>
<tr>
<td>Predicted value of duration of search squared</td>
<td>-0.0012 (0.0082)</td>
<td>6.46 (8.32)</td>
</tr>
<tr>
<td>Unemployment rate of county of residence</td>
<td>-0.0324 (0.0543)</td>
<td>7.10 (2.80)</td>
</tr>
<tr>
<td>Log of past wage</td>
<td>0.5502 (0.0397)***</td>
<td>$3.17 (2.71)</td>
</tr>
<tr>
<td>Log of weekly minimum unemployment benefits allowable under state law</td>
<td>-0.1108 (0.1189)</td>
<td>$23.91 (1.60)</td>
</tr>
<tr>
<td>Log of weekly maximum unemployment benefits allowable under state law</td>
<td>1.6533 (1.227)</td>
<td>$169.13 (1.26)</td>
</tr>
<tr>
<td>Waiting (0 or 1 week) for unemployment benefits according to state law</td>
<td>0.7234 (0.8183)</td>
<td>0.91 (0.29)</td>
</tr>
<tr>
<td>( \lambda )</td>
<td>-2.7901 (2.713)</td>
<td>-2.14 (0.49)</td>
</tr>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td>$3.25 (2.36)*</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>( N )</td>
<td>737</td>
<td></td>
</tr>
</tbody>
</table>

Table 6.4: Switching Regression Model with Sample Selection: Estimation of Reservation Wage (Observed only for Unemployed)
Sample Selection Criterion: Unemployed
Dependent Variable: Logarithm of Reservation Wage

a. The use of the predicted value of the duration of search in the equation rather than its simultaneous estimation (for which there was no procedure in LIMDEP) with the reservation wage produces bias in the standard errors of the estimate and consequently its efficiency as pointed out by Greene (1993). I tried using the actual number of weeks for which an individual is looking for work and its squared instead of the predicted value in the reservation wage equation. With this specification, the signs on the actual duration
and its squared were positive and negative respectively (being 0.0297 and -0.0022 respectively). The coefficient on the unemployment rate in this specification was bigger than in Table 6.4, being -0.067 and a t ratio of -1.33 (higher than in Table 6.4), but still insignificant. The coefficients on the other variables changed little from what is reported. I tried also using various dummies based on actual duration (dummies of 1 if looking for work for less than 15 weeks (0 otherwise), between 15 and 30 weeks, between 45 and 60 weeks and looking for work for longer than 60 weeks). With this specification, the reservation wage increased with each of the dummies, all of them being significant. The sign on the unemployment rate continued to be negative (being -0.05), but insignificant (t=-1.52).

b. The mean that was reported was in log form. I took the antilog of the log to convert the reservation wage, past wage, and weekly maximum and minimum unemployment benefits to dollars. I used the log of the past wage, and weekly unemployment benefits allowable under state law, to be consistent with the literature (Jones 1989). Thus the coefficients on these variables can be interpreted as elasticities.

The education variable (grades of school completed) shows that persons with higher education (number of grades completed) and work experience have about 15 and 11 percent lower reservation wages than others, although the effects are not significant. Jones (1989) found that the effect of education on reservation wages was not significant.

In Table 6.4, the various measures of unemployment benefits do not have a significant effect on the reservation wage. Higher minimums for weekly unemployment benefits in the state of residence cause the reservation wages to be lower. This is contrary to what we expect because higher minimum amounts of unemployment benefits increase the income of the individual while s/he is unemployed and would increase his/her reservation wages. The maximum weekly benefit allowable under state law has the expected sign and increases the reservation wage. The waiting period for unemployment benefit eligibility has the wrong sign, but has no significant effect on the reservation wage.

The results in Table 6.4 show that African Americans have higher reservation wages although the effect is not significant. Age, marital status, or the number of children under 17 years of age in a household, do not have a significant impact on reservation wages. Jones (1989) found that age and being married had positive and significant impacts on the reservation wage.
The estimation in Table 6.4 also shows that men have about 63% higher reservation wages than women. These results are consistent with that in Jones (1989). The sample selection correction factor is negative, but not significant.

The estimation of reservation wages is used to predict reservation wages for Ohio's enterprise zones, based on their unemployment rate and other characteristics, in the next chapter. The estimation of reservation wages in this chapter is for unemployed persons only, but the prediction will be for all persons in Ohio's zones (including the employed). This is because census data are not disaggregated at the individual level (they are aggregated at the block-group level or state/metropolitan area level) so that it is not possible to identify the unemployed in Ohio's zones. However this procedure does not create a bias in the predicted reservation wage estimates for Ohio's zones because of the inclusion of the sample selection correction factor (for including only the unemployed) in the prediction of reservation wages for persons in Ohio's zones. However a flaw that remains with the data is that all PSID characteristics used to determine reservation wages are not available in the (Ohio) census data. So PSID means for just these variables (and Ohio data for the other variables on which data are available) are substituted in the equation in order to predict reservation wages for Ohio's zones. We should acknowledge the flaw in this procedure, especially if there were to be substantial discrepancy between PSID data and Ohio's data for these variables (duration of job search, work experience and past wages).

The predicted reservation wages are used to compute economic rents from employment created in the zones. The economic rents are compared to the costs of the EZ program in every zone. The next chapter reports the results from the prediction of reservation wages for Ohio's zones and the benefit-cost analysis of the EZ program and finally the estimation of area unemployment rate.
CHAPTER 7

RESULTS FROM EVALUATION OF OHIO'S ENTERPRISE ZONES

In this chapter, I predict reservation wages for Ohio's enterprise zones to estimate benefits from employment created in Ohio's zones. I then describe the results of a survey that was sent to a sample of EZ administrators whose objective was to obtain data on the costs of infrastructure provision to firms that located in the zones. The survey was sent to supplement cost data (on tax abatements and other incentives) that was available from the Ohio Department of Development, with costs of infrastructure provision to firms. I then present the benefit-cost analysis of Ohio's enterprise zones making different assumptions about employment in the zones. Finally I report the results from the estimation of Ohio's census block group unemployment rates as a function of zone designation and other variables.

In order to estimate economic rents from employment created in the zones and perform benefit-cost analysis, the reservation wage estimates reported in the previous chapter are used to predict reservation wages for Ohio's enterprise zones. The estimates from Table 6.4 are applied to the various characteristics of persons that were available at an aggregated level for Ohio census block groups to predict reservation wages for Ohio's zones. This was possible because I was able to overlay a map of Ohio's census block groups over that of enterprise zones. This enabled me to determine the census block groups that each enterprise zone was comprised of.

7.1 Prediction of Reservation Wages for Ohio's Enterprise Zones

Characteristics on which data were available for persons at the census block group level were whether/not unemployed, whether African American, age, marital status, and whether male/female. So I was able to compute the unemployment rate (based on employment status of persons), average age (of persons), mean number of children per

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71 Census block groups are unique within every county and census tract.
family, and mean proportion African American, married, and male for Ohio's census block groups. This was especially useful because unemployment rates and other characteristics were not available by zone. I could use the geographical overlaying to estimate these characteristics for Ohio's zones which enabled me to predict reservation wages based on the zones' (census block groups') mean characteristics. I found that out of the 11,621 or so census block groups of the state, about 8,300 block groups had enterprise zones. An additional 1,000 block groups had Community Reinvestment Areas (CRAs). The remaining 2,000 or so block groups were non-tax incentive areas.

Figure D.1 in Appendix D shows a map of Ohio's enterprise zones. Below I show a profile of Ohio's zones by showing a distribution of the socio-economic characteristics (that determine reservation wages) for the zone areas of the state. Table 7.1 summarizes the profiles for the zones. Table 7.1 shows that the 280 enterprise zones in Ohio have substantial variability in terms of their distress conditions (unemployment rate), have middle-aged population, with high school (about 12 grades of school) completed on

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72 I did this with the help of GIS (Geographic Information Systems) software called ARCVIEW.

73 The way in which I have estimated zone unemployment rates is according to the procedure recommended by the Ohio Department of Development. According to this procedure, I first estimated the unemployment rate for all the counties based on the ratio of unemployed to total labor force aggregated in the 1990 census at the county level. I then estimated a similar ratio for the block groups comprising the zones, obtaining a raw unemployment rate for every zone. I took the ratio of zone to county unemployment rates computed in this way. I applied the zone to county unemployment rate ratio to the county unemployment rates published by the Ohio Bureau of Employment Services (OBES) to arrive at zones' unemployment rate for 1990.

This approach is helpful to not only estimate zone unemployment rates for the census year, but also for other years since data on county unemployment rates are available for other years. It is possible to apply the zone-county ratio (from 1990) to the county unemployment rates for 1983-94 (for which period jobs, investment and other data are available for zones) to arrive at zone unemployment rates for 1983-94. However, at this point, I have not checked for data availability on other characteristics of counties for other years, i.e., mean age, proportion African American, female and married, so that I can estimate them for zones based on a similar ratio as for the unemployment rate. This could be a potential extension that can expand the sample to include time-series data as well. As of now, the characteristics, the reservation wages, economic rent and benefit-cost ratios that are predicted for the zones are for 1990 only.

74 The mean age of persons aggregated by block groups (zones) was calculated in a very similar manner as those for grades completed since the number of persons in each age range was reported. See the next footnote. I substituted midpoints for intervals and calculated a weighted average for age based on number of persons in each age group. Here again in order to be consistent with the PSID, in the calculation of the mean age, I removed all persons who were below 17 years of age, in order to be consistent with the age of PSID respondents. In the PSID, household heads are at least of age 17.
average, and with the distribution of women and men equal and majority of them married.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>0th Percentile (Minimum)</th>
<th>50th Percentile (Median)</th>
<th>100th Percentile (Maximum)</th>
<th>Mean (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Rate</td>
<td>1.73%</td>
<td>6.23%</td>
<td>16.95%</td>
<td>6.34% (2.44)</td>
</tr>
<tr>
<td>Age</td>
<td>36.57</td>
<td>44.45</td>
<td>49.53</td>
<td>44.43 (1.86)</td>
</tr>
<tr>
<td>Grades completed</td>
<td>11.27</td>
<td>12.08</td>
<td>13.73</td>
<td>12.17 (0.47)</td>
</tr>
<tr>
<td>Proportion African American</td>
<td>0</td>
<td>0.01</td>
<td>0.79</td>
<td>0.05 (0.10)</td>
</tr>
<tr>
<td>Proportion Male</td>
<td>0.44</td>
<td>0.49</td>
<td>0.56</td>
<td>0.49 (0.01)</td>
</tr>
<tr>
<td>Proportion Married</td>
<td>0.32</td>
<td>0.61</td>
<td>0.75</td>
<td>0.59 (0.07)</td>
</tr>
<tr>
<td>Number of children per family</td>
<td>0.56^a</td>
<td>0.91</td>
<td>1.30^c</td>
<td>0.91 (0.11)</td>
</tr>
</tbody>
</table>

| (Total children divided by total number of families for a zone) |  |

Table 7.1: Summary of Profile for Ohio’s Enterprise Zones in 1990

- a. The nth percentile of a distribution is the number below which n percent of observations lie.
- b. This was in the City of Mayfield Heights zone, Cuyahoga County, where there were 2,267 children and 4,016 families.
- c. This was in the City of Cincinnati (Lower Mill Creek) EZ, where there were 19,724 children and 15,205 families.

Table 7.2 shows the profile of characteristics shown in Table 7.1 for the non-zone areas in Ohio. Table 7.2 is based on the 3,331 census block groups of the state that are not enterprise zones. It shows that some of the non-zone areas of the state are more

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75 With regard to educational attainment, the classification from the 1990 census was the number of persons with less than 9 grades completed, number with grades between 9-12 completed, high-school graduates, some college (no degree), Associate degree, Bachelor’s degree and Graduate or professional degree. In order to be consistent with the PSID, I attributed 12 grades of school as being completed to high-school graduates, 13 grades to those with some college, but no degree, 14 grades to those with Associate degree, 16 to those with Bachelor’s degree (15 grades would have been appropriate for 3 years of college according to PSID documentation, but there was no category in the Census corresponding to this, so I skipped attributing 15 grades to any group), and 17 grades to those with a graduate or professional degree. I took a weighted average of the grades completed by computing: \[
\text{[(persons with <9 grades \times 8) + (persons with 9-12 grades \times 10.5) + (persons with 12 grades + 12) + (persons with 13 grades \times 13) + (persons with 14 grades \times 14) + (persons with 16 grades \times 16) + (persons with 17 grades \times 17)] / total persons with 0-17 grades completed.}
\]
For the grade intervals I thus substituted the mid-points in order to calculate the mean grades completed. This explains the small standard deviation for this variable.
distressed (have higher unemployment rates) than the areas designated as zones. This makes sense when we take into account the bureaucracy that is involved in the process of zone designation. There are apparently many communities in the state with high unemployment rates that have not applied for zone designation because of the time, effort and financial burden (tax incentives) involved.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>0th Percentile&lt;sup&gt;a&lt;/sup&gt; (Minimum)</th>
<th>50&lt;sup&gt;b&lt;/sup&gt; Percentile (Median)</th>
<th>100&lt;sup&gt;b&lt;/sup&gt; Percentile (Maximum)</th>
<th>Mean (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Rate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0%</td>
<td>3.57%</td>
<td>59.16%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.66% (4.40)</td>
</tr>
<tr>
<td>Age</td>
<td>19.05</td>
<td>44.38</td>
<td>69.13</td>
<td>44.63 (5.27)</td>
</tr>
<tr>
<td>Grades completed</td>
<td>8.07&lt;sup&gt;c&lt;/sup&gt;</td>
<td>12.54</td>
<td>16.24</td>
<td>12.72 (1.04)</td>
</tr>
<tr>
<td>Proportion African American</td>
<td>0</td>
<td>0</td>
<td>1.00</td>
<td>0.08 (0.20)</td>
</tr>
<tr>
<td>Proportion Male</td>
<td>0.22&lt;sup&gt;d&lt;/sup&gt;</td>
<td>0.48</td>
<td>1.00</td>
<td>0.48 (0.05)</td>
</tr>
<tr>
<td>Proportion Married</td>
<td>0&lt;sup&gt;e&lt;/sup&gt;</td>
<td>0.61</td>
<td>1.00</td>
<td>0.57 (0.15)</td>
</tr>
<tr>
<td>Number of children per family (total number of children divided by total families for a census block group)</td>
<td>0&lt;sup&gt;f&lt;/sup&gt;</td>
<td>0.83</td>
<td>2.85&lt;sup&gt;g&lt;/sup&gt;</td>
<td>0.84 (0.29)</td>
</tr>
</tbody>
</table>

Table 7.2: Summary of Profile for Ohio’s Non-Zone Census Block Groups in 1990

a. The unemployment rates for the census block groups was calculated in a similar manner as for the zones, using the procedure recommended by the Ohio Department of Development. See footnote 73 on page 92.
b. This was for census block group number 4 in census tract 502 in Ottawa county that had 18 persons unemployed out of its labor force of 32 persons.
c. This was in block group 1 in census tract 1361.02 in Cuyahoga county, which covers part of Broadview Heights City. In this block group that had 18 persons unemployed out of its labor force of 32 persons, there are 235 persons out of whom 221 completed less than 9 grades. The average age for the block group is 35.11 years, which assures us that children are not included in the profile. In the Census, the grades completed question is asked only of respondents who are 25 years or older.
d. The low proportion male was in block group 9 in census tract 5322.02 in Summit County. As an assurance that children below 17 are not included in the profile, the average age for this block group is 68.73 years.
e. No married persons (with spouse present) were in block group 1 in census tract 1351.05 in Cuyahoga county, which covers part of Brecksville City. The average age for the block group of 513 persons is 55.6 years. It is possible that this is an area that contains an old age or retirement home. It is to be noted that the percentage married is defined as those that were married with spouse present. In the Census, the marital status question is only asked of respondents who were 15 years or older.
f. This was in Ottawa county, census tract 502, block group number 4 (this was not unique, there were a few others with 0 children per family). Here there were 26 families and no children. The block group had 80% of its population married, but the average age for the block is 62 years, indicating that they were probably old to have children under 17.
The highest number of children per family was in Hamilton County (Cincinnati), census tract 21, block group number 2 where there were 111 children and 39 families. The average age for the block group was nearly 40 years, with 95% of them being African American.

However it may be noted that the average unemployment rate for the non-zone areas is still lower than it is for the zone areas. It also may be noted that on average, non-zone areas in the state are of the same age as but slightly more educated than the zone areas. This is somewhat consistent with the profile of an EZ the theoretical model describes. It may be noted that at least one non-EZ census block group had an educated population, with its population having completed college degree on average. (This is the one with a maximum of 16.23 grades (or college degree) completed, being in Franklin county, census tract 7820 and block group number 6).

In addition to the characteristics of zones summarized in Table 7.1, it may be noted that there are few other characteristics that determine the reservation wage (see Table 6.4 in Chapter 6) that did not have analogous data in the census block group files. These variables were the duration of unemployment for unemployed persons (and its squared), individuals' past wages and their work experience. So for these variables, I substituted for their mean from the PSID to predict reservation wages for Ohio's zones. It may be noted that for the minimum and maximum weekly unemployment benefits and waiting period for the eligibility under state law, I substituted Ohio's data. I did this in order to arrive at an estimate of predicted reservation wages for the state's zones based on their characteristics that determine the reservation wage. I acknowledge that there could be a problem with this procedure if there were to be huge variation between PSID and Ohio data with respect to work experience, duration of search and past wages of unemployed persons.

For an average zone (with an unemployment rate of 6.34%, with about 12 grades completed on average, 5% African American population, 59% married, less than a child per family in a zone, and 49% male, and with average age of its population about 44 years), the reservation wage was predicted in the following manner, using the estimates in Table 6.4.
Reservation Wage = (-13.973-(0.0709*44.43)-(0.1559*12.17)-(0.1120*12.43) + (0.6344*0.49)-(0.9112*0.59)+(0.1602*0.91)-(0.0324*6.34) + (1.4125*0.05)-(0.1353*1.92)-(0.0012*6.46) + (0.5502*1.15)-(0.1108*2.50)+(1.6533*5.50)+(0.7234*1)+(2.7901*2.1418))-----------------[7.1]

In [7.1], the average predicted duration of search (1.92 weeks), the mean for duration of search squared (6.46 weeks), average work experience (of 12.43 years), average past wage ($3.16/hour, the antilog of 1.15), were used from PSID data, because these variables were not part of the census file.\(^\text{76}\) The minimum ($12.15, the antilog of 2.50) and maximum weekly unemployment benefit ($245.44, the antilog of 5.50), and the waiting period for unemployment benefit (1 week) eligibility are for Ohio.

