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Which Green Policy?: an analysis of the relationship between state environmental policy and state economic growth

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WHICH GREEN POLICY?
AN ANALYSIS OF THE RELATIONSHIP BETWEEN STATE ENVIRONMENTAL POLICY AND STATE ECONOMIC GROWTH

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ABSTRACT

This project examines state environmental policy and its effect upon state economic growth. State policymakers actively pursue policies intended to positively impact state economic growth. A policy area surrounded by controversy regarding its affect upon economic performance is that of environmental regulation. Prior research indicates that policymakers believe state environmental regulations influence business decisions to invest in certain areas. In this research I seek to determine whether states which deliberately enact more lax environmental regulatory standards succeed in increasing state economic growth. State economic growth is modeled as a function of environmental policy variables and range of national economic and state demographic, policy, financial, and institutional variables. Variables used to measure environmental policy are critical to the results of the model estimations. When pollution abatement compliance costs of business and industry are used as the measure of environmental policy, state economies appear to suffer a detrimental impact as a result of more stringent environmental policies. When state spending on environmental and natural resource programs is used as the measure of environmental policies, state economies appear to receive a positive impact as a result of more stringent regulations.

CHAPTER 1:
INTRODUCTION

> What I am suggesting to you today is that federal land management and the implementation of federal environmental laws in the West does not have to be a contentious, win-lose, zero-sum game. This is not about sacrificing economic benefits for environmental health -- it is about working together as a region to have both.
>
> --John Kitzhaber, Governor of Oregon, Federal Land Management Speech Boise, Idaho, June 1, 2000.

State environmental regulatory policy and state economic development policy are frequently viewed as policies with objectives that are in conflict with one another. Many believe that in order to ensure a high level of environmental quality, sacrifices must be made in the area of economic growth. In order in have a safe, clean environment, industrial development must be kept to a minimum. By the same token, there are those who believe that to grow a state economy, policymakers must be willing to lower regulatory burdens in order to entice industry to remain or move into a state. These individuals hold the view that some level of environmental degradation is acceptable in order to attract industries that have the potential to affect a state economy in a positive manner. Policy development is thus viewed as a competition between economic and environmental goals. But the question remains as to whether these are in fact competing policies. Must the environment be sacrificed in order to garner strong economic growth? Do states that choose to enact strict environmental regulations pay a price in terms of economic development? Do states that trade lax environmental policies for economic development reap the rewards of strong economic performance? Broadly speaking, is there a tradeoff between economic development and environmental quality? I seek to answer these questions in this dissertation.

State officials, along with those seeking state offices, frequently list economic growth as their top priority. Elected officials often cite successful economic development programs as reasons they deserve reelection. Candidates seeking state offices often run on a pro-growth, pro-business platform. Finding ways to enhance economic development through income and job growth are tasks toward which officials purport to work endlessly. Indeed, various organizations and think tanks provide enumerable resources for state leaders in their efforts to improve the economic growth of their home states (e.g., Council of State Governments, Center on Budget and Policy Priorities, Corporation for Enterprise Development). Tax incentives for businesses, better public schools, low crime rates, and healthy environmental conditions are just a few of the suggestions often proposed to improve a state's economic growth potential. Great attention is centered on efforts to develop effective methods for improving state economic growth and development.

However, questions remain as to whether these pursuits have any merit. Many state officials offer businesses lucrative financial incentives to consider locating within their borders. These incentives can take on many forms, including tax breaks, cash assistance, loan forgiveness, and low regulatory burdens. In order to attract and/or retain business and industry, many states are willing to forgo immediate economic rewards in the hopes of attaining long-term economic growth and development. It is unclear, though, whether states do indeed achieve the economic benefits that they hope for when adopting these policies.

Economic Development

A quick perusal of any state or local newspaper makes it quite evident that, whether or not economic development policies actually work, state leaders believe it is important to their constituencies to pursue such policies. News stories are often filled with promises of potential new businesses and the jobs they bring with them. Leaders must be viewed as working aggressively to improve state economic conditions. To be considered effective, state officials work to bring jobs and, thus, economic prosperity to their states. State websites generally have direct links on their homepages listing information on how to start, locate, or expand a business within their borders. Many states follow the examples of California and Alabama and list the economic incentives readily available to businesses relocating or expanding within their borders. Indeed the state of New York proudly has a "NY Loves Business" link on which it declares itself a "pro-business, pro-growth state" in order to attract businesses. Oregon asserts that it is a "small business state" ranking top in the nation in electronic commerce. Even a seemingly rural state, such as Wyoming declares itself "Open for Business" on its business resources webpage. The campaign to lure new businesses and encourage expansion by existing businesses is constant for state governmental officials. Economic development is considered critical if a given elected official is to be viewed as a successful leader.