The reservation wage for an average zone when predicted in the above manner turns out to be about $4.88 an hour, which is the antilog of 1.585, obtained from [7.1] above. The distribution of reservation wages predicted in the above manner for every zone based on its characteristics looks as shown in Table 7.3, with mean around $4.88 as demonstrated above and with a minimum of $2.60 and a maximum of $16.98 an hour, depending on zone characteristics.\(^\text{77}\)

<table>
<thead>
<tr>
<th>Nth Percentile</th>
<th>Reservation Wage (Dollars and cents per hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0(^\text{th}) percentile (Minimum)</td>
<td>$2.60</td>
</tr>
<tr>
<td>50(^\text{th}) percentile (Median)</td>
<td>$4.09</td>
</tr>
<tr>
<td>Mean (Std.Dev)</td>
<td>$4.88 (1.48)</td>
</tr>
<tr>
<td>100(^\text{th}) percentile (Maximum)</td>
<td>$16.98</td>
</tr>
</tbody>
</table>

Table 7.3: Distribution of Hourly Reservation Wages predicted for Ohio’s Enterprise Zones

This is keeping in mind the flaws that could occur with the substitution of PSID means for work experience, past wages and duration of search.

\(^{76}\) The coefficient and mean of \(\lambda\) (the correction factor from the sample selection estimation) have also been substituted in [7.1] as can be seen.

\(^{77}\) When I applied equation 7.1 to the non-EZ block groups of the state, the mean reservation wage was $5.67 (antilog of 1.735) (and standard deviation of 6.18), which is higher than that for the zones, and as expected.
The next step was to estimate economic rents for employment created in the zones and compare them to costs of the program in every zone. Because the reservation wages that were predicted were hourly figures, they were converted to an annual figure by assuming that persons worked 40 hours a week and 52 weeks a year.\textsuperscript{78} Using the figures in Table 7.3, the annual reservation wage (for an average job) in a zone turns out to be $10,150.40\textsuperscript{79} on average with a maximum of $35,318.40 (both in constant 1982-84=100).\textsuperscript{80} The respective annual reservation wages were subtracted from the deflated earnings reported for every job that was created in Ohio’s zones, to arrive at an estimate of economic rent for every job.

These economic rents were compared to the property tax abatements (including personal and real property), cost of any other local incentives and the costs of providing infrastructure to firms, to estimate the benefit-cost ratio.\textsuperscript{81} It should be clear that the benefit-cost ratios calculated in this way refer only to local government investment, and not all government investment.\textsuperscript{82} This helped to determine in which zones economic rents from employment created in the program exceeded program costs.

\textsuperscript{78} This was because the Ohio Department of Development reported annual earnings from employment.

\textsuperscript{79} $4.88\times40\times52=10,150.40$

\textsuperscript{80} $16.98\times40\times52=35,318.40$

\textsuperscript{81} The data on personal and real property taxes foregone and other local incentives were from the Ohio Department of Development. The cost of providing infrastructure to firms was obtained from a survey of enterprise zone administrators in high-unemployment areas. A brief summary from the survey follows these results. As reported in that section, the mean cost of providing infrastructure to a single firm that located in the average high-unemployment zone and any administrative costs of negotiating the contract with a firm was about $25,000 (reported in current dollars). In 1982-84=100 dollars, this average cost of infrastructure per firm (or contract) is $15,576.32. It follows that in every enterprise zone the total cost of infrastructure equals $15,576.32 \times \text{the number of firms (contracts)}.$

However it should be noted that the costs of the program that are not included here are when negotiations between the local government and firm do not result in a contract. This is because in Ohio’s enterprise zone program, tax abatements are not automatic upon a firm’s location in the zone. The abatements have to be negotiated with the local government. It is possible that if the affected School Board does not approve of the abatement to the firm, a contract does not result. Then it is up to the firm to decide whether or not it wants to locate in the zone.

\textsuperscript{82} It should be remembered that data on property tax abatements, other incentives and infrastructure costs are for individual zones. Similarly the benefits that are calculated are also only for local governments, as may be reflected in a decrease in the unemployment rate. Also see footnote 83.

98
7.2 Results from Survey of Ohio's Enterprise Zone Administrators

A survey was sent out to the administrators of a sample of 44 Ohio zones in November 1997. The 44 zones were designated as distressed zones. The objective of the survey was to primarily gather data on the costs of providing infrastructure services to firms because these data are not routinely collected at the state level. Moreover there is also no standard definition of what constitutes infrastructure across the zones. In some areas this means installation of water and sewer lines or traffic lights for a single firm whereas in other areas it could refer to road improvements. It can be expected that water and sewer lines cost less than county or highway improvements and so it was important to know the components of the costs of infrastructure provision to firms at least for a sample of zones.

Because the idea behind the survey was to get an approximate figure by which I could adjust the cost estimates, selection of the distressed zones defined a maximum for the cost of making infrastructure improvements for a firm that locates in the zone. This is because we would expect the non-distressed areas (that are designated as (limited authority) zones in Ohio if they merely meet minimum population requirements) to already have the basic infrastructure such as state highways, county roads, sewer and water lines in place.

Of the 44 surveys that were sent, 27 were returned, for a response rate of 61 percent. I followed up through telephone calls the incomplete surveys and those that had not responded regarding the costs of infrastructure provision. With this the response for the cost of infrastructure increased to 39, accounting for a response of 89 percent for the primary objective of the survey.

7.2.1 Infrastructure Costs

In most (27 out of the 39 zones) of the zones, infrastructure provision referred to water and sewer lines and few (13 out of the 39 zones) referred to road improvements (such as thickening of pavements), and installation of traffic lights for the sake of firms. In general, most of the respondents reported that the cost to the local government of
providing infrastructure services to firms was minimal, which was probably less than
taxes received over a 20-30 year period. In most cases the cost was either covered by
grants from the state or federal government, mostly by the Economic Development
Administration (EDA) and in some cases by the Appalachian Regional Commission. In
other cases the cost to the local government of providing public services to firms was
usually recovered through the imposition of an impact fee. In a number of cases, the area
had been designated as zone recently so there were few firms that had located there. In
some cases the cost of infrastructure provision was borne by the local government.

There was a definite pattern to the responses from zones located in large urban
areas with respect to the infrastructure costs borne by the local government. All the zones
in urban areas responded that the cost of providing infrastructure to firms varied widely
across firm types.\textsuperscript{83} The zones in urban areas (Cincinnati and Columbus) reported
spending more on large firms and very less on small firms. The total average cost
(excluding state and federal funds) to the local government of providing infrastructure to
a single firm that located in a zone in the urban areas of the state (Columbus, Cincinnati,
and Youngstown) was approximately $107,000.\textsuperscript{84} The average for all the zones was about
$24,200 of providing basic infrastructure services to a single firm that located in the zone.
\textsuperscript{85} The maximum amount that was spent on a single firm was around $141,500 where the
city spent about $3.5 million on about 25 firms in the industrial parks that are part of the
EZ. However there were also several zones (17 out of 39 zones) in which the cost of
providing infrastructure to firms to the local government was zero because it was either
covered by a federal grant or paid by the firm.\textsuperscript{86}

\textsuperscript{83} The standard deviation of the cost of providing infrastructure services to firms across zones was around
$38,000.
\textsuperscript{84} In Cleveland, no infrastructure is provided to firms under the EZ program, although it is provided under
federal programs like the Urban Development Action Grant (UDAG). Under the EZ program, just the tax
abatement is given to firms.
\textsuperscript{85} In some cases, respondents reported total costs on infrastructure expenditure that were incurred by the
local government as part of the EZ program since the certification of the EZ. In such instances, the total
cost was divided by the number of firms in the zone to obtain an average cost per firm.
\textsuperscript{86} Thus it must be clear that in all cases involving infrastructure costs, I took into account only local
government costs. So in cases where federal and state governments spent on infrastructure in the EZ, I
In the case of poorer areas, such as those in the Appalachian region, zones were very willing to provide infrastructure to firms. This demonstrates that in the case of these zones, the local government provided water and sewer lines to the firms that located there. It was quite rare to find road improvements being offered as part of the EZ package to firms.

In addition to the costs of providing infrastructure to firms, respondents were also asked for any administrative costs of negotiating the EZ agreement with the firm. Most (92 percent of the respondents) reported that there was no cost to negotiating the contract with the firm. On average, the cost of negotiating the agreement with the firm was around $1,000. In most cases this referred to the employment of attorneys by the local governmental unit to deal with the negotiations with firms. In zones that had no administrative costs of negotiating the agreement with the firm, the full-time staff in the city’s department administering the EZ program spent their time for the negotiations. None of the zones reported employing staff exclusively for administering the zone. So it is believable that the EZ program cannot account for staff time alone.

In addition to infrastructure and administrative costs, zone administrators also responded to questions regarding zone effectiveness pertaining to the tax incentive, commute time, job creation success of firms including the proportion held by zone residents, and the impact of zone firms on the surrounding area.\(^{87}\) Below I summarize the results from the survey with regard to the compliance of firms to the negotiated

\(^{87}\) As mentioned in the text, obtaining the cost of infrastructure provision to firms by which I could adjust the cost estimates of the program, was the primary objective of the survey. The other aspects of the survey, although they relate to other benefits or costs of the enterprise zone, are not to be mixed up with the results from the benefit-cost analysis reported earlier. This is because the benefits and costs reported by the zone administrators are different in nature than those considered in the empirical benefit-cost analysis, and so should be viewed separately.

Of course the questions relating to the effectiveness of tax incentives in attracting firms and the proportion of employment held by zone residents substantively contribute to an enhancement of what is learnt in the theoretical model. But some aspects could complicate the theoretical model considerably, although their consideration does not invalidate it (for instance, the presence of intermediary firms as indicated by the impact of zone firms).
agreement, the impact of zone firms on the surrounding area and the overall effectiveness of the zone.

7.2.2 Compliance of Firms

With respect to the conditions of the EZ agreement, namely job creation, the administrators reported compliance in most cases. On average, the response was that firms were highly successful in their job creation commitments they made in the agreement, and created 75-100 percent of the employment they originally committed. Nearly 90 percent (24 out of the 27 zone administrators) reported that firms in their zones had created between 75-100 percent of the jobs to which they had committed. Eleven percent noted that the firms did create 50-75 percent of the employment they committed to in the agreement.

The picture with respect to the proportion of jobs held by zone residents was less optimistic, but positive. About one-fifth of the respondents noted that 75-100 percent of the jobs that were created were held by zone residents, with another fifth reporting that the proportion held by residents was in the range of 25-50 percent of the jobs that were created by zone firms. On average, the mean proportion of jobs held by zone residents appeared to be in the range of 50-75 percent of the employment that was created. This is consistent with the results from other empirical work reported by HUD (1986).

7.2.3 Impact of Zone Firms

With regard to the impact zone firms had on the surrounding area, half of the respondents reported that other firms have developed in the area to supply the zone firms with inputs and intermediate products. One reported the development of a new industrial park that was under construction. The type of intermediary firms that cropped up seemed to be dependent on the base of the local economy. While the EZ administrators adjoining the northern border with Michigan reported an increase in automotive parts suppliers,

88 I did not ask them how they determined compliance.
those in the central part of the state (for example, Columbus) referred to software and telecommunication firms and banks. Thus it is possible to believe that the EZ led to increased demand for workforce and corresponding higher wages. A few respondents reported reduction in crime because of the existence of the zone. At least one respondent noted the negative impact of the zone in the form of increased traffic congestion and pollution.

7.2.4 Zone Effectiveness

Closely related to the provision of infrastructure such as roads and highways as part of the EZ program is the assumption that changes in commute time within or surrounding the zone area can be expected due to the improvements that have taken place. The opinion was unanimous among zone administrators that there was no change in commute time within or surrounding the zone. In only one case it was reported that commute time had decreased. This is consistent with the underlying assumption because highway improvements were not a common form of infrastructure that was provided to firms in most of the zones.

All respondents reported that the zone and the tax incentive were effective in attracting firms to locate there. The average response was that the zone and the tax incentive were high or moderately effective in attracting firms. None reported that the zone or the tax incentive were not effective. Moreover, about two-thirds (67 percent) of the respondents noted that the firms that located in their zones would not have done so without the abatement. This seemed to be especially the case with large firms because a tax cut to large firms most probably implies large savings in payment of taxes. The remaining (30 percent) noted that the firms probably would have located there even without the tax incentive.

Overall, the opinion was that the EZ program has allowed local companies to become more competitive; and the community too to become more competitive in attracting and retaining new and existing industry. In addition, most thought that the EZ program provides the community with a marketing tool to attract the type of business it
wants, and aides in the retention and creation of jobs, and it provides a foundation for a long-term relationship between the community and its businesses. The impression seemed to be that as long as abatement programs existed in bordering states, and competition from other cities continued, Ohio needed them at least for "interstate" locations (I-70, I-71 and I-75). However, at least one community thought that programs like the EZ should be used sparingly and the terms and conditions of the abatement had to be negotiated according to the law. Most programs were also being tightly monitored for compliance.

In some cases, the majority of the abatements went to long established enterprises to help them modernize and expand in place rather than move to greener outer suburbs. Rural communities thought that the EZ program is an especially important tool to attract firms. An Appalachian community reported that it was extremely proactive in assisting businesses create jobs in a zone in which the unemployment rate was greater than 9 percent. Thus, according to some administrators, the enterprise zone program helped areas to reverse the economic decline that began in the late 1970's and 1980's when unemployment rates had reached 22% and poverty rates were increasing at an alarming rate, as a result of deindustrialization in the United States.

So the enterprise zone seemed to be an important tool for a number of the administrators that were surveyed.

7.3 Benefit-Cost Analysis

I performed B-C analysis of the zones under three scenarios reflecting various assumptions. The B-C analysis was reported in various scenarios reflecting different assumptions about employment created in the zones, because of two reasons:
1. I wanted to test the sensitivity or robustness of the B-C results to the various assumptions, and their implications for choice by policymakers from among multiple policy options, rather than from a single alternative as the only solution.

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89 When I checked the unemployment rate I estimated for the zones, the unemployment rate was 7.51% for this zone in 1990.
2. Another reason for reporting B-C analysis in various scenarios was the theoretical model. Retained employment cannot be considered as being held by the unemployed, because, they are by definition, already held by someone. It is crucial to examine the benefits and costs when the employment is held by unemployed, which is one of the assumptions in the part of the theoretical model dealing with reservation wages (that they are lower for the unemployed). So when we take into account only jobs that are newly created, can the assumption of the jobs being held by unemployed is plausible. The assumption in scenario 2 below reflects this. Moreover, the data from the Ohio Department of Development with regard to retained jobs (and their earnings) was not very reliable, which was especially so for the earlier years (from 1984 till the early 1990s). So, with one of the assumptions that I made pertaining to created employment, I was able to overcome the data limitation with retained employment by eliminating these observations.

The assumptions which formed the basis for the three scenarios are explained below:

1. Economic rents estimated from all employment reported as being created and retained by the firms (relocated firms excluded).\(^{90}\)

2. Economic rents estimated from employment reported as being created only (excludes jobs retained) because in the case of retention, the employees cannot be considered as having been unemployed before (relocated firms excluded).

3. Economic rents estimated from a proportion of the total employment (those created and retained) attributable to the tax incentive only (relocated firms excluded) under two assumptions of elasticity.

\(^{90}\) I noted from Ohio's EZ data that intra-state relocations just constituted 19 percent and interstate relocations, 4% of firms that located in Ohio's EZs. The other 77% of the firms were either firms already existing in the area, or were new firms which started after the area was designated as a zone. But my data do not permit me to say which was existing and which was new (as I indicate in footnote 12, p.43).

Because a majority of the firms were already existing in the EZ or were new, I did not include firms that had relocated from within the state or from outside in the B-C analysis here. For the same reason, I did not do B-C analysis for the various relocation types discussed in Chapter 4 (section on politics of zone designation). Moreover, not all the data needed for estimating B-C ratios for the various relocation types exist. Thus it should be remembered that costs to other areas are not included. However, benefits to other areas (for instance, the start-up of intermediary firms that supply inputs to zone firms in the surrounding
The economic rents, costs per job and benefit-cost ratios (all for local government investment) were computed at two levels: at the level of the enterprise zone and at the level of the firm, in all the scenarios.\footnote{It should be remembered that only because there were performance data available at the firm-level as well as zone-level, I could report results at both the levels. The justification, from a policy perspective, for computing B-C ratios for firms and zones is that they can tell whether or not particular firms or particular zones should be targeted.}

7.3.1 Scenario 1

In this scenario, all the jobs that were reported as being created and retained are taken into account for the computation of the benefit-cost ratios. The results are reported at the level of 531 firms that did not relocate from within or outside the state in the 143 zones and those that received some tax incentives from their local governments.\footnote{Of the 1,974 firms that located in the state’s 280 enterprise zones over 1983-94, there were some data missing for some firms, and for some others, the data were inconsistent. Instances of inconsistent data were when the earnings were either reported as 0 or as being too low or too high for some jobs. So I had to delete observations that had earnings less than $10,000 a year (which is around the minimum wage, i.e., $5.00*40*52), and greater than $50,000 a year. I also deleted observations that had inconsistent earnings data for retained jobs (for instance, those firms that reported earnings for retained jobs when no jobs were in fact retained). I also removed all firms that did not receive abatements. Because of these restrictions, I was left with 531 observations in the firm-level data and 143 observations in the zone-level data in this scenario.}

Table 7.5 shows the distribution of total employment (that was created/retained by firms in the zones), economic rents from jobs, costs and benefit-cost ratios per job at the level of the contracts that were negotiated with 531 firms in Ohio’s enterprise zones. The 531 firms in the 143 zones created and retained 104,840 jobs through 1995. Table 7.5 shows average figures for firms in each quintile (0\textsuperscript{th}-25\textsuperscript{th} quintile, 25\textsuperscript{th}-50\textsuperscript{th}, 50\textsuperscript{th}-75\textsuperscript{th}, and 75\textsuperscript{th}-100\textsuperscript{th} quintiles) of the distribution of employment, earnings, economic rent, costs and B-C ratios per job. The table shows considerable variation in the employment that was created by the various firms that located in the state’s zones. The high cost zones are those in which little employment was created. With the variation, it may be noted that the benefits were greater than costs in the average contract that was negotiated in Ohio’s
zones. The economic rents per job approximately equal the earnings less the mean annual reservation wage (about $10,000 per job).

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min,Max) for firms: 0th-25th Percentile</th>
<th>Mean (Min,Max) for firms: 25th-50th Percentile</th>
<th>Mean (Min,Max) for firms: 50th-75th Percentile</th>
<th>Mean (Min,Max) for firms: 75th-100th Percentile</th>
<th>Unweighted Mean for all firms (Std.Dev.)</th>
<th>Weighted mean for all firms (Wt. Std.Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>12.07 (1,23)</td>
<td>40.32 (24,63)</td>
<td>95.51 (64,152)</td>
<td>646.91 (153,11,000)</td>
<td>197.44 (789.22)</td>
<td>197.44 (382.91)</td>
</tr>
<tr>
<td>Annual deflated earnings per job (1982-84=100)</td>
<td>$12,553.57 (10,148.45, 14,497.31)</td>
<td>$16,546.92 (14,497.71, 18,714.21)</td>
<td>$21,913.32 (18,764.75, 24,985.60)</td>
<td>$32,078.94 (25,100.70, 49,636.24)</td>
<td>$20,621.28 (8,012.17)</td>
<td>$20,766.91 (2,449.43)</td>
</tr>
<tr>
<td>Economic rent per job</td>
<td>$11.69 ($8997.97, 3508.62)</td>
<td>$2,819.81 (3,564.41, 8,126.84)</td>
<td>$11,185.96 (8,168.76, 14,699.24)</td>
<td>$20,624.94 (14,372.16, 36,913.09)</td>
<td>$9,498.97 (8,388.51)</td>
<td>$9,407.17 (2,996.77)</td>
</tr>
<tr>
<td>Costs per job</td>
<td>$30.21 (21.99, 330.67)</td>
<td>$24.24 (22.14, 262.76)</td>
<td>$1,226.24 (764.53, 1,791.36)</td>
<td>$8,962.99 (5,795.12, 12,2982.19)</td>
<td>$3,085.54 (5,142.42)</td>
<td>$2,691.40 (5,087.54)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>-2.52 (-59.53, 2.71)</td>
<td>5.85 (2.72, 9.36)</td>
<td>15.22 (9.48, 24.74)</td>
<td>80.25 (24.41, 144.75)</td>
<td>24.73 (77.04)</td>
<td>24.73 (37.12)</td>
</tr>
<tr>
<td>Average Unemployment</td>
<td>7.46% (3.05, 11.66)</td>
<td>7.03% (2.05, 13.49)</td>
<td>6.69% (2.36, 13.49)</td>
<td>6.80% (2.85, 13.49)</td>
<td>6.34% (2.44)</td>
<td>6.99 (2.25)</td>
</tr>
<tr>
<td>Adjusted B-C ratio</td>
<td>-0.19</td>
<td>0.41</td>
<td>1.02</td>
<td>5.46</td>
<td>1.57 (1.81)</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Table 7.5. Distribution of Economic Rents and Benefit-Cost Ratios for the (531) Firms in Ohio’s Enterprise Zones under Scenario 1

a. Total employment in this scenario includes jobs created and retained.

b. Economic rent is defined as: Earnings per job – Annual reservation wage.

c. This was for a steel corporation in the city of Cleveland zone which created 48 jobs, for an earning of $11,357.53 per job, and the reservation wage being $9.74/hour (for an annual reservation wage of $20,255.53). Thus the low earnings for jobs created by the firm compared to the average reservation wage (i.e., reservation wage per job) is responsible for the negative economic rent per job.

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.

e. This was for a firm with SIC code 2812 in Clinton Township et al EZ to whom about $12.7 million, $10,711.55 and about $35,000 were provided in the form of real and personal property tax abatements and other incentives respectively. But the firm created only 10 jobs which explains the high costs per job.

f. B-C Ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual firm's B-C ratios which I have calculated as the ratio of individual firms' economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.
g. This was for a firm with SIC code 7389 (in City of Norwood EZ) that had negative economic rent from employment of -$2,577.69 because of its higher reservation wage per job ($6.23/hour, translating to an annual reservation wage of $12,958.40) relative to the earnings from the jobs it created (of $10,341.56). The higher reservation wages were due to the zone’s low unemployment rate, which was 4.6%.

h. This was for a GM plant in the City of Cortland et al EZ, whose economic rent per job was $31,865.61 (earnings of $43,283.32 per job) and cost per job was merely 21.99 because of the 11,000 jobs that were retained and abatements of only $226,371.51 (plus the costs of infrastructure). The zone’s unemployment rate was 7.9% leading to a low reservation wage explaining the high economic rents per job.

i. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for firms in the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the B-C ratios would not be the same firms with the minimum and maximum values of the unemployment rate for the zone in which they locate.

j. Weighted ratios were calculated as weighted averages in which the weights were the number of firms in each category (firms in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for firms in each category and sum of the weights and the means were divided by the total number of firms. A similar procedure was used to calculate weighted standard deviations for the various distributions.

There is also large variation in the costs incurred for every job that was created, ranging from less than $25 a job to about $1.27 million per job. The highest costs (abatements and other incentives) were incurred for those firms that made the largest investments in personal and real property. This is reasonable because the property tax abatement is an incentive to capital. Given that these firms did not create much employment, the costs per job are high.

There is also considerable variation in the benefit-cost ratios (for local government investment) across zones. The unadjusted benefit-cost ratio is less than 1 for about 10 percent of the firms indicating that costs were greater than benefits in contracts with these firms. The low benefit areas are areas that awarded large abatements because of firms’ investments in capital (personal and tangible property), resulting in high costs to create employment. However, for firms in majority of the distribution, the unadjusted (unweighted) B-C ratio is well above 1 indicating that economic rents per job are substantially higher than costs per job for these firms.
In addition to the unadjusted B-C ratio, I also report in the tables that follow, B-C ratios that are adjusted for the unemployment rate of the zone. The reasons for reporting unemployment-rate adjusted B-C ratios are as follows:

1. We learnt from the theoretical model that unemployment exists in the EZ (assumption 5 of the model). The reservation wage part of the theoretical model (following Jones 1989) shows that the decision to work (and hence the reservation wage) is essentially a function of the benefits and costs of remaining unemployed for the job searcher. So the assumption in the evaluation of the tax incentive program is of an unemployed job searcher. Even the job search literature shows that the unemployed job searcher’s reservation wage is likely to be different than for employed (see Holzer 1987).\(^93\) So, the net benefits (or economic rent) from employment are likely to be different for unemployed, and if the jobs created by zone firms were to be held by them. This is likely to be the case even if the relationship between the economic rents and unemployment rate is ambiguous in the theoretical model.

2. The B-C analysis, it should be remembered, for local government investment only. So it is relevant to compare the reduction in an area’s unemployment rate with the costs of reducing it. By the definition of unemployment rate,\(^94\) we know that an area’s unemployment rate reduces only when jobs created by the zone firms accrue to unemployed and not when they are allocated to those changing jobs or to immigrants. So it is important to examine what happens when employment is held by unemployed only, which the adjusted approach assumes.

3. The policy literature that evaluates enterprise zones (and other urban development programs) focuses on the proportion of jobs held by zone residents, unemployed, low and moderate income persons (for instance, see the 1986 HUD evaluation of 10 state-designated enterprise zones) without elaborating the rationale for doing this. The

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\(^93\) Holzer (1987) showed that mean hourly reservation wages for unemployed youth were $4.61, compared to $6.01 for employed youth.

\(^94\) Unemployment rate is defined as the ratio of unemployed to all persons in the labor force (that consists of the employed and the unemployed).
adjustment approach overcomes this limitation in the literature by making explicit the assumptions of the model that also underlie the program.

Because there is no information available from the state’s Department of Development on who were the recipients of these jobs created by zone firms, I made the assumption that the unemployment rate of the zone represents what proportion of these jobs actually went to the unemployed. So for arriving at the unemployment-rate adjusted B-C ratio at the zone level and the firm-level respectively, I merely multiplied the unadjusted B-C ratio (obtained by taking the ratio of economic rent to costs of creating employment) by the unemployment rate of the zone (for the zone-level), or the zone in which the firm has located (for the firm-level).

Under scenario 1, for the firm at the upper end of the B-C distribution, the average adjusted (adjusted by the unemployment rate of the zones in which the firms located) B-C ratio is about 5.5. With the same adjustment, it turns out that B-C ratios for the average firm (adjusted by the average unemployment rate for the zones which is 6.34%) is slightly above 1. The adjusted, weighted average B-C ratio is also consistent with this result.

This indicates that on average, the costs of creating employment can be expected to be about equal to the benefits from such employment for local government investment, if employment were to be allocated to the unemployed. In areas with very high unemployment, the adjusted B-C ratio can be expected to be higher.95

It should be noted that the relationship between economic rents and an area’s unemployment rate was predicted to be ambiguous (although the relationship between the reservation wage and unemployment rate was hypothesized to be negative) from the theoretical model. Even in the data, there seemed to be little relationship between economic rents from employment and the unemployment rate. I found that there was a simple, but negative and insignificant correlation between the economic rents from jobs created in the zones and the unemployment rate of the zone in which they located.
Table 7.6 shows the distribution of the employment, economic rents, costs and benefit-cost ratios by zone. Table 7.6 shows that in half of the zones, the cost of creating a job was less than $1,000. In the average zone, the economic rent was above $10,000 per job, which was substantially higher than the costs per job. The difference between the earnings and the economic rent per job is equal to an amount in the range of the annual reservation wage reported earlier (about $10,000 per job). On average, the unadjusted B-C ratio is about 27. The unemployment-rate adjusted B-C ratio for the average zone is about 1.71, indicating that the benefits are 71% greater than costs of creating the employment.

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min, Max) for zones: 0th-25th Percentile</th>
<th>Mean (Min, Max) for zones: 25th-50th Percentile</th>
<th>Mean (Min, Max) for zones: 50th-75th Percentile</th>
<th>Mean (Min, Max) for zones: 75th-100th Percentile</th>
<th>Unweighted Mean for all zones (Std.Dev)</th>
<th>Weighted Mean for all zones (WL Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>36.97 (1, 82)</td>
<td>153.75 (83, 231)</td>
<td>335.83 (236, 533)</td>
<td>2,453.83 (549, 26360)</td>
<td>733.15 (2369.38)</td>
<td>733.14 (1113.75)</td>
</tr>
<tr>
<td>Annual deflated earnings per job</td>
<td>$13,074.35 (10,148.45, 15154.95)</td>
<td>$17,611.45 (13510.28, 19974.22)</td>
<td>$22,152.01 (20020.53, 24177.00)</td>
<td>$31,549.11 (24534.56, 45,281.78)</td>
<td>21,089.35 (7725.08)</td>
<td>21,089.35 (2684.22)</td>
</tr>
<tr>
<td>Economic rent per job</td>
<td>$2,739.62 (-2120.76, 5262.69)</td>
<td>$7,048.75 (5282.18, 8950.70)</td>
<td>$12,002.45 (9121.22,14443.00)</td>
<td>$20,454.63 (14575.34, 36121.29)</td>
<td>16,666.51 (7544.30)</td>
<td>10,487.25 (2963.70)</td>
</tr>
<tr>
<td>Costs per job</td>
<td>$179.80 (85.09, 267.39)</td>
<td>$408.01 (268.69, 573.82)</td>
<td>$897.30 (581.38, 1299.17)</td>
<td>$14,154.65 (1383.08, 156491.30)</td>
<td>$4,927.96 (19,853.35)</td>
<td>$3,860.62 (7148.55)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>1.79 (3.17, 4.61)</td>
<td>8.11 (4.69, 11.55)</td>
<td>22.18 (11.93, 35.66)</td>
<td>72.34 (36.15, 224.84)</td>
<td>26.95 (38.24)</td>
<td>25.55 (13.03)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>7.13% (2.05, 10.71)</td>
<td>5.85% (2.36, 11.17)</td>
<td>6.44% (2.85, 13.49)</td>
<td>6.63% (2.88, 11.66)</td>
<td>6.34% (2.44)</td>
<td>6.51 (2.13)</td>
</tr>
<tr>
<td>Average Adjusted B-C ratio</td>
<td>0.13</td>
<td>0.47</td>
<td>1.43</td>
<td>4.80</td>
<td>1.71 (0.93)</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Table 7.6: Distribution of Economic Rents and Benefit-Cost Ratios in Ohio’s (143) Enterprise Zones under Scenario 1

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It should be remembered that this is because of the way in which the adjustment is made, by multiplying the B-C ratio obtained with the area’s unemployment rate. The higher the unemployment rate, the higher is the adjusted ratio.
a. Total employment in this scenario includes jobs created and retained.
b. Economic rent is defined as: Earnings per job – Annual reservation wage.
c. This was the City of Lima EZ, where the earnings per job were only about $11,509.36 but the annual reservation wage (calculated at $6.55 per hour predicted for the zone) is $13,630.12. So the economic rent is negative.
d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.
e. This was in the Clinton Township et al EZ where a total of about $15.2 million were given to 2 firms in the form of personal and real property tax abatements (plus the cost of infrastructure) and other incentives of about $98,973.83. The two firms created about 98 jobs in the zone, which explains the high costs per job in the zone.
f. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual zones’ B-C ratios which I have calculated as the ratio of individual zones’ economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.
g. The negative B-C ratio was for the City of Lima EZ referred to in note c above, which had negative economic rent per job of -$2,120.76. The cost per job for the zone was $669.67 (about $11,210.38 was given in the form of abatements and to this I added the cost of infrastructure of $15,576.32). The single firm in the zone created about 40 jobs for a cost of $670 per job. Thus the negative economic rents per job explain the negative B-C ratio for the zone.
h. The highest B-C ratio was in the City of Galion et al EZ where 300 jobs were created with earnings of $44,287.63 per job. The reservation wage for the zone was merely $8,166.34 (hourly reservation wage of $3.93 per hour) because of its unemployment rate of 11.64%. Thus the economic rent per job was $36,121.29 and the cost per job was merely $160.65 (because only abatements of about $32,618.55 plus the cost of infrastructure) were provided to the firm in the zone.
i. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the B-C ratios would not be the same zones with the minimum and maximum values of the unemployment rate.
j. Weighted ratios were calculated as weighted averages in which the weights were the number of zones in each category (zones in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for zones in each category and sum of the weights and the means were divided by the total number of zones. A similar procedure was used to calculate weighted standard deviations for the various distributions.

The weighted B-C ratio is consistent with this indicating that net benefits are 67 percent greater than the costs of creating employment. Thus if employment is allocated to unemployed residents, benefits can be substantially greater than costs for local government investment as is the case with the average zone in the upper part of the
adjusted B-C ratio distribution (4.80). This is because it can be safely assumed that for zones with relatively lower unemployment rates, a substantial proportion of employment that is created is not held by previously unemployed. So the adjusted B-C ratio for the low-unemployment zones is less indicating that costs are greater than the benefits of creating employment if jobs are not allocated to unemployed.

I found that the correlation between the zone unemployment rate and economic rent per job was positive and stronger than that found at the firm level, being 0.09, with many lower B-C ratios found in the low-unemployment zones.

7.3.2 Scenario 2

Here the B-C ratios and the other figures (for local government investment) that are reported at the firm level and zone-level take into account only employment that was newly created. The results in this scenario are based on 575 firms in 148 zones. Retained jobs are excluded from the B-C analysis. Table 7.7 shows the distribution of B-C ratios at the firm level when calculated based on only new jobs that were created.

The total employment that was created in the zones was 33,896. The remaining 70,944 of the total of 104,840 jobs considered in Scenario 1 were retained. The economic rent in this scenario is about $10,000 on average, and about $10,000 lower than the earnings per job which is approximately equal to the annual mean reservation wage. The unadjusted B-C ratios are less than 1 till up to the 25th percentile or so indicating that for

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96 It should be noted that the unemployment rate of an area reduces only when employment that is created is offered to unemployed residents of the area. It is a different issue whether or not their reservation wages would be lower so that we can expect higher net benefits from employment offered to them. The estimation of reservation wages indicates that the unemployment rate of an area does not have a statistically significant impact on the reservation wages of individuals residing in the area. Nonetheless the effects of providing employment to unemployed persons residing in an area on the area's unemployment rate cannot be underestimated.

97 Here I applied the same restrictions for the data set of 1,974 firms as I did in Scenario 1 (deleting observations with payroll per job < $10,000 and > $50,000, those firms that did not receive tax abatements and those that relocated from within or outside the state). In this scenario, the number of observations are 575 (higher than in Scenario 1 where it was 531) because the restriction pertaining to retained jobs was not there since this scenario takes into account only jobs that were newly created. To recall the restriction with respect to retained jobs in Scenario 1, I deleted in Scenario 1 observations that had inconsistent earnings data for retained jobs (for instance, those firms that reported earnings for retained jobs when no jobs were
more than 20 percent of the firms, the costs of creating employment were greater than the benefits from local government investment. The firms with (unadjusted) B-C ratios <1 were those that created few jobs (usually <10 jobs) or were offered large abatements and were randomly distributed across low-unemployment and high-unemployment zones. I found that most of the firms with B-C ratios in higher percentiles of the distribution are located in the zones with high unemployment rates (have unemployment rates greater than 125% of the state’s average for 1990). The correlation, however, between economic rent and unemployment rate of the zone (in which firm had located) was negative though not statistically significant, being -0.1.