"The objective of state economic development policy is to promote investment in a particular location" (Saiz and Clarke, 1999, p. 475). State officials seek to convince business leaders that their particular state offers the best climate within which to conduct business. States are under increased pressure to compete with each other for these

businesses (Brierly and Costello, 1999). Saiz and Clarke point out that state leaders have very limited control of the movement of the objects of production through their borders. Officials cannot mandate that businesses locate within their states. They do not have the ability to direct the location decisions of businesses. Thus, state policymakers try to entice investment through the offer of incentives for businesses.

Saiz and Clarke (1999) identify three types of economic development strategies employed by the states: strategies for infrastructure, locational incentives, and entrepreneurial strategies. Strategies for infrastructure focus state attention and resources on the physical infrastructure of a state, such as roads and highways (p.481). Entrepreneurial strategies focus on developing opportunities for growth and innovation within a state, such as providing seed money for business formation or research (p.491). Locational incentives focus on lowering the operating costs either for businesses newly locating to a state or for existing businesses considering expansion. It is the locational incentive type of economic development strategy that is the focus of this study.

Examples of states offering locational incentives or engaging in "smokestack chasing" are plentiful (Saiz and Clarke, 1999; Mahtesian, 1994; Mahtesian, 1996; Mahtesian, 1998). State leaders try to convince businesses that they will reap more economic rewards by locating within their particular states. In 1993 the governor of Illinois offered incentives to convince two companies to remain in the state. Tootsie Roll industries was offered $20,000,000 in loans, $1,400,000 in tax exemptions, and $200,000 for job training. Nabisco was extended $30,000,000 in tax incentives and $700,000 for job training. North Dakota held a special legislative session in 1994 for the sole purpose of changing tax laws in order to be able to offer tax incentives to lure a corn processing

plant to the state. Over a six year period, New York offered $176,000,000 worth of tax breaks and concessions to NBS, CBS, and ABC television networks to prevent them from leaving for another state (Mahtesian, 1994). Some Southern states have offered enormous incentives to lure automobile manufacturers to their areas. In the 1980s Tennessee offered incentives to Nissan amounting to $11,000 per job created and offered Saturn incentives worth $26,000 per job created. In 1985 Kentucky leaders convinced Toyota to locate a plant in their state with $150,000,000 worth of incentives. A $300,000,000 incentive package won the state of Alabama a new Mercedes-Benz plant (Mahtesian, 1994). In the past decade, much news has been made of the incentives offered to sports franchises to locate (or remain) within a state. Maryland built a new stadium to successfully lure a football team from Ohio, Missouri received a football franchise after building a new $300,000,000 stadium, and many other states are willing to offer new facilities, free rents, and other incentives to secure their own teams (Mahtesian, 1998). In the 1980s states and localities spent $750,000,000 to lure sports teams to their areas, by the mid-1990s the amount dedicated to similar efforts reached $8,000,000,000 (Saiz and Clarke, 1999). It is clear that states are willing to invest significant amounts of money to entice businesses to move to or stay within their jurisdictions. Economic development policies designed to lower the costs of business operations or directly provide aid to such operations are routinely employed by state leaders.

However, it is not always guaranteed that such economic development policies will translate into economic growth within a state. States that engage in "bidding wars" for businesses or sports franchises cannot be certain that winning the "bidding war" will win them economic growth. Pennsylvania provided $71,000,000 worth of incentives to

Volkswagen to open a new plant in the state in 1978. Within ten years, the plant closed down. In the early 1990s Minnesota provided Northwest Airlines with a $270,000,000 loan; however, the airline postponed the planned expansion. Similarly, General Motors shut down a plant in Michigan even though it was under an agreement to remain open in order to receive tax breaks from the state and local governments (Mahtesian, 1994). Hence, while state leaders may be eager to provide inducements to retain existing or attract new businesses, there is no assurance that an economic benefit will be gained as a result.

The Role of States in Environmental Regulation

In this research I investigate whether a particular locational incentive used to attract businesses actually results in state economic growth. Governmental regulation of business and industry affects the operational decisions that business leaders make. Just as state leaders believe that offering tax breaks and other financial incentives will attract businesses to their states, leaders believe that environmental regulations effect the site location decisions of firms (Jaffe, Peterson, Portney, and Stavins, 1995). Because of the intense economic development competition between states, officials may choose to lower regulatory burdens in order to be more competitive in attracting business and industry. Since a business can choose the state to which it will locate, it can choose which state will regulate its interests (Williams, 1999). By lowering environmental regulatory standards, state officials can offer businesses reduced operating costs. Lower standards can allow businesses to spend less money on pollution control measures, and thus, lower their operating costs. A decrease in operating costs allows businesses to make more profits. Consequently, states that adopt less stringent environmental regulations increase

the earning potential of businesses and may be more attractive to businesses than states with more stringent environmental standards. Moreover, firms currently located in the state may be less prone to being lured to move to another state.