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min,Max) for firms: 0th-25th Percentile</th>
<th>Mean (Min,Max) for firms: 25th-50th Percentile</th>
<th>Mean (Min,Max) for firms: 50th-75th Percentile</th>
<th>Mean (Min,Max) for firms: 75th-90th Percentile</th>
<th>Unweighted Mean for all firms (Std.Dev.)</th>
<th>Weighted Mean for firms (WLS.Std.Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>6.37 (1.11)</td>
<td>17.56 (12.27)</td>
<td>43.88 (28.68)</td>
<td>170.79 (69.1023)</td>
<td>59.95 (22.61)</td>
<td>58.95 (37.23)</td>
</tr>
<tr>
<td>Annual deflated</td>
<td>$12,409.71 (10076.12, 14554.11)</td>
<td>$16,472.92 (14634.91, 18596.79)</td>
<td>$21,491.57 (18600.32, 24635.04)</td>
<td>$31,477.84 (24816.45, 48436.18)</td>
<td>$20,534.26 (7,881.70)</td>
<td>$20,534.26 (2,513.02)</td>
</tr>
<tr>
<td>Economic rent</td>
<td>$121.06 (-10,138.02, 3670.92)</td>
<td>$5,921.91 (3,062,26, 7,882.93)</td>
<td>$10,713.90 (7,921.71, 14,097.20)</td>
<td>$20,381.02 (14,127.23, 37,980.23)</td>
<td>$9,331.02 (816.65)</td>
<td>$9,281.10 (2,856.89)</td>
</tr>
<tr>
<td>Costs per job</td>
<td>$462.65 (80.04, 754.12)</td>
<td>$1,086.88 (759.82, 1,501.95)</td>
<td>$2,173.33 (1,512.89, 3,039.92)</td>
<td>$14,062.94 (3047.45, 12739.82)</td>
<td>$6,623.86 (54,776.70)</td>
<td>$4,415.92 (6,639.01)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>-0.76 (-46.43, 1.40)</td>
<td>2.94 (1.49, 4.71)</td>
<td>7.82 (4.77, 11.47)</td>
<td>25.58 (11.59, 106.88)</td>
<td>9.05 (14.11)</td>
<td>8.88 (6.20)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>7.57% (2.05, 11.66)</td>
<td>6.76% (2.76, 11.66)</td>
<td>6.76% (2.76, 11.66)</td>
<td>6.59% (2.36, 13.49)</td>
<td>6.34% (2.43)</td>
<td>6.87 (2.19)</td>
</tr>
<tr>
<td>Average Adjusted B-C ratio</td>
<td>0.06</td>
<td>0.20 (0.20)</td>
<td>0.52 (0.52)</td>
<td>1.68 (1.68)</td>
<td>0.57 (0.34)</td>
<td>0.58 (0.58)</td>
</tr>
</tbody>
</table>

Table 7.7: Distribution of Economic Rents and Benefit-Cost Ratios for the (575) Firms in Ohio’s Enterprise Zones under Scenario 2

a. Total employment in this scenario includes only jobs that were created. Excludes retained jobs.
b. Economic rent is defined as: Earnings per job – Annual reservation wage.

in fact retained). Because of not imposing this restriction in this scenario, I was left with 575 observations in the firm-level data and about 148 observations in the zone-level data.
c. This was for a firm with SIC code 2789 in the City of Cleveland EZ. The economic rent per job is negative because of the high reservation wages ($9.78 per hour translating to $20,342.40) in the zone relative to earnings from jobs ($10,117.47 per job).

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.

e. This was a foundry plant in Rootstown Township et al, which created 317 jobs. The cost per job is low because only abatements for $9,797.57 were given to the firm (plus the cost of infrastructure, $15,576.32). This along with the considerable employment the firm created is the reason for the low cost per job.

f. This was for a firm with SIC code 2812 in Clinton Township et al EZ to whom about $12.7 million, $10,711.55 and about $35,000 were provided in the form of real and personal property tax abatements and other incentives respectively. But the firm created only 10 jobs which explains the high costs per job.

g. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual firms' B-C ratios which I have calculated as the ratio of individual firms' economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.

h. This is for a firm with SIC code 2399 in the City of Cincinnati (Lower Mill Creek) EZ. The B-C ratio is negative because the economic rent is negative being -$8,853.65. This is due to the low earnings per job of $10,539.32 whereas the reservation wages per job for the zone (in which this firm located) is predicted to be $9.30/hour ($19,392.92 annually). The firm created 116 jobs. The cost per job for the firm is low being $190.70 (abatements of $6,544.76 plus the cost of infrastructure were provided to the firm). But the ratio of the negative economic rent to a low cost per job yields us a negative B-C ratio.

i. The high B-C ratio is for a firm in the City of Norwalk EZ. The economic rent per job created by this firm was $9,716.89 because the earnings from job is $17,974.94, but the reservation wage for the zone (in which the firm located) is low being $8,258.04 (hourly reservation wage of $3.97), causing the high economic rents per job. The zone is a high unemployment zone (with unemployment rate of 9.6%). The cost per job is low, being $90.01 because abatements of only $1,969.35 plus the cost of infrastructure were given to the firm. 193 jobs were created by the firm. The ratio of the high economic rent to the low cost per job explains the high B-C ratio.

j. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for firms in the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the adjusted B-C ratios would not be the same with the minimum and maximum values of the unemployment rate for the zone in which they locate.

k. Weighted ratios were calculated as weighted averages in which the weights were the number of firms in each category (firms in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for firms in each category and sum of the weights and the means were divided by the total number of firms. A similar procedure was used to calculate weighted standard deviations for the various distributions.
The unemployment rate-adjusted average B-C ratio based on Table 7.7 is 0.57 (9.05*6.34%, the average unemployment rate for the zones). Thus when we take into account only jobs that were created new and assume that about 6 unemployed out of 100 people get the jobs (remember that 6.34% is the average unemployment rate for all zones), the B-C ratio is less than 1 on average. The average, adjusted weighted B-C ratio of 0.58 also supports this. For firms at the top of the distribution of B-C ratios, the unemployment rate-adjusted ratio ranges to slightly over 1. Thus in an area with average or low unemployment rate that uses tax incentives to attract firms and create employment, the costs of creating the employment can be expected to be higher than the benefits of creating them, at least from the local government’s perspective. This is especially the case if we take into account unemployment-rate adjusted ratios, as we have seen above. Only highly selective targeting of areas (with high unemployment rates) with employment allocated to unemployed can make the program more beneficial.

The same pattern of B-C ratios essentially repeats itself when we take into account zone-level performance in Scenario 2, the results from which are reported in Table 7.8. Table 7.8 shows that the mean earnings per job is reasonable around $20,000, and concurs with the expectation of the Ohio Department of Development regarding the nature of jobs that are created by the firms that typically locate in the zones. The high-cost areas are those in which firms made large investments in personal and real property and as a result large abatements were provided. The lowest economic rents from employment are in zones in which the earnings per job were below average or when reservation wages were high due to the area’s low unemployment rate. Lower economic rents were found in some high-unemployment zones, with correlation between economic rent and unemployment rate being –0.1.

The same pattern holds good for zones with B-C ratios less than 1 because these are zones with low economic rents because of low earnings from employment. The

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98 The unemployment-rate adjusted approach is quite similar to the assumption made in this scenario which takes into account only jobs created, but is more restrictive in that it assumes that the unemployment rate of the area represents the proportion of persons that can be expected to hold the jobs, even if the jobs were newly created.
unemployment rate (unweighted) adjusted B-C ratio for the average zone is about 0.64 (the weighted average being 0.65), which indicates that on average, it is not cost-effective to use tax incentives to create employment. For zones in the upper 25% of the B-C ratio distribution, the benefits are roughly equal to costs and the adjusted unemployment-rate ratio ranges to slightly over 1. These were zones in which the economic rents from employment were high compared to the costs of creating them. Thus local government investment is beneficial only in few areas, with the assumption that jobs that are newly created are held only by the unemployed.

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min,Max) for zones: 0th - 25th Percentile</th>
<th>Mean (Min,Max) for zones: 25th - 50th Percentile</th>
<th>Mean (Min,Max) for zones: 50th - 75th Percentile</th>
<th>Mean (Min,Max) for zones: 75th - 100th Percentile</th>
<th>Unweighted Mean for all zones (Std.Dev)</th>
<th>Weighted Mean for zones (Wt.Std. Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>19.87 (1, 42)</td>
<td>74.69 (43, 106)</td>
<td>791.40 (107, 288)</td>
<td>531.62 (290, 1431)</td>
<td>229.03 (280.56)</td>
<td>229.02 (93.06)</td>
</tr>
<tr>
<td>Annual deflated earnings</td>
<td>$13,337.93 (10148.45, 15311.77)</td>
<td>$17,706.85 (15438.60, 19707.11)</td>
<td>$21,468.59 (19757.39, 23618.26)</td>
<td>$29,282.95 (23861.97, 47345.77)</td>
<td>$20,449.08 (6574.58)</td>
<td>$20,449.08 (2326.66)</td>
</tr>
<tr>
<td>Economic rent per job</td>
<td>$2,952.61 (-755.87, 5036.53)</td>
<td>$7,118.41 (5194.37, 8953.70)</td>
<td>$11,224.33 (8964.85, 13440.43)</td>
<td>$18,495.26 (13702.25, 3790.67)</td>
<td>$10,079.37 (6643.42)</td>
<td>$9,957.24 (2172.44)</td>
</tr>
<tr>
<td>Costs per job</td>
<td>$440.94 (1.34, 662.61)</td>
<td>$515.05 (668.12, 1233.86)</td>
<td>$1,723.47 (1265.99, 2428.51)</td>
<td>$19,970.69 (2464.24, 182954.77)</td>
<td>$5,762.54 (20148.18)</td>
<td>$5,762.54 (9452.37)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>1.01 (0.59, 3.17)</td>
<td>4.96 (3.20, 6.69)</td>
<td>9.95 (6.77, 13.76)</td>
<td>24.77 (13.90, 67.03)</td>
<td>10.17 (10.96)</td>
<td>10.17 (4.16)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>7.30% (205, 11.17)</td>
<td>5.90% (2.67, 10.30)</td>
<td>5.99% (2.36, 11.66)</td>
<td>6.65% (3.05, 13.49)</td>
<td>6.34 (2.44)</td>
<td>6.46 (2.11)</td>
</tr>
<tr>
<td>Average Adjusted B-C ratio</td>
<td>0.07 (205, 11.17)</td>
<td>0.29 (2.67, 10.30)</td>
<td>0.60 (2.36, 11.66)</td>
<td>1.65 (3.05, 13.49)</td>
<td>0.64 (0.27)</td>
<td>0.65 (0.27)</td>
</tr>
</tbody>
</table>

Table 7.8: Distribution of Economic Rents and Benefit-Cost Ratios for (148) Ohio’s Enterprise Zones under Scenario 2

a. Total employment in this scenario includes only jobs created. Excludes retained jobs.
b. Economic rent is defined as: Earnings per job – Annual reservation wage.
c. The negative economic rent per job is in the City of Dayton EZ. The earnings per job was $18,903.37 and the reservation wage was $19,659.24 ($9.45/hour).
d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.
e. This was in the Village of Ontario EZ where only $5,960.97 in the form of abatements (plus the infrastructure cost of $15,576.32 from the survey) were awarded to a single firm cumulatively that created 160 jobs.
f. This is in the Clinton Township et al EZ. The high cost per job is because $15.2 million, $46,728.96 and $98,973.83 were respectively given as abatements, infrastructure and other incentives to three firms in the EZ that created a total of 84 jobs.

g. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual zones' B-C ratios which I have calculated as the ratio of individual zones' economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.

h. The negative B-C ratio is due to the negative economic rent per job for the City of Dayton EZ which was -$755.87 (the same zone referred to in note c above). The cost per job in the zone $1,275.47. Abatements of $728,175.93 and infrastructure costs (obtained from survey) of about $373,831.68 were incurred on 24 firms in the zone that created 864 jobs. The ratio of -$755.87 to $1,275.47 gives a B-C ratio of -0.59.

i. This is in the Concord Township EZ. The economic rent per job is $20,349.19 with earnings being $29,274.96 per job and reservation wages of $8,925.76 ($4.29/hour). The cost per job is only $303.59 in this zone because only $6,889.27 were given in the form of property tax abatements (plus the cost of infrastructure) to the firm in the zone that created 74 jobs. The ratio of this cost per job to the economic rent yields a B-C ratio of 67.03.

j. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the B-C ratios would not be the same zones with the minimum and maximum values of the unemployment rate.

k. Weighted ratios were calculated as weighted averages in which the weights were the number of zones in each category (zones in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for zones in each category and sum of the weights and the means were divided by the total number of zones. A similar procedure was used to calculate weighted standard deviations for the various distributions.

7.3.3 Scenario 3

Tables 7.9-7.12 show the results from the economic rents from employment and B-C ratios for respectively 198 (in 62 zones) and 91 firms (in 32 zones). These are results

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99 Here I imposed the same restrictions as I did in Scenario 1 (deleted observations with payroll per job <$10,000 and >$50,000, those firms that did not receive tax abatements and those that relocated from within or outside the state). However the extra condition here that reduces the number of firm observations considerably is that of deleting observations that had X (i.e., total taxes that would've been paid in the absence of the abatement) = 0. This condition was necessary to be imposed because X appears in the denominator in the calculation of dY in the expression for elasticity: dY/dX  * X/Y = -0.1 (-0.3). So dY=(dX/X)*0.3(0.1)*Y. See the next footnote. If I do not delete these observations with X=0, division by zero is encountered while calculating dY. The number of observations differs across the two elasticity assumptions because the restriction of deleting observations with payroll per job <$10,000 and >$50,000 that is imposed takes into account only employment that was attributable to the tax incentive under the two
based on the assumption that the elasticity of employment with respect to taxes is −0.3 (the upper range in Bartik's summary of econometric studies) and −0.1 respectively (the lower range in Bartik's summary). Thus the employment and economic rents that are reported in these tables refer to the portion of employment reported to be created and retained that was actually attributable to the tax incentive under two different assumptions of elasticity (−0.3 and −0.1). With an assumed elasticity of employment with respect to taxes equal to −0.3, of the 19,990 jobs that were reported by the firms to be created and retained, only about 8,791 (about 44%) were actually attributable to the tax incentive. With an assumed elasticity of −0.1, only about 1,894 (about 31%) of the 5,974 jobs that were created were actually attributable to the tax incentive.

For firms in the lower portion of the employment distribution, the number of jobs that was attributable to the tax incentive was almost always less than what they reported. For firms none of whose jobs were attributable to the tax incentive, this indicates that the firms probably did not locate there for the tax incentive (for instance, the case of 0.91 jobs a firm created, see the 1st row and 1st column of Table 7.9). For firms in the upper part of the employment distribution, a majority of the employment that they reported to be created and/or retained was due to the tax incentive.

assumptions of elasticity. Under the lower elasticity assumption, it should be clear that the employment attributable to the tax incentive will be lower than that under the higher elasticity assumption. We should also see that the cost per job is undefined when the total employment attributable to the tax incentive is 0 (since cost per job is defined as abatements/jobs). So I defined the cost per job to be missing if total employment were 0. If cost per job were missing, the B-C ratio would also be missing and the number of valid observations reduce. It is easy to see why some firms created no jobs that were attributable to the tax incentive according to the lower elasticity assumption, and so a large number of observations are lost this way when elasticity=−0.1 (rather than when it is −0.3).

The long-run (which may be defined as 10 years or more) elasticity of business activity (here, employment) due to a proportionate change in taxes, for intrametropolitan locations, according to Bartik (1991; 1992) is in the range of -1.0 to -3.0. For any given year, then the elasticity is,

\[ \frac{dY}{dX} \times \frac{X}{Y} = -0.1 (-0.3) \]

\( X \) refers to original taxes (total taxes that would have been paid in the absence of the EZ), \( Y \) is the original (baseline) employment at the site (without EZ), \( dX \) is the change in taxes paid due to the EZ (which is the abatement) and \( dY \) is the change in employment because of EZ. I substituted for the values of \( dX, X \) and \( Y \) to obtain employment that is attributable to the tax incentive (\( dY \)), based on the two ranges of elasticity reported by Bartik (1991). So \( dY = (dX/X) \times 0.3 \times 0.1 \times Y \). If \( dY \) turned out to be > actual employment created and retained by the firm or zone, I made \( dY = \) actual total employment created and retained by the firm or zone. In cases where \( dY \) turned out to be <=actual employment, I used the smaller \( dY \) (instead of actual employment) to calculate earnings/job, economic rent/job, costs/job and B-C ratios/job.
Tables 7.9-7.10 provide a range for the benefit-cost ratio for local government investment at the firm level if we were to assume the elasticity to be in the range $-0.3$ to $-0.1$. Tables 7.9-7.10 show that on average, the (unweighted) unemployment rate-adjusted B-C ratio can be expected to be in the range 1.75 (with an elasticity of $-0.3$) to (0.81) less than 1 (with elasticity of $-0.1$). The range, if weighted average B-C ratio is taken into account, is from 1.86 to 0.85 with the two assumptions of elasticity, as shown in Tables 7.9-7.10. Naturally with an assumption of the elasticity in the lower range, the benefits from creating employment are lower than the costs. However, under both assumptions of elasticity, it should be noted that for firms in the upper quintile of the B-C distribution, the benefits are substantially greater than costs (although the ratio is naturally higher with the higher assumed elasticity than with the lower elasticity).

A similar pattern repeats for the zone-level performance data (see Tables 7.11-7.12). At the zone-level, the (unweighted) average B-C ratios are slightly lower than at the firm level. The (unweighted) unemployment rate adjusted B-C ratio for the average zone is 1.3 for the higher elasticity and <1 (0.62) for the lower elasticity. As before, for zones in approximately the upper 10 percent of the B-C ratio distribution, benefits are substantially (twice) greater than costs under both assumptions of elasticity. However, when the weighted adjusted, average B-C ratio is taken into account at the zone level, the range of B-C ratio appears to be from 0.96 (with an elasticity of $-0.3$) to 0.69 (elasticity of $-0.1$), as shown in Tables 7.11-7.12.

The correlation between economic rents from employment and zone unemployment rates with an assumed elasticity of $-0.3$ was negative, but small and insignificant, being about $-0.03$. With an assumed elasticity of $-0.1$, this correlation was positive and higher, being 0.12.\footnote{It should be remembered that the prediction from the theoretical model regarding the relationship between economic rents and the unemployment rate of zones was also ambiguous, mainly because of low wages and low reservation wages in EZs (at least in those with high unemployment). The data also are ambiguous regarding this relationship.} The zones in the top portion of the B-C ratio distribution were ones with higher economic rents relative to lower costs of creating employment. The average unemployment rate for the (2) zones with B-C ratio $>100$ (with
an assumed elasticity of \(-0.3\) was 9.9\%, which is higher than 120\% of the state’s average unemployment rate in 1990. With an assumed elasticity of \(-0.1\), the only zone that had a B-C ratio > 100 (111.97) had a high unemployment rate also, which was 8.13\% in 1990.

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min, Max) for firms: 0\textsuperscript{a}-25\textsuperscript{a} Percentile</th>
<th>Mean (Min, Max) for firms: 25\textsuperscript{a}-50\textsuperscript{a} Percentile</th>
<th>Mean (Min, Max) for firms: 50\textsuperscript{a}-75\textsuperscript{a} Percentile</th>
<th>Mean (Min, Max) for firms: 75\textsuperscript{a}-100\textsuperscript{a} Percentile</th>
<th>Unweighted Mean for all firms (Std.Dev)</th>
<th>Weighted Mean for firms (WLS.Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>3.53 (6.91, 6)</td>
<td>9.29 (6.16, 12.51)</td>
<td>18.33 (12.61, 25)</td>
<td>148.18 (26, 1206)</td>
<td>44.40 (124.41)</td>
<td>44.40 (56.47)</td>
</tr>
<tr>
<td>Annual deflated earnings per job</td>
<td>$13,636.09 (101,770,80,1720.05)</td>
<td>$21,584.98 (172,747,92588,46)</td>
<td>$30,591.50 (35455,71)</td>
<td>$42,440.13 (35862,24,49737,04)</td>
<td>$27,073.02 (11,196,61)</td>
<td>$27,073.02 (2898,34)</td>
</tr>
<tr>
<td>Economic rent per job\textsuperscript{a}</td>
<td>$2,075.81 (15703,50,6272,03)</td>
<td>$10,959.53 (6755,28,15741,49)</td>
<td>$29,199.52 (15936,28,24809,38)</td>
<td>$31,510.01 (25017,49,40862,68)</td>
<td>$16,135.22 (11,518,54)</td>
<td>$16,135.22 (5338,53)</td>
</tr>
<tr>
<td>Costs per job\textsuperscript{a}</td>
<td>$615.57 (10517,255,06)</td>
<td>$1,842.51 (10731,3,2255,06)</td>
<td>$3,166.89 (2264,07,4326,76)</td>
<td>$16,051.59 (4435,89,127398,19)</td>
<td>$71,692.13 (91,494,86)</td>
<td>$5,284.57 (7,456,57)</td>
</tr>
<tr>
<td>B-C Ratio\textsuperscript{a}</td>
<td>0.18 (-10.28, 1.73)</td>
<td>3.49 (1.77, 5.60)</td>
<td>9.41 (5.88, 15.21)</td>
<td>96.61 (15.50, 2159.17)</td>
<td>27.65 (159.40)</td>
<td>27.65 (79.54)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>7.31% (3.65, 1.61)</td>
<td>7.23% (2.88, 11.98)</td>
<td>7.95% (3.70, 13.49)</td>
<td>6.61% (3.44, 13.49)</td>
<td>6.34 (2.44)</td>
<td>7.27 (2.18)</td>
</tr>
<tr>
<td>Average Adjusted B-C ratio\textsuperscript{a}</td>
<td>0.01</td>
<td>0.25</td>
<td>0.75</td>
<td>6.38</td>
<td>1.75 (3.89)</td>
<td>1.86</td>
</tr>
</tbody>
</table>

Table 7.9: Distribution of Economic Rents and Benefit-Cost Ratios for (198) Firms in Ohio’s Enterprise Zones under Scenario 3 (Assumed Elasticity = -0.3)

a. Total employment, including jobs that were created and retained, that were attributable to the tax incentive, assuming an elasticity of -0.3.

b. Economic rent is defined as: Earnings per job – Annual reservation wage.

c. This was a machinery plant in the City of Lincoln Heights et al. EZ. The earnings per job were lower (being $10,177.08) when compared to the reservation wages per job ($12.44/hour ($25,880.71 being the annual reservation wage) predicted for the zone with unemployment rate of 6.46\%. Thus the high reservation wages explain the negative economic rent per job.

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.

e. This was for a GM plant in the City of Defiance et al. EZ to which no abatements were given by the EZ (I included only the cost of infrastructure of $15,576.32) and created 960 jobs. The large number of jobs and no abatements explain the low cost per job.

f. This was for a firm with SIC code 2812 in Clinton Township et al. EZ to whom about $12.7 million, $10,711.55 and about $35,000 were provided in the form of real and personal property tax abatements and other incentives respectively. But the firm created only 10 jobs (that were attributable to the tax incentive) which explains the high costs per job.

g. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratio based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal
valuable information on the individual firms' B-C ratios which I have calculated as the ratio of
individual firms' economic rents to costs per job. The minimum and maximum values for the
distribution of B-C ratios should make clear the average values of the B-C distribution, when we
compare them to the economic rent and cost distribution.

h. The negative B-C ratio is for a machinery plant (SIC code 5084) in the City of Lincoln Heights et al
EZ. The B-C ratio is negative because of the negative economic rent, which was -$15,703.50 (the same
firm referred to in note c above). The cost per job for this firm, which created 10 jobs, was $1,527.09.
No abatements were provided to the firm. I added the cost of infrastructure ($15,576.32) to the cost of
creating employment. The ratio of negative economic rent to a low cost per job leads to a negative B-C
ratio of -10.28.

i. The high B-C ratio is for a GM/Powertrain plant in the City of Defiance et al EZ that created 960 jobs
attributable to the abatement. The economic rent per job was $35,033.21, the earnings being
$43,192.33 per job. The economic rent is high because of the low reservation wage ($3.93/hour,
translating to an annual amount of $8,174.40) due to an unemployment rate of 8.13%.

j. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C
ratio (row 5) multiplied by the average unemployment rate for firms in the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the
unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for
this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and
maximum values for the adjusted B-C ratios would not be the same firms with the minimum and
maximum values of the unemployment rate for the zone in which they locate.

k. Weighted ratios were calculated as weighted averages in which the weights were the number of firms
in each category (firms in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles)
of the relevant distributions. For the weighted means, the weights were multiplied by the means for
firms in each category and sum of the weights and the means were divided by the total number of
firms. A similar procedure was used to calculate weighted standard deviations for the various
distributions.
<table>
<thead>
<tr>
<th></th>
<th>Mean (Min, Max) for firms: 0th-25th Percentile</th>
<th>Mean (Min, Max) for firms: 25th-50th Percentile</th>
<th>Mean (Min, Max) for firms: 50th-75th Percentile</th>
<th>Mean (Min, Max) for firms: 75th-100th Percentile</th>
<th>Unweighted Mean for all firms (Std.Dev)</th>
<th>Weighted mean for firms (Wt.Std. Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>1.96 (0.37, 3.73)</td>
<td>5.87 (4.86, 8.53)</td>
<td>14.14 (8.89, 21)</td>
<td>72.43 (21.5, 387)</td>
<td>23.15 (48.62)</td>
<td>23.23 (21.46)</td>
</tr>
<tr>
<td>Annual deflated earnings per job</td>
<td>$13,952.83 (11,013.22, 16,497.22)</td>
<td>$20,616.23 (17,343.53, 24,146.09)</td>
<td>$30,263.82 (24,709.70, 35,165.22)</td>
<td>$41,796.84 (56,306.58, 49,292.28)</td>
<td>$26,617.57 (11,100.76)</td>
<td>$26,356.61 (2,636.23)</td>
</tr>
<tr>
<td>Economic rent per job</td>
<td>$3,586.48 (-125.77, 6,272.03)</td>
<td>$9,514.91 (6,899.56, 13,466.98)</td>
<td>$19,601.75 (13,585.95, 26,671.05)</td>
<td>$32,005.81 (26,974.90, 36,384.07)</td>
<td>$16,152.39 (11,002.71)</td>
<td>$16,348.94 (2,731.12)</td>
</tr>
<tr>
<td>Costs per job (a)</td>
<td>$750.35 (40.25, 1028.13)</td>
<td>$2,254.77 (1,038.42, 3,857.38)</td>
<td>$5,516.82 (3,609.37, 9,016.16)</td>
<td>$27,866.49 (9,548.63, 15,277.34)</td>
<td>$10,517.92 (2,361.22)</td>
<td>$9,897.30 (2,152.57)</td>
</tr>
<tr>
<td>B-C Ratio (b)</td>
<td>0.66 (-0.03, 1.38)</td>
<td>2.37 (1.40, 3.62)</td>
<td>5.36 (3.69, 7.98)</td>
<td>42.31 (8.62, 422.78)</td>
<td>12.80 (45.36)</td>
<td>12.80 (22.11)</td>
</tr>
<tr>
<td>Unemployment rate (c)</td>
<td>7.08% (3.05, 9.35)</td>
<td>7.20% (2.88, 11.61)</td>
<td>7.44% (4.26, 13.98)</td>
<td>6.54% (2.05, 13.49)</td>
<td>6.34 (2.44)</td>
<td>6.61 (2.02)</td>
</tr>
<tr>
<td>Average Adjusted B/C ratio (d)</td>
<td>0.05</td>
<td>0.17</td>
<td>0.41</td>
<td>2.77</td>
<td>0.81 (1.11)</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Table 7.10: Distribution of Economic Rents and Benefit-Cost Ratios for (91) Firms in Ohio’s Enterprise Zones under Scenario 3 (Assumed Elasticity = -0.1)

a. Total employment, including jobs that were created and retained, that were attributable to the tax incentive, assuming an elasticity of -0.1.

b. Economic rent is defined as: Earnings per job – Annual reservation wage.

c. The economic rent is negative because of the low earnings per job ($11,013.22) for the 8 jobs created by the firm (with SIC code 2654) in the City of Mount Vernon EZ. The reservation wage was $5.35/hour for the zone (translating to an annual reservation wage of $11,138.95).

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.

e. This is for a GM/Powertrain plant in the City of Defiance et al EZ that created 387 jobs. The cost per job is low because no abatements were given to the firm. The only cost of creating employment is the cost of infrastructure to the firm (the average cost per firm obtained through the survey).

f. This is a plant (with SIC code 3070) in the Village of West Unity EZ. The cost per job is high because only 6 jobs were created by the firm which received an abatement of nearly $901,064.15 (plus the cost of infrastructure).

g. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual firms’ B-C ratios which I have calculated as the ratio of individual firms’ economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.

h. This is the same firm that has the negative economic rent per job (the firm referred to in note c above). The cost per job for the 8 jobs created by the firm is $4,700.34. Abatements for $22,026.43 (plus the cost of infrastructure) were provided to the firm. The ratio of -125.77 to 4700.34 gives a negative B-C ratio of -0.03.

i. This is for the GM/Powertrain plant in the City of Defiance et al EZ that created 387 jobs attributable to the abatement. This is the firm with the lowest cost/per job ($40.25 explained in note e above). The
economic rent per job for jobs created by the firm is $17,016.29, and the earnings being $25,175.40 per job. The economic rent per job is high because of low reservation wages of $3.92 per hour (translating to an annual reservation wage of $8,159.13 per job). The ratio of the high economic rent ($17,016.29) to the low cost per job ($40.25) explains the high B-C ratio of 422.78.

j. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for firms in the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the adjusted B-C ratios would not be the same firms with the minimum and maximum values of the unemployment rate for the zone in which they locate.

k. Weighted ratios were calculated as weighted averages in which the weights were the number of firms in each category (firms in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for firms in each category and sum of the weights and the means were divided by the total number of firms. A similar procedure was used to calculate weighted standard deviations for the various distributions.

<table>
<thead>
<tr>
<th></th>
<th>Mean (Min,Max) for zones: 0th-25th Percentile</th>
<th>Mean (Min,Max) for zones: 25th-50th Percentile</th>
<th>Mean (Min,Max) for zones: 50th-75th Percentile</th>
<th>Mean (Min,Max) for zones: 75th-100th Percentile</th>
<th>Unweighted Mean for all zones (Std.Dev)</th>
<th>Weighted Mean for zones (WLS.Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>7.56 (1.41, 12.61)</td>
<td>26.77 (13.15, 41.29)</td>
<td>95.81 (43.74, 157.46)</td>
<td>454.88 (162, 1570)</td>
<td>143.51 (268.11)</td>
<td>143.51 (112.24)</td>
</tr>
<tr>
<td>Annual deflated</td>
<td>$15,596.67 (10894.26, 19022.55)</td>
<td>$22,630.06 (19041.79, 27154.26)</td>
<td>$29,532.43 (27379.72, 32714.84)</td>
<td>$41,133.26 (33360.46, 48587.09)</td>
<td>$143.51 (10,212.04)</td>
<td>$27,357.45 (2,574.45)</td>
</tr>
<tr>
<td>earnings per job</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic rent per</td>
<td>$3,988.64 (-4990.01, 8491.40)</td>
<td>$12,565.93 (8506.76, 16857.30)</td>
<td>$19,629.91 (17088.55, 23154.76)</td>
<td>$30,809.09 (23298.23, 39143.82)</td>
<td>$16,589.07 (10,458.32)</td>
<td>$16,589.07 (3,262.76)</td>
</tr>
<tr>
<td>job</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs per job</td>
<td>$672.67 (511.74, 1129.73)</td>
<td>$1,354.99 (1126.21, 1735.04)</td>
<td>$2,533.31 (1767.29, 3394.43)</td>
<td>$8,772.99 (3618.97, 1273982.19)</td>
<td>$27,684.78 (61479.00)</td>
<td>$3,188.10 (2,394.90)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>1.11 (-4.15, 6.98)</td>
<td>5.44 (3.00, 7.76)</td>
<td>11.03 (7.93, 15.55)</td>
<td>38.63 (15.86, 150.33)</td>
<td>21.36 (63.55)</td>
<td>13.84 (10.61)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>7.28% (3.05, 10.20)</td>
<td>7.74 (4.26, 11.00)</td>
<td>7.39% (4.76, 11.17)</td>
<td>6.69% (3.49, 13.49)</td>
<td>6.34 (2.44)</td>
<td>7.27 (2.14)</td>
</tr>
<tr>
<td>Average Adjusted B-C</td>
<td>0.08</td>
<td>0.42</td>
<td>0.81</td>
<td>2.58</td>
<td>1.35 (1.55)</td>
<td>0.96</td>
</tr>
</tbody>
</table>

Table 7.11: Distribution of Economic Rents and Benefit-Cost Ratios for Ohio’s (62) Enterprise Zones under Scenario 3 (Assumed Elasticity = -0.3)

a. Total employment, including jobs that were created and retained, that were attributable to the tax incentive, assuming an elasticity of -0.3.

b. Economic rent is defined as: Earnings per job – Annual reservation wage.

c. This is for the City of Lincoln Heights et al EZ where the earnings per job were $20,890.60 and the annual reservation wages were $25,880.61 ($12.44 per hour). The high reservation wages were due to the low unemployment rate of the zone, which was 6.46%. In the zone were created 32 jobs that were attributable to the abatement.

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.
e. The cost per job is low in the City of Defiance et al EZ where only $2,456 were given in the form of abatements to 5 firms that created 1,570 jobs. The large number of jobs and the small abatement explain the low cost per job.

f. This was in Clinton Township et al EZ where about $12.7 million, $15,576.32 and about $35,000 were provided in the form of real and personal property tax abatements, infrastructure and other incentives respectively to a single firm. But the firm created only 10 jobs (that were attributable to the tax incentive) which explains the high costs per job.

g. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual zones' B-C ratios which I have calculated as the ratio of individual zones' economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.

h. The negative B-C ratio is in the City of Lincoln Heights et al EZ. The B-C ratio is negative because of the negative economic rent per job (-$4,990.01) which is explained in note c above. The cost per job in the zone was $1,202.40 for the 32 jobs that were created in the zone (by 2 firms) that were attributable to the abatement of $7,444.29 (and infrastructure costs of $31,152.64). The ratio of -4,990.01 to $1,202.40 explains the B-C ratio of -4.15.

i. This was in the City of Middletown EZ where 1,200 jobs were created. The economic rent per job was $34,617.90 and the earnings per job was $46,414.96. The reservation wage was low being $5.67/hour (or an annual reservation wage of $11,797.06) because of the zone's unemployment rate of 11.66%. The cost per job in the zone was only $230.28 because although abatements worth $260,762.15 and infrastructure for $15,576.32 were given to the firm in the zone, the large number of (1,200) jobs that were created made the cost per job low. The ratio of $34,617.90 to $230.28 explains the B-C ratio of 150.33.

j. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the adjusted B-C ratios would not be the same zones with the minimum and maximum values of the unemployment rate.

k. Weighted ratios were calculated as weighted averages in which the weights were the number of zones in each category (zones in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for zones in each category and sum of the weights and the means were divided by the total number of zones. A similar procedure was used to calculate weighted standard deviations for the various distributions.
<table>
<thead>
<tr>
<th></th>
<th>Mean (Min, Max) for zones: 0th- 25th Percentile</th>
<th>Mean (Min, Max) for zones: 25th- 75th Percentile</th>
<th>Mean (Min, Max) for zones: 75th- 100th Percentile</th>
<th>Unweighted Mean for all zones (Std.Dev)</th>
<th>Weighted Mean for zones (Wt.Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Employment</td>
<td>4.50 (1.55, 7.42)</td>
<td>11.34 (8.16, 14.14)</td>
<td>38.85 (27.97, 48.72)</td>
<td>182.11 (64.01, 523)</td>
<td>59.20 (106.01)</td>
</tr>
<tr>
<td>Annual defined earnings per job</td>
<td>$15,085.66 (111,03.22, 18899.14)</td>
<td>$21,350.98 (18905.91, 25450.02)</td>
<td>$28,404.33 (25844.22, 32716.81)</td>
<td>$39,968.96 (34347.08, 43895.87)</td>
<td>$26,202.48 (9,866.44)</td>
</tr>
<tr>
<td>Economic rent per job</td>
<td>$31.18 (125.77, 692.74)</td>
<td>$40,728.34 (88005.55, 13272.49)</td>
<td>$17,587.70 (14066.98, 22528.87)</td>
<td>$30,119.24 (25039.41, 36384.07)</td>
<td>$15,896.02 (10019.75)</td>
</tr>
<tr>
<td>Costs per job</td>
<td>$952.72 (199.66, 1827.23)</td>
<td>$2,435.89 (1925.31, 3175.07)</td>
<td>$5,605.98 (3669.23, 1085.77)</td>
<td>$3,437.66 (11433.87, 97277.84)</td>
<td>$12,742.80 (23,168.14)</td>
</tr>
<tr>
<td>B-C Ratio</td>
<td>0.56 (-0.03, 0.16)</td>
<td>2.20 (1.88, 2.39)</td>
<td>5.79 (3.69, 8.76)</td>
<td>30.36 (9.48, 11.97)</td>
<td>9.73 (20.48)</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>5.40% (3.05, 6.88)</td>
<td>7.97% (5.24, 9.35)</td>
<td>7.97% (4.76, 11.00)</td>
<td>8.87% (2.05, 13.49)</td>
<td>6.34 (2.44)</td>
</tr>
<tr>
<td>Average Adjusted B-C ratio</td>
<td>0.03</td>
<td>0.17</td>
<td>0.46</td>
<td>2.09</td>
<td>0.62 (0.50)</td>
</tr>
</tbody>
</table>

Table 7.12: Distribution of Economic Rents and Benefit-Cost Ratios for Ohio's (32) Enterprise Zones under Scenario 3 (Assumed Elasticity = -0.1)

a. Total employment, including jobs that were created and retained, that were attributable to the tax incentive, assuming an elasticity of -0.1.

b. Economic rent is defined as: Earnings per job – Annual reservation wage.

c. The economic rent is negative because of the low earnings per job ($11,013.22) for the 8 jobs created by the firm (with SIC code 2654) in the City of Mount Vernon EZ. The reservation wage was predicted to be $5.35/hour for the zone (translating to an annual reservation wage of $11,138.95).

d. Costs per job include property tax abatements, other local incentives, and costs of infrastructure.

e. This is in the City of Medina EZ where abatements for $188,259.11 (plus infrastructure for $15,576.32) were provided to a firm that created only 2 jobs that were attributable to the abatement. The little employment that was created combined with large abatements explain the high cost per job.

f. B-C ratio is defined as the ratio of economic rent per job to costs per job. Notice that it is not average economic rent per job (row 3) divided by average cost per job (row 4). If I were to calculate B-C ratios based on average economic rent and cost per job (rows 3 and 4 respectively), I would not reveal valuable information on the individual zones' B-C ratios which I have calculated as the ratio of individual zones' economic rents to costs per job. The minimum and maximum values for the distribution of B-C ratios should make clear the average values of the B-C distribution, when we compare them to the economic rent and cost distribution.

g. This is in the City of Mount Vernon EZ where the economic rent per job was negative, being -125.77 (explained in note c above). The cost per job for the 8 jobs created by the firm in the zone is $4,700.34. Abatements for $22,026.43 (plus the cost of infrastructure) were provided to the firm. The ratio of -125.77 to 4700.34 gives a negative B-C ratio of -0.03.

h. This is in the City of Defiance et al EZ where 324 jobs attributable to the tax abatement were created. The economic rent per job ($22,355.16) is high in the zone because of low reservation wages. The earnings per job are $30,514.27 and the reservation wage is only $3.92/hour (annual reservation wage of $8,159.11 assuming work 40 hours a week and 52 weeks a year). The cost per job is only $199.66 because abatements of only $2,456.01 (plus the cost of infrastructure of $15,576.32 per firm for a total
of $64,761.29) were given to the 4 firms in the zone. Thus the ratio of 22355.16 to 199.66 gives a B-C ratio of 111.97.

i. The adjusted B-C ratio is the B-C ratio adjusted for the area unemployment rate. It is defined as B-C ratio (row 5) multiplied by the average unemployment rate for the respective zones (row 6). Because the unemployment rate is in percentage terms, the B-C ratio is multiplied by the unemployment rate in row 6 divided by 100. I did not report the minimum and maximum values for this distribution because it is calculated based on rows 5 and 6. If I were to do that, the minimum and maximum values for the adjusted B-C ratios would not be the same zones with the minimum and maximum values of the unemployment rate.

j. Weighted ratios were calculated as weighted averages in which the weights were the number of zones in each category (zones in 0th-25th percentile, those in the 25th-50th, 50th-75th, and 75th-100th percentiles) of the relevant distributions. For the weighted means, the weights were multiplied by the means for zones in each category and sum of the weights and the means were divided by the total number of zones. A similar procedure was used to calculate weighted standard deviations for the various distributions.

Table 7.13 summarizes the weighted and unweighted average unemployment rate adjusted B-C ratios for the three scenarios at the firm and the zone-level.

<table>
<thead>
<tr>
<th>Scenario 1 (All employment taken into account)</th>
<th>Firm-level:</th>
<th>Zone-level:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unweighted</td>
<td>Weighted</td>
</tr>
<tr>
<td>1.57</td>
<td>1.68</td>
<td>1.71</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 2 (Only jobs created taken into account)</th>
<th>Firm-level:</th>
<th>Zone-level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>.57</td>
<td>.58</td>
<td>.64</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 3: Elasticity = -.3</th>
<th>Firm-level:</th>
<th>Zone-level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.75</td>
<td>1.86</td>
<td>1.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scenario 3: Elasticity = -.1</th>
<th>Firm-level:</th>
<th>Zone-level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>.81</td>
<td>.85</td>
<td>.62</td>
</tr>
</tbody>
</table>

Table 7.13: Summary of Average Adjusted B-C Ratios in Various Scenarios at Firm-level and Zone-level

Table 7.13 shows that a summary of B-C analyses from the three scenarios conform to our expectations. The most optimistic B-C ratios are in Scenario 1, which makes favorable assumptions regarding job creation and retention. These ratios become considerably smaller when only jobs (both created as well as retained) that are attributable to the tax incentive are taken into account (with the two assumed elasticities). B-C ratios are the lowest when only jobs created are taken into account, which is to be expected.\textsuperscript{102}

\textsuperscript{102} It should be noted that at the zone-level, the (unweighted and weighted) B-C ratios (1.35 and 0.96) are lower in scenario 3 than under scenario 1 (1.71 and 1.67), as we would expect. At the firm level, the
Thus on average, the unemployment rate adjusted B-C ratio for firm level and zone-level performance for local government investment appears to be around 1. Only under a favorable assumption when all employment reported to be created and retained is taken into account, local benefits appear to be greater than local government costs. Under restrictive assumptions such as a low elasticity, the average B-C ratio is less than 1. The B-C ratios are also less than 1 at the firm-level as well as zone-level in the scenario (scenario 2) which takes into account only jobs that are created.

Because the results in this table are based on averages and refer to only local government investment (and not all government investment), Table 7.13 reinforces what has been shown in the preceding tables. This inference is that it is not a good strategy for all zones to adopt tax incentives to create employment. It could be beneficial for zones with higher unemployment rates to use tax incentives to create employment because of the high unemployment rate adjusted B-C ratios that will be found in such areas.

7.4 Results from the Estimation of Unemployment Rate

As described in Chapter 5 (research methodology), the estimation of unemployment rates for the census block groups in the state of Ohio was done taking into account the treatment effects problem, which refers to the endogeneity of zone designation and the unemployment rate.

(unweighted and weighted) B-C ratios are higher in scenario 3 than under scenario 1, and this may seem counter-intuitive. Some observations can be made regarding the firm-level B-C ratios under scenario 3. First, although scenario 3 is more restrictive, the number of firms is only 198 in scenario 3 whereas there are 531 firms in scenario 1. I have explained why the number of firms reduces in scenario 3 in footnote 94 (page 113). It reduces to a subset of those firms under scenario 1, which created all its employment attributable to the tax incentive. Second, it should be noted that B-C ratio is defined as the ratio of economic rent to costs per job. The two scenarios themselves differ in the magnitude of the employment that was created. The reason that caused the somewhat counter-intuitive ratios was the magnitude of earnings and economic rent from employment created by the firms under scenario 3. This is not inconsistent with the assumptions of the two scenarios. The firms under scenario 3 were located in zones that had lower reservation wages and so economic rents from employment created by firms under scenario 3 were greater. Thus firm level B-C ratios under scenario 3, although the scenario is based on a more restrictive assumption, are higher because of higher economic rent. This is true although the costs were more or less the same for firms under both the scenarios, and employment was less in scenario 3 than under scenario 1.
Table 7.14 shows the results from the estimation of unemployment rates as a function of zone designation (or tax incentive program) and other exogenous variables. The definitions for variables used in Tables 7.14-7.15 are shown below. It may be noted that the enterprise zone dummy variable is a dummy indicating whether a census block group had a tax incentive program in place in 1990 (1) or not (0). Because the zone designation dummy is endogenous, variables that determine zone designation (net population change in the county over 1980-90, a dummy for population loss in the census tract over 1980-90, proportion of vacant housing units in the block group, and poverty rate of the block group) are included as instruments in the 2SLS estimation. Tables 7.14-7.15 show the results from various specifications of the model that were estimated.

**Variable Definitions**

1. Dummy for tax incentive program is a dummy (=1) if a tax incentive program (EZ or CRA) is in place (0 if not).
2. Dummy for population loss (tract level) is a dummy created at the census tract level if population loss appeared to have been occurred in a census tract over the period 1980-90. I made a decision regarding this dummy by looking at the block groups within each census tract of every county. If the number of block groups in a tract decreased or if the total population of the tract decreased, the population loss dummy got a value of 1; 0 otherwise. This measure is developed at the tract level because a tract is subdivided (into block groups) only if it grows.
3. Net population change (county level) is computed as merely the change in population (in thousands) from 1980 to 1990. It is \((1990 \text{ population for a county} - 1980 \text{ population for the county})/1,000\). I thus use two different measures for the population loss variable, one at the tract level as above and one at the county level as here.
4. Percentage of area's employment in manufacturing is the percentage of employed in manufacturing industry jobs as a proportion of all employed.
5. Percentage of area's employment in manufacturing is the percentage of employed in service industry jobs as a proportion of all employed.
6. Percentage of area's occupational mix in professional specialty, technical & administrative occupations refers to the percentage of the area's employment in managerial and professional specialty occupations, technical, sales and administrative support occupations.\(^{103}\)

\(^{103}\) This category includes executive, administrative, and managerial and professional specialty occupations.

\(^{104}\) This refers to technicians and related support, sales, and administrative support including clerical occupations.
7. Percentage in service occupations refers to those in private household occupations, protective service occupations, and other service occupations.

8. The poverty rate is calculated as the number of persons in the block group that had 1989 incomes below the poverty level to the ratio of all persons in the block group. It is multiplied by 100 to be expressed as a percentage. This measure is used as a measure of the income criterion (51% of the population is below 80% of the area’s median income) required for zone designation.

9. The percentage of vacant housing units is calculated as the ratio of vacant housing units in the area to all housing units (occupied and vacant) (again multiplied by 100 for percentage). This is used as a measure of the prevalence of vacant demolished commercial or industrial facilities in the area, because only data on residential structures are reported in the census at the block group level.

Table 7.14 shows the results from several specifications of the regression of the block group’s unemployment rate as a function of the dummy for tax incentives and other variables. The regressions are corrected for heteroskedasticity. The mean for the EZ dummy variable shows that 78 percent of areas in the state had a tax incentive program in place in 1990, leaving 22 percent as non-tax incentive areas. Table 7.14 shows in columns 2 and 3, the results of OLS and 2SLS estimations respectively. As should be clear, the OLS estimation considers the EZ dummy as exogenous and is a simple regression of unemployment rate as a function of the EZ dummy and other variables (i.e., does not use any instruments for the EZ dummy). Thus it does not take the endogeneity of the EZ dummy into account. The 2SLS estimation considers the EZ dummy as endogenous. The 2SLS estimation uses factors that determine zone designation (1982 county unemployment rate, poverty rate, prevalence of vacant housing units and two measures of net population change -- net population change for the county (in which the block group is located) over 1980-90 and a dummy for population loss in the census tract over 1980-90 -- as instruments for the endogenous enterprise zone dummy.
<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS Estimates (Std.Error)</th>
<th>2SLS Estimates (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>12.266 (1.678)***</td>
<td>16.245 (1.984)***</td>
<td></td>
</tr>
<tr>
<td>Dummy for tax incentive program</td>
<td>0.0303 (0.1127)</td>
<td>-4.5263 (0.9469)***</td>
<td>0.78 (0.41)</td>
</tr>
<tr>
<td>Percentage of area's employment in manufacturing</td>
<td>0.0323 (0.0112)***</td>
<td>0.0342 (0.0113)***</td>
<td>23.38 (11.11)</td>
</tr>
<tr>
<td>Percentage of area's employment in service industry</td>
<td>0.0332 (0.0113)***</td>
<td>0.0260 (0.0116)</td>
<td>31.45 (11.89)</td>
</tr>
<tr>
<td>Percentage of area's occupational mix in professional specialty, technical &amp; administrative occupations</td>
<td>-0.0895 (0.0105)***</td>
<td>-0.0901 (0.0106)***</td>
<td>51.78 (17.67)</td>
</tr>
<tr>
<td>Percentage of area's occupational mix in service occupations</td>
<td>0.0638 (0.0184)***</td>
<td>0.0626 (0.0186)***</td>
<td>14.79 (9.31)</td>
</tr>
<tr>
<td>Percentage African American</td>
<td>0.0649 (0.0039)***</td>
<td>0.0616 (0.0040)***</td>
<td>12.55 (26.42)</td>
</tr>
<tr>
<td>Mean age</td>
<td>-0.0585 (0.0162)***</td>
<td>-0.0816 (0.0177)***</td>
<td>44.35 (5.05)</td>
</tr>
<tr>
<td>Percentage male</td>
<td>-0.0334 (0.0201)*</td>
<td>-0.0296 (0.0204)</td>
<td>48.15% (5.42)</td>
</tr>
<tr>
<td>Percentage with bachelor's degrees</td>
<td>-0.0745 (0.0135)***</td>
<td>-0.0904 (0.0142)***</td>
<td>9.34% (8.88)</td>
</tr>
<tr>
<td>Duration of EZ existence</td>
<td>0.4595 (0.1157)***</td>
<td>1.8177 (0.3031)***</td>
<td>1.46 (1.95)</td>
</tr>
<tr>
<td>Duration of EZ existence squared</td>
<td>-0.0256 (0.0231)</td>
<td>-0.2173 (0.0458)***</td>
<td>5.94 (10.30)</td>
</tr>
<tr>
<td>Dependent variable</td>
<td>6.84%</td>
<td>6.84%</td>
<td>6.84% (6.59)</td>
</tr>
<tr>
<td>N</td>
<td>11,445</td>
<td>11,445</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.32*</td>
<td>0.26*</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.14: Estimation of Area Unemployment Rate

a. The $R^2$ reported was the one reported by the regression, calculated as the ratio of explained to total sum of squares of the regression.

The coefficients on the tax incentive dummy from the regressions in Table 7.14 are plausible if we take into account the assumptions of the various estimation methods that are used. The OLS specification (specification 1, uncorrected for endogeneity of the EZ dummy) shows that the EZ dummy does not have a statistically significant impact on the
unemployment rate of areas. When combined with the statistically significant duration of EZ variable and its squared, the coefficient on the EZ dummy in the OLS estimation may be interpreted as follows: an area that is an EZ for one year sees actually an increase in its unemployment rate by about 0.46 percentage points, an area that is an EZ for 2 years sees an increase in its unemployment rate by about 0.84 points and so forth. Thus, with this (OLS) estimation, it appears as if enterprise zones actually increase the unemployment rates of areas, whereas the model hypothesizes that the causality runs in the opposite direction.

I have most confidence in the 2SLS specification in Table 7.14 which takes into account the endogeneity of the EZ dummy and unemployment rate and includes the duration of EZ existence and its squared as independent variables along with others.\textsuperscript{105} The coefficient on the EZ dummy has the expected negative sign (and is statistically significant) and indicates that tax incentive programs have some impact on reducing the unemployment rate of areas. When considered along with the impact of the duration of EZ existence variable, the net impacts of being an EZ versus not being an EZ for durations of 1, 2, 3, 4, 5, 6 and 7 years is approximately: -2.92 percentage points (-4.5263+1.8177*1-0.2173*1\textsuperscript{2}), -1.76 percentage points (-4.5263+1.8177*2-0.2173*4), -1.03, -0.73, -0.87, -1.44, and -2.45 percentage points respectively. Thus if an EZ had 10 unemployed persons out of a labor force of 100 persons in 1982 (when it was designated, with an unemployment rate of 10%), the model predicts that the EZ's unemployment rate in 1983 would be (2.92 percentage points less) 7.08%. Taking into account the fact that a 3-percentage point reduction over a period of 1 year translates to about 3 persons obtaining gainful employment with the EZ or other tax abatement program in place, these results are plausible. Consider the example of a firm that creates 100 jobs in the first year of its existence in the zone. Assume that 97 out of these 100 new jobs are allocated to

\textsuperscript{105} In order to check whether the quadratic in duration was properly specified, I categorized the residual from this regression and computed means for 4 groups according to values of duration (<=1, duration between 1 and 3 years, between 3 and 5 and duration between 5 and 7 years (7 years being the sample maximum for duration)). When I did this, the following were the means of the residuals for the various groups respectively: 0.08, -0.26, -0.17, and 0.70. Thus the residual means varied randomly across the
labor force that might migrate into the area with increased job growth, consistent with what the migration literature has argued. The remaining 3 of the 100 jobs created are held by zone residents. Assuming that these 3 are among the original 10 unemployed in the zone, the unemployment rate of the area falls by about 3 percentage points (from 10% to 7%) in the first year. One qualification to this result: we should remember that the EZ dummy in the regression is used as a measure of a tax abatement program in place -- either the EZ or the Community Reinvestment Area (CRA) program tax incentives for job creation. With this in mind, when we look at the effectiveness of EZ program or tax incentives in general, from the data, we might say that they are indeed big enough to register.

One could doubt the plausibility of the estimate, which shows that the unemployment rate moves 2.9 percentage in the first year, given that the mean unemployment rate was 6.34%. It should be remembered that the estimation of area unemployment rates is done at the census block group level. The average unemployment rate for the enterprise zones was 6.34%, for the census block groups this average was 6.84%. The variation in the unemployment rate across the 11,445 census block groups was quite large, with a minimum of 0% (there were quite a few census block groups that had 0% unemployment rate, one of them was in census tract 101, block group number 2 in Allen county, which was part of the Village of Bluffton EZ\(^{106}\)) and a maximum of 83.08% (this was in Lucas county, census tract 25 and block group number 7, which covered part of the City of Toledo EZ\(^{107}\)). With this large variation in unemployment rates at the block group level, it is easy to interpret the 2.9 percentage point reduction in a year. For high-unemployment areas, the result shows that tax incentive programs reduce their unemployment rates to the extent of about 2.9 percentage points in the first year. So even if the average...
unemployment rate were 6.8%, the result of 2.9 percentage point reduction in an area's unemployment rate in a year is quite plausible.

It may be noted that in the regressions reported, apart from the EZ dummy and duration variables, the rest of the variables are added as controls. The percentage of area's employment in the service industry shows as having a consistent impact in all the specifications, and shows that the higher this percentage, the higher the unemployment rate of the area. The percentage in technical and administrative occupations has a negative impact on the unemployment rate showing that the higher the percentage employed in such routine occupations, the lower the unemployment rate of the area.

The demographic structure of an area also influences its unemployment rate. Higher proportions of African Americans in areas increase area's unemployment rates and the effect is statistically highly significant in all the regressions. The area's manufacturing base and the occupational mix in service occupations are shown to increase an area's unemployment rate in all the estimations. Younger areas (where the mean age is lower) and those with lower proportion of men have higher unemployment rates in the preferred specification. The percentage with bachelor's degrees in all the specifications has the expected sign showing that the higher the proportion of college graduates, the lower is the unemployment rate of the area to the extent of 0.10 percentage points. Thus better-educated areas (i.e., those with higher percentages of persons with bachelor's degrees) have lower unemployment rates, which is to be expected.

The final table (Table 7.15) replicates the specification in column 3 of Table 7.14 with the duration of EZ variable included as dummies. In Table 7.15 too, the same variables as in Table 7.14 were used as instruments for the endogenous enterprise zone dummy. Table 7.15 shows that even when the duration of EZ variables are included as dummies, the EZ dummy has the expected negative sign, indicating that areas with tax incentive programs see a decrease in their unemployment rates. This effect is statistically significant at the one percent level, as in the previous estimation.
<table>
<thead>
<tr>
<th>Variable</th>
<th>2SLS Estimates (Std.Error)</th>
<th>Means (Std.Dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>18.949 (1.669)***</td>
<td></td>
</tr>
<tr>
<td>Dummy for tax incentive program</td>
<td>-6.9831 (0.8635)***</td>
<td>0.78 (0.41)</td>
</tr>
<tr>
<td>Percentage of area’s employment in manufacturing</td>
<td>0.0314 (0.0086)***</td>
<td>23.38 (11.11)</td>
</tr>
<tr>
<td>Percentage of area’s employment in service industry</td>
<td>0.0289 (0.0091)***</td>
<td>31.45 (11.89)</td>
</tr>
<tr>
<td>Percentage of area’s occupational mix in professional specialty, technical &amp; administrative occupations</td>
<td>-0.0850 (0.0080)***</td>
<td>51.78 (17.67)</td>
</tr>
<tr>
<td>Percentage of area’s occupational mix in service occupations</td>
<td>0.0392 (0.0142)***</td>
<td>14.79 (9.31)</td>
</tr>
<tr>
<td>Percentage African American</td>
<td>0.0534 (0.0033)***</td>
<td>12.55 (26.42)</td>
</tr>
<tr>
<td>Mean age</td>
<td>-0.1087 (0.0149)***</td>
<td>44.35 (5.05)</td>
</tr>
<tr>
<td>Percentage male</td>
<td>-0.0335 (0.0166)**</td>
<td>48.15% (5.42)</td>
</tr>
<tr>
<td>Percentage with bachelor’s degrees</td>
<td>-0.1037 (0.0117)***</td>
<td>9.34% (8.88)</td>
</tr>
<tr>
<td>Duration of EZ existence &gt;0 &amp; less than or equal to 1 year (0 otherwise)</td>
<td>3.5911 (0.4059)***</td>
<td>0.17 (0.3)</td>
</tr>
<tr>
<td>Duration of EZ existence between 1 and 3 years (0 otherwise)</td>
<td>3.8050 (0.4024)***</td>
<td>0.14 (0.3)</td>
</tr>
<tr>
<td>Duration of EZ existence between 3 and 5 years (0 otherwise)</td>
<td>4.6721 (0.4240)***</td>
<td>0.18 (0.3)</td>
</tr>
<tr>
<td>Duration of EZ existence between 5 and 7 years (0 otherwise)</td>
<td>4.7664 (0.5926)***</td>
<td>0.02 (0.1)</td>
</tr>
<tr>
<td>Dependent variable</td>
<td>6.84% (6.59)</td>
<td></td>
</tr>
</tbody>
</table>

| N | 11445 | 0.16 |

Table 7.15: Estimation of Area Unemployment Rate with Dummies for Enterprise Zone Duration

When combined with the effect of the signs on the duration dummies, the impact of the EZ on the area’s unemployment rate for EZs that have been in existence for a year is a decrease in their unemployment rate to the extent of \(-6.9831+3.5911\times 1 = -3.39\) percentage points. The impact for an area that has been an EZ between 1 and 3 years is \(-6.9831+3.8050 \times 2 = +0.63\) percentage points. Thus, here we see a decrease in the unemployment rate of new EZs and increase in the unemployment rates of older EZs, that points to the need for the area’s decertification as a zone when unemployment rates have
reduced. Overall, then, the interpretation is that tax incentive programs decrease the unemployment rates of areas that adopt them.

Thus, one result is robust with respect to the effect of the EZ dummy when the duration of EZ existence variable is taken into account. This result is that the EZ has the impact of reducing the unemployment rates of areas, which is one of the primary purposes for which they were started in the state. So here at least the data support the common hypothesis that tax incentive programs reduce the unemployment rates of areas. The B-C analyses especially support the view that such programs can be beneficial if adopted by high-unemployment areas.

I discuss the policy implications of all the results in the next chapter.
CHAPTER 8

POLICY IMPLICATIONS OF RESEARCH AND CONCLUSION

The contribution of this research is to analyze the efficiency implications of enterprise zones and to also analyze the general equilibrium effects of a tax abatement provided to capital and labor in the EZ. The empirical work makes an attempt to go beyond a comparison of net benefits and costs of enterprise zone programs, and addresses the question as to whether the unemployment rate of an area depends on tax incentives. In addition to the efficiency implications of such competition, no study so far has taken into account the impact of EZs on an area's unemployment rate, as should be clear from the literature review provided here.

The benefit-cost analysis of the enterprise zone program is relevant because of the local government's expenditure on tax abatements and infrastructure costs incurred in providing public services to firms. In order to justify local expenditure, it is important to know from the viewpoint of local governments whether the benefits from urban development are worth the costs. The benefit-cost analysis is then obviously important for local governments that spend on EZ programs in their jurisdictions. The benefits to the local governments for the costs incurred for such development are increases in local employment and the net benefits from employment.

In addition to its net benefits, increasing employment has the effect of increasing households' labor force participation rates (measured in the aggregate as the ratio of employment to population, for instance). This has hysteresis effects on the labor market, as Bartik (1991) has argued. Hysteresis is a term borrowed from physics to explain how the electromagnetic properties of certain metals are permanently affected by the temporary application of certain magnetic forces. When applied to the labor market, this means that the increase in the labor force participation rate due to increased employment
increases households' employability (due to training and acquisition of skills) in the long-run.

Thus, in the empirical work, the benefit to the EZ is measured. In theory, EZ designation also causes to lower the unemployment rate of high-unemployment areas by relaxing the constraints (such as low marginal product of labor) firms face in increasing wages in such areas. The theoretical framework showed that the EZ causes the unemployment rate of the EZ to be lower, and that in the non-EZ areas is the same as before due to their initial excess capacity in capital.

The benefit-cost analysis reveals that the benefits in terms of employment and the benefits thereof, from EZ programs are worth the costs only for some areas. The implication for policy could be that traditional urban development tools such as EZ programs with tax incentives should not be pursued in an untargeted fashion by all the areas of the state. Rather it could indicate that local governments have to focus their development efforts on non-traditional development policies rather than on branch plant recruitment. The main reason why this could be true in the context of the model presented here, is that tax abatement programs that target branch plant recruitment, distort relative prices of factors across areas, and the incidence of this could be far-reaching, as demonstrated with the theoretical framework here.

The policy implications of the findings relate to program design and focus on targeting of areas for zone designation and targeting of certain kinds of firms.

8.1 Targeting of Areas

It is not completely clear from the empirical results that only high-unemployment areas are likely to gain higher net benefits from enterprise zones. This is because the estimation of reservation wages showed that the unemployment rate of the area does not have a significant impact on the reservation wage of individuals residing in the area. However in certain scenarios of the B-C analysis, the correlation between economic rents from employment and unemployment rates appeared to be positive, even though the theoretical model was ambiguous with regard to this relationship. Moreover, the adjusted
B-C ratios depend on unemployment rates so that the higher the unemployment rate of an area, the higher the adjusted B-C ratio.

So the implication for program design based on these results tentatively would be a reduction in the number of zones, so that only high unemployment areas would be allowed to compete. This calls for more selective designation criteria that could possibly result in a reduction of competition among the zones. In this context, it is enlightening to know that even as of 1989, Ohio was only one of the few states in the United States (see Erickson and Friedman 1989) that had greater than 75 enterprise zones in its territory.

Thus one of the implications of this research could be a recommendation to decertify zones that did poorly in terms of (unadjusted) B-C ratios. Table 8.1 shows the proportion of zones that had adjusted and unadjusted (unweighted) B-C ratios >1 under various scenarios.109

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Proportion of Zones</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1</strong></td>
<td></td>
</tr>
<tr>
<td>% of zones with unadjusted (unweighted) B-C ratios &gt; 1:</td>
<td>90%</td>
</tr>
<tr>
<td>% of zones with adjusted (unweighted) B-C ratios &gt; 1:</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Scenario 2</strong></td>
<td></td>
</tr>
<tr>
<td>% of zones with unadjusted (unweighted) B-C ratios &gt; 1:</td>
<td>75%</td>
</tr>
<tr>
<td>% of zones with adjusted (unweighted) B-C ratios &gt; 1:</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Scenario 3 (Assumed Elasticity: -0.3)</strong></td>
<td></td>
</tr>
<tr>
<td>% of zones with unadjusted (unweighted) B-C ratios &gt; 1:</td>
<td>80%</td>
</tr>
<tr>
<td>% of zones with adjusted (unweighted) B-C ratios &gt; 1:</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Scenario 3 (Assumed Elasticity: -0.1)</strong></td>
<td></td>
</tr>
<tr>
<td>% of zones with unadjusted (unweighted) B-C ratios &gt; 1:</td>
<td>78%</td>
</tr>
<tr>
<td>% of zones with adjusted (unweighted) B-C ratios &gt; 1:</td>
<td>10%</td>
</tr>
</tbody>
</table>

Table 8.1: Proportion of Zones with B-C Ratios>1 in Various Scenarios

Table 8.1 shows that the proportion of zones with adjusted B-C ratios>1 is highest in scenario 1, which is natural to expect. The proportion falls by more than half (to 20%) when we take into account only jobs that are created (as in scenario 2). In scenario 3, the

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109 The proportion of zones with B-C ratios >1 cannot be calculated with the weighted averages. This is because the weighted average for the adjusted B-C ratio was calculated (it is a single figure) for the entire distribution of zones taking into account zones in each percentile of the B-C distribution (which is obtained by taking the ratio of economic rents from employment to the costs for every zone).
proportion of zones with B-C ratios > 1 is higher (being 25%) in the higher assumed elasticity than with the lower assumed elasticity (where it is about 10%), consistent with what we would expect. As described in the following section, most of the areas with adjusted B-C ratios > 1 were high-unemployment areas. I explain following Table 8.2 (which explains efficiency losses under various scenarios) what were the factors that appeared to distinguish zones with B-C ratios > 1 from those that had B-C ratios < 1, and their policy implications.

Based on the unadjusted B-C ratios, it is possible to evaluate the efficiency implications of decertification. This would be the extent to which costs exceed benefits in the poor-performing zones in which the unadjusted B-C ratio was < 1. When the total employment (created and retained) created by the firms is taken into account (scenario 1), I found that the most (8) of the (11) zones that had B-C ratios (not adjusted for unemployment rate) < 1 were limited authority zones. The average unemployment rate for these 8 zones was 7.2% (in 1990), which was above 120% of the state’s average unemployment rate for 1990 (5.7%). The efficiency loss in the form of property tax abatements and other incentives provided by the local governments of these (8) zones amount to $44,249,535.23 ($40,959,245.89 (property tax abatements) + $3,290,289.34 (cost of infrastructure to firms and other incentives, or a total of $5,531,191.90 per zone)).

When we take into account the jobs that were created only (scenario 2), this efficiency loss turns out to be of slightly higher magnitude which is natural to expect. More (21 zones as opposed to 8 zones in scenario 1) zones turned out to be inefficient in this scenario than under scenario 1 because the assumption is more restrictive. The property tax abatements, provision of infrastructure and other incentives to firms in these

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110 The 11 zones were: City of Lima; City of Fostoria; City of Springfield; Madison Township et al; City of Newark; Clinton Township et al; Village of Lexington et al; City of Sebring; Village of West Unity; Village of Stryker, and City of Bryan.
111 I have calculated efficiency loss as the sum of the abatements, infrastructure and other incentives provided to firms in zones that have B-C ratios < 1 in the various scenarios, and divided the total efficiency loss by the number of zones in each category to arrive at efficiency loss per zone.
(21) zones\textsuperscript{111} that had B-C ratios <1 in this scenario amounts to $44,940,718.89
($40,635,478.02 (abatements) + $4,305,240 (infrastructure and other incentives or a total
of $2,140,034.23 per zone)). Understandably, many of the zones that did poorly in
scenario 1 were also the ones that performed poorly under this scenario. The average
unemployment rate for these (21) zones that had negative B-C ratios was 6.92%, just
around 120% of the state’s average unemployment rate of 5.7% for 1990.

Under scenario 3, the efficiency loss under the higher elasticity assumption was
higher than under the low elasticity. With the assumed elasticity of employment with
respect to taxes being –0.3, the efficiency loss is $16,144,733.07 ($15,643,299.93
(property tax abatements) + $501,433.14 (infrastructure and other incentives or
$2,690,788.84 per zone)) for just 6 zones the average unemployment rate for them being
6.73%.\textsuperscript{112} If the elasticity were to be –0.1, then the efficiency loss becomes $4,172,090.96
($3,996,609.11 (property tax abatements) + $175,481.85 (infrastructure and other
incentives)) for 5 zones ($834,418.19 per zone) whose average unemployment rate was
just 6% for 1990.\textsuperscript{113} Table 8.2 summarizes these efficiency losses in the poor-performing
zones in various scenarios.

Overall, we find that zones that incurred efficiency losses were mostly low-
unemployment areas. I found that all the firms and zones with negative B-C ratios and
positive B-C ratios <1 were ones in which the earnings from jobs were low relative to the
reservation wages. This was because of the areas’ lower unemployment rate in relation to
state average, leading to low economic rents and consequently low B-C ratios from
employment. On the other hand, firms that located in high-unemployment zones had low
reservation wages and wherever this coincided with well-paying jobs, it resulted in high

\textsuperscript{111} These zones were: City of Lima; City of Cincinnati (Lower Mill Creek); City of
Massillon; City of St. Bernard et al.; City of Springfield; Village of St. Henry; City of Barberson; City of Dayton; Madison
Township et al.; Village of Jeffersonville; Clinton Township et al.; Village of Lexington et al.; City of
Sebring; Village of Fayette; Village of Columbus Grove et al.; Village of West Unity; Village of Stryker;
Canton Township et al.; City of Medina; City of Bryan; and Village of Caldwell et al.

\textsuperscript{112} The zones were: City of Lincoln Heights et al.; City of Mount Vernon; City of Springfield; City of
Newark; Clinton Township et al.; and City of Sebring.

\textsuperscript{113} These five zones were: City of Mount Vernon; City of Newark; City of Sebring; Village of West Unity;
City of Medina.
economic rents and high B-C ratios. Some of the zones in which the economic rent from employment could have been high due to this reason had lower B-C ratios because of the large abatements that were given to firms that located in them. On the other hand, I found based on my analysis that even when skilled or unskilled (well- or poor-paying) jobs were created in low-unemployment zones, the B-C ratios were low because of higher reservation wages in such low-unemployment zones.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Efficiency Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1 (Created and Retained employment taken into account)</td>
<td>$44,249,535.23</td>
</tr>
<tr>
<td>Scenario 2 (Only Created employment taken into account)</td>
<td>$44,940,718.89</td>
</tr>
<tr>
<td>Scenario 3: Assumed elasticity = -0.3</td>
<td>$16,144,733.07</td>
</tr>
<tr>
<td>Scenario 3: Assumed elasticity = -0.1</td>
<td>$4,172,090.96</td>
</tr>
</tbody>
</table>

Table 8.2: Efficiency Losses in Various Scenarios

Thus the policy implication that comes out of this analysis is that it is most beneficial when skilled (i.e., well-paying) jobs are created in high unemployment zones since they have lower reservation wages. It is also necessary for the local governments to ensure strict compliance from firms in terms of job commitment so that firms create all the employment stated in the agreement. It is necessary to place a ceiling on the amount of the abatement to be given to a single firm. As of now, the legislation states the limits of the incentives in terms of the percentage of assessed values of the property. The location of firms that create low-skill jobs in low-unemployment areas is not beneficial for the state and local governments and hence should not be encouraged. As of now,

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114 The enterprise zone law permits municipalities to exempt real and/or personal property assessed values of up to 75% for up to 10 years, or an average of 60% over the term of the agreement on new investments in buildings, machinery/equipment and inventory and improvements to existing land and buildings for a specific project. The state’s Enterprise Zone law permits unincorporated areas to exempt real and/or personal property assessed values of up to 60% for up to 10 years or an average of 50% over the term of the agreement on new investments in buildings, machinery/equipment and inventory and improvements to existing land and buildings for a specific project. However, maximum exemption levels may be exceeded with approval by the affected Board of Education.
retail operations are not eligible for tax incentives within zones and this is a step in the right direction, based on the results I have found.

It may be noted from Table 8.2 that total efficiency losses are greatest in scenario 2 (which is a restrictive assumption involving only jobs that were created) and are the lowest in scenario 3 (with an assumed elasticity of -0.1). The analysis with the scenario 3 (with an assumed elasticity of -0.3) provides a middle ground.\(^\text{115}\) There are a few zones that did poorly in all the scenarios. The tentative implication that comes out of the B-C analysis presented here is then that these zones can be decertified to avoid these efficiency losses, as one alternative. Because the assumptions of the model developed here apply only to new jobs that are created (when they are held by the local unemployed), an implication that comes out of this is to decertify the zones that have not performed well in Scenario 2.

When more selective designation criteria are used for zone designation and firm-level performance, the EZ program in Ohio can be capable of generating greater employment for its high-unemployment areas and reducing wasteful competition. To a degree, this would provide an empirical response to the policy debate in the states regarding the enterprise zone program and also in the literature regarding traditional tax incentive programs.

8.2 Summary, Contribution and Conclusions from the Research

In this dissertation, I developed an analytical framework to analyze the impact of enterprise zones on the economies that adopt them, applying the intuition that Bartik (1991) developed. I showed the far-reaching general equilibrium response to the tax abatement with full capital mobility.

\(^\text{115}\) One could expect, for instance, that the efficiency losses under Scenario 1 would be the least and that under Scenario 2 would be the highest because of their assumptions pertaining to job creation and retention. However here efficiency loss is measured as the total amount of abatements and other incentives provided to firms in zones in which the B-C ratios <1. It should be remembered that the amount of abatements can vary quite independently of the assumptions pertaining to jobs. I found that the abatement amount is mostly related to the amount of investment firms made in the zone, which of course can create differing amounts of employment depending on the capital or labor intensity of the firm. It should be noted that the B-C ratios reported in Table 7.13 were according to expectations.
An attempt was also made to clarify the econometric determination of the reservation wage, which I think, the literature has ignored in the past (example, Jones 1989). The results from the estimation of reservation wages using data from the PSID, with all corrections for sample selection made, showed that reservation wages of unemployed persons are not significantly affected by the unemployment rate of their areas. Reservation wages predicted for Ohio’s zones using the PSID estimates showed that the average hourly reservation wage for zones in the state is around $4.88 (in constant 1982-84 dollars). I also found that the highest reservation wage ($16.98) in the distribution was in a zone with low unemployment rate (4.87%)\footnote{116 The zone was the Village of Highland Hills EZ.} in relation to state average (of 5.7%) for 1990.

The benefit-cost analysis in the various scenarios show that the benefits of creating employment using tax incentives can be greater than the costs only if they are adopted by areas in which a large proportion of employment that is created is likely to be held by the unemployed. The results from the unemployment rate-adjusted B-C analysis show that if the average unemployment area uses tax incentives to create employment, the net benefits are likely to be less than the costs of creating them, when we make various assumptions. Based on the results reported here, it is possible that a few of the low-unemployment rate zones that performed poorly can be decertified.

Finally, the estimation of the unemployment rate of areas as a function of zone designation, taking into account the endogeneity of zone designation, shows that such tax incentive programs have a statistically significant impact in reducing the unemployment rates of areas. When we go back to the history of enterprise zones in the state, we find that this was the objective for which the program was initiated in the state in 1982. Thus the results from the estimation of unemployment rates taking into account the endogeneity of zone designation shows that enterprise zones are mostly successful in the objective for which they were adopted in the state. The net impact of being an EZ versus not being an EZ for a duration of 7 years is approximately a 3 percentage point reduction in the unemployment rate of the EZ area.

\footnote{116 The zone was the Village of Highland Hills EZ.}
Based on the results from the B-C analyses, tax incentive programs such as enterprise zones also appear to produce some benefits if they are adopted by high-unemployment areas. This should be clear from the B-C analysis presented here.

8.3 Directions for Future Research

Some avenues for further research stem from the weaknesses of the analytical model that is developed here; others stem from those in the empirical work. A possible extension to the theoretical model that is developed here is in the Harberger analysis. This would be to consider the extension of the model currently consisting of only two sectors to include a third sector, the intermediate sector. This has been attempted by others (for example, Bhatia 1981) with respect to other taxes. However it has not been applied to tax abatements. Moreover this extension to include the intermediate sector has some interesting implications for evaluating the impact of enterprise zones (for example, see footnote 87 (page 101) in the survey section of Chapter 7).

Extensions to the empirical work could involve PSID data and the Ohio enterprise zone program data. Possible extensions to the estimation of the reservation wage could be to examine how the reservation wage varies across job-leavers and job-losers. Because one would expect that the reservation wages of job leavers would be higher than those for job-losers (this has been examined by Jones (1989)), the estimation has interesting implications for economic rent from employment. Information is available in the PSID on the type of job loss for unemployed persons which categorizes reasons for their job loss. However, at this point, information is not available in the data on Ohio’s enterprise zone program, on whether the individuals given the job offers in EZs were unemployed, and if so, if they were job leavers or job losers or even first-time job seekers.

A measurable concept also emerges out of the theoretical framework to analyze the impact of tax abatements on capital investment and employment in the EZ, using Harberger’s analysis. This is the elasticity of substitution of firms that locate in the EZ. We know that the elasticity of substitution between labor and capital is given by:
\[ S_z = \frac{d \left( \frac{K_z}{L_z} \right) / K_z}{d \left( \frac{w_z}{r_z} \right) / r_z} \]

\( S_z \) refers to the elasticity of substitution between labor and capital, \( K_z \) refers to capital investment, \( L_z \) refers to employment, \( w_z \) refers to the payroll, in the EZ and \( r_z \) refers to the rental rate of capital. It is clear that the data that is needed to estimate the elasticity of substitution between the factors are the capital-labor ratio of firms and their factor prices.\(^{117}\) Data on all these variables except the rate of return to capital are readily available.

If one were to use the property tax abatement as a measure of the rate of return to capital, we also have to obtain data on the proportion property taxes typically account for in the rate of return calculation.\(^{118}\) However, data on gross profit from operations and depreciation are not available for firms that have located in Ohio's zones at this point. Later, when this data becomes available, there are interesting implications that arise from the computation of the elasticity. Based on the elasticity, the implications for first-order and second-order effects of the tax abatement can be distinguished. That is, it can be determined which firms readily substitute capital for labor when a subsidy to capital (in the form of a tax abatement) is given.

The extensions to the empirical work involving Ohio's enterprise zone program pertain to expanding the sample to include time-series data. Now only data for 1990 on unemployment rates at the zone level are available (see footnote 73 (page 93) in Chapter 7 in which I have described the computation of unemployment rates for zones according

\(^{117}\) In terms of actual calculation, the computation for the elasticity of substitution could be done as follows:

\[ S_z = \frac{\Delta K}{K} \cdot \frac{L}{\Delta L} \cdot \frac{\Delta r}{r} \cdot \frac{\Delta w}{\Delta w}, \] where \( \Delta K, \Delta L, \Delta r \) and \( \Delta w \) are respectively the change in capital investment, employment, rate of return and wages after the EZ comes into existence. \( K, L, r \) and \( w \) are respectively the baseline (existing) capital investment, employment, rate of return and wages of the firm in the absence of the EZ.

\(^{118}\) Typically, total returns to capital are typically taken to be equal to gross profit from operations (excluding other income) minus depreciation (Solow et al 1961).
to the procedure recommended by the Ohio Department of Development) for 1982-present. When data on other characteristics of the determinants of reservation wages (proportion married, average number of children, proportion male/female, proportion African American) become available at the county level for years other than census, then it is possible to base the benefit-cost analysis on multiple time-periods, which could give more confidence in the results.
APPENDIX A

SOLUTIONS FOR CHANGE IN EMPLOYMENT AND INVESTMENT IN ENTERPRISE ZONE

A.1 Solution to the System of Equations

The simultaneous equations are in matrix form, and Cramer’s rule is used to solve for $dK_Z$ and $dL_Z$. So

$$dK_Z = \left| \frac{D_1}{D} \right|$$

where $|D|$ is the determinant of the matrix and $|D_1|$ is the determinant of the matrix with its first column replaced by the d vector. So

$$dK_Z = \frac{-S_ydP_{L_Y}}{L_Z} \left[ \frac{-S_yf_{LZ} - \varepsilon (f_{KZ} - f_{KY})}{1 - A_{KZ}} \right] - \frac{\varepsilon}{L_Y (1 - A_{KZ})} \left[ \frac{S_ydA_{KZ} f_{KZ} - S_y (f_{KZ} - f_{KY})}{(dP_{L_Y} (1 - A_{KZ}) + dA_{KZ})} \right]$$

$$- S_ydA_{KZ} f_{KZ} - \frac{f_{LZ}}{L_Z} S_y S_y \left[ \frac{dP_{LZ} (1 - A_{KZ}) + dA_{KZ}}{(1 - A_{KZ})} \right]$$

In a very similar way,

$$dL_Z = \left| \frac{D_2}{D} \right|$$

where $|D|$ is the determinant of the matrix as before and $|D_2|$ is the determinant of the matrix with its second column now replaced by the d vector. The expression obtained for $dL_Z$ turns out to be:

$$dL_Z = -\frac{S_ydP_{L_Y} f_{KZ}}{K_Y (1 - A_{KZ})} \left[ \frac{-S_z}{L_z (1 - A_{KZ})} + \frac{\varepsilon (1 - f_{KY})}{K_z} \right] + \frac{S_y f_{KZ}}{L_z} \left[ \frac{dA_{KZ} + dP_{LZ} (1 - A_{KZ})}{(1 - A_{KZ})} \right]$$

$$- \frac{S_y f_{KZ}}{(1 - A_{KZ})} \left[ \frac{1}{K_Y L_Z} + \frac{1}{L_Y K_Z} \right] + \varepsilon (f_{KZ} - f_{K}) \left[ \frac{1}{K_Y L_Z} - \frac{1}{L_Y K_Z} \right] + S_z \left[ \frac{f_{KZ} + f_{LZ}}{K_Z L_Z} \right]$$
APPENDIX B

ESTIMATION OF STRUCTURAL PROBIT EQUATION FOR FULL SAMPLE

Table B.1 below shows the results from the probit estimation of the full structural model. It estimates the individual’s employment status as a function of the wage and the reservation wage for the full sample, which is equation [3.1a] in the theoretical model.\textsuperscript{119}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Maximum Likelihood Estimates (Std.Error)</th>
<th>Means (Std.Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.9430 (0.0396)***</td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>0.0907 (0.0113)***</td>
<td>$3.01 (2.17)</td>
</tr>
<tr>
<td>Reservation Wage</td>
<td>-0.0615 (0.0033)***</td>
<td>$2.70 (4.68)</td>
</tr>
<tr>
<td>Dependent Variable</td>
<td></td>
<td>0.98 (0.14)</td>
</tr>
<tr>
<td>N</td>
<td>23,814</td>
<td></td>
</tr>
</tbody>
</table>

Table B.1: Probit Estimation of Structural Model of Employment Status

It may be noted that the probit estimation in Table B.1 is based on the full sample. I predicted wages for the full sample (including the unemployed) using the coefficients obtained from the estimation based on the employed, and predicted reservation wages for the full sample (including the employed), based on a similar procedure. This prediction enabled me to test the structural equation of individual’s unemployment status as a function of wages and reservation wages for the full sample.

The results in Table B.1 show that the estimation of the structural probit model conform to expectations from the theoretical model. Higher reservation wages decrease the probability of employment for the individual and higher wages increase the likelihood of employment. Both the coefficients are statistically significant as can be seen from the Table.

\textsuperscript{119} Remember that equation [3.1a] is an equation for unemployment status (not employment status). So there, higher reservation wages increase the probability of unemployment and higher wages decrease this likelihood. However here what is being estimated is the employment status of the individual (employed=1;
APPENDIX C

SURVEY OF ENTERPRISE ZONE ADMINISTRATORS IN OHIO: NOVEMBER 1997

C.1 Survey Questions

1. **Infrastructure Provision:**
   a. On average, what is the total local cost (excluding state and federal funds) of providing public services to a firm that locates in your enterprise zone?

   $__________

   b. What are the public services for which you responded in 1(a)?
      __ Improvement to public schools
      __ Highways/country roads improvement
      __ Installation of new sewers
      __ Installation of traffic lights due to the firm’s existence
      __ Other (please specify)______________________________

2. If the public services for which the local government spends its resources on included highways/country road improvements or installation of traffic lights due to the firm, how has this affected the average time for commute to work in your locality?

   __ Commute time has increased
   __ Commute time has decreased
   __ Commute time has not changed

3. To what extent are tax incentives, or, more generally the zone, effective in attracting firms?

   **Tax Incentive:** __HIGHLY EFFECTIVE __SOMewhat EFFECTIVE __NOT EFFECTIVE

   **Zone:** __HIGHLY EFFECTIVE __SOMewhat EFFECTIVE __NOT EFFECTIVE

4. What does your response to (3) indicate about the firms that locate in your zone? Would they have located in your zone even without the zone or the tax incentive?

   __YES ______PROBABLY ______NO

unemployed=0). So we expect the reservation and market wages to have opposite signs to those expected in equation (3.1a).
5. What is the extent to which firms are on the whole, successful in their job creation commitments they made in the contract?
   ____ HIGHLY SUCCESSFUL (actually created 75%-100% of committed employment)
   ____ SUCCESSFUL (actually created 50%-75% of committed employment)
   ____ SOMEWHAT SUCCESSFUL (actually created 25%-50% of committed employment)
   ____ NOT SUCCESSFUL (actually created <25% of committed employment)

6. What proportion of jobs created actually go to zone residents?
   ____ (75%-100%)
   ____ (50%-75%)
   ____ (25%-50%)
   ____ (<25%)

7. What is the impact of the zone firms on the area surrounding the zone?
   ____ Other firms have developed to supply the zone firms with inputs & intermediate products
   ____ Reduction in crime
   ____ Increase in crime
   ____ Increased traffic congestion and pollution
   ____ Other (please specify)

8. If other firms developed in your area to supply the zone firms with inputs, what kind of firms were these intermediary firms?
   ____ Software companies
   ____ Telecommunications
   ____ Banks
   ____ Utility companies
   ____ Consulting firms
   ____ Other (please specify)

9. What overall statement would you make regarding the effectiveness of the enterprise zone in your locality?

   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

Thank you very much for your time and effort in filling out this survey.
APPENDIX D

DESCRIPTION OF OHIO'S OTHER TAX INCENTIVE PROGRAMS

D.1 The Community Reinvestment Area Program

In the state of Ohio, Community Reinvestment Areas (CRAs) are areas of land in which property owners can receive tax incentives for investing in real property improvements. The primary difference between this and the EZ program is that under the EZ program, tax abatements are provided only to firms whereas the CRA program can be used to encourage residential rehabilitation as well as to encourage commercial and industrial expansion and new construction. The CRA program was created in 1977 and it underwent major revisions in 1994.

D.1.1 Eligible Areas

The state's Department of Development specifies the areas that can be designated as CRAs. A municipality or county must undertake a Housing Survey of the structures within the area proposed as a CRA. The results of the survey must support the finding that the area is one in which housing facilities are located and that new construction and renovation are discouraged. In the state of Ohio, certain areas were designated as CRAs before July 1994 and some, after 1994.

D.1.2 Tax Incentives

The CRA program is a permanent tax exemption incentive program that does not have a sunset provision. Local municipalities or counties can determine the type of development to be supported by the CRA program by specifying the eligibility of residential, commercial and/or industrial projects. The tax incentives are summarized in Table D.1.
In a municipality that has a local income tax, any project that will generate new annual payroll of one million dollars or more, the municipality and the board of education must negotiate a revenue sharing agreement outlining the manner and procedure of the agreed-upon compensation. If no agreement is reached, then the income tax revenues generated by the new employees will be split 50/50 between the municipality and the board of education. Any project that includes the relocation of facilities from within Ohio must provide the local legislative authority of the county or municipality from which the relocation will occur.

<table>
<thead>
<tr>
<th>Tax Incentives</th>
<th>Pre-July 1, 1994 CRAs</th>
<th>Post-July 1, 1994 CRAs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exemption Levels:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Property</td>
<td>Must be 100%</td>
<td>Up to 100%*</td>
</tr>
<tr>
<td>Personal property</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Inventory</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Term Exemptions:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential remodeling (2 units or less; minimum $2500)</td>
<td>Up to 10 years</td>
<td>Up to 10 years</td>
</tr>
<tr>
<td>Residential (more than 2 units), Commercial &amp; Industrial (minimum $5000)</td>
<td>Up to 12 years</td>
<td>Up to 12 years</td>
</tr>
<tr>
<td>New Construction Residential, Commercial and Industrial</td>
<td>Up to 15 years</td>
<td>Up to 15 years</td>
</tr>
</tbody>
</table>

Taken from the Ohio Department of Development Summary of the CRA program.

Table D.1: CRA Program Incentives

* The exemption percentage and term for commercial and industrial projects are to be negotiated on a project-specific basis. All commercial and industrial CRA agreements must ensure that at least 50% of the amount of the taxes estimated (that would have been charged on the improvements of the exemption had not taken place) are made up by other taxes or payments available to the school district. Boards of education can however approve projects that do not meet this standard.
Figure D.1: Map of Ohio’s Enterprise Zones
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Literature Bearing on Theoretical Model


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**Literature Bearing on the Data Aspects of the Research**

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**Literature Bearing on Policy-Relevant Aspects of the Research**