Broad environmental regulation began with the federal government in the late 1960s and early 1970s: the Clean Air Act was passed in 1970, the Federal Water Pollution Control Act Amendments in 1972, Resource Conservation and Recovery Act in 1976, and the Clean Air Act Amendments and the Clean Water Act Amendments in 1977 (Bartik, 1988; McConnell and Schwab, 1990; Ringquist, 1993). Until these major pieces of legislation were passed, the states exercised dominance in environmental policymaking, and there was much variation among the states. Indeed, this variation caused some severe environmental problems, which prompted interests groups to push for federal involvement in environmental regulation (Williams, 1999). Further, federal policymakers were concerned about states using environmental regulation as a weapon in their "bidding wars" with one another for businesses to locate within their borders. A significant reason for the passage of this federal legislation in the 1960s and 1970s was to eliminate state variation and have the same rules for all to follow. For instance, according to one House report:

> "The promulgation of Federal emission standards for new sources . . . will preclude efforts on the part of States to compete with each other in trying to attract new plants and facilities without assuming adequate control of large scale emissions therefrom."
>
> (H. Report No. 91-1146 in Legislative History of the Clean Air Act [1979], Taken from Bartik, 1998, p. 24).

Many federal regulations were designed to prevent states from using environmental regulatory factors as a tool in their endless competition to secure economic growth.

However, during the 1980s and the devolution movement of Ronald Reagan, states began to exert more control over their own environmental policies and regulations. Under our federal system of government, much power was restored to the states to manage environmental activities within their borders. Supporters of devolution policies maintain the appropriateness of this movement since states and localities are most knowledgeable about environmental conditions in their areas and best able to respond to changing circumstances. Detractors argue that states frequently do not possess the financial capabilities to address significant environmental problems in an adequate manner (Sabat, 2004). It may also be true that some states do not find an economic advantage in certain environmental policies. Increased authority over environmental policy allows these states some flexibility in their environmental programs. While states cannot establish regulatory requirements below those set by the EPA, there is much room for variation above the EPA "baseline." Many states choose to go further with their regulatory burdens. These states enact environmental policies more stringent than the EPA. Other states choose to keep their regulations at the minimum level required by the EPA. They maintain the federal requirements, but make no effort to enact environmental policies that are more restrictive than those of the federal government (Sabatier, 1973). Further, states can use procedural rules to help "loosen" environmental regulations. According to Gray and Shadbegian, (1998) "state regulators have substantial discretion when making plant level decisions, such as where to direct enforcement activity and how strict (or slow) to make the permit application (p. 238)" Thus, states can maintain federal

requirements but act on them in a manner designed to give industry more leeway in fulfilling their environmental obligations.

Some observers contend that this environmental regulatory competition among states is waning. State officials have come to develop a cooperative view of environmental and economic goals, rather than a conflicting view (Fiorina, 2001; Graham, 1998). State and industrial leaders have speculated about the economic benefits of preventing pollution on the front-end rather than controlling it later in the game. While it is certainly true that some states consider a "green" strategy as part of their overall incentive package to attract new industry, it is not clear that all states have embraced this philosophy. The conflicts of "jobs vs. environment" and "growth vs. regulation" are arguments that are still waged. Many state leaders believe that the costs of environmental regulation weigh into location decisions made by business and industry. This is especially true for states that have economies that are highly dependent upon polluting industries (Williams, 1999). Leaders in these states believe that lower environmental standards will assist the industries that are so vital to their economies. Thus, they provide locational incentives in the form of lower regulatory costs to convince existing industries to remain within their borders and to attract new industries to locate to their jurisdictions.

Organization of Research

The purpose of this dissertation is to ascertain whether state officials can effect state economic growth through environmental regulatory policymaking. Different states have taken various approaches to secure "better" economic performance. A controversial incentive in many states is that of environmental regulations. Some states choose to have

strict regulations in order to ensure higher environmental quality; this is expected to make the state an attractive place to live and, hence, attract new businesses, though the strict regulations that create an attractive place to live usually impose some costs on businesses. Other states try a different approach. They offer looser environmental regulations in an attempt to provide incentives for businesses to relocate within their borders or to remain in their state. Of course, this approach reduces the cost of regulation but likely results in the very lower levels of environmental quality that some believe will draw new businesses to the state.

In this project, I attempt to identify the effects of environmental regulations upon the economic performance of the states. Do states that adopt more relaxed environmental regulations as an incentive to lure and keep businesses actually succeed in stimulating economic performance? In order to answer this question, I explore the linkage between environmental policy and state economic performance. The dependent variables are various indicators of state economic performance, including economic growth and unemployment. The primary independent variable of interest is environmental regulation. A variety of control variables are included in the analysis. These control variables include state business incentive policies, national economic conditions, state fiscal conditions, state structural characteristics, and state demographic characteristics. I utilize state data from 1977 to 2003 to determine if state economic performance is a function of environmental regulation.

I review existing research and develop a model to estimate the effects of state environmental policy on state economic performance. Chapter 2 consists of the review of research surrounding the topics of state economic growth and development and state

environmental policy. I begin with an examination of the literature surrounding the determinants of state economic growth and the effects of state economic development policies upon state economic growth. I then review the literature surrounding the determinants of state environmental policy and the effects of environmental policy upon state environmental conditions. I conclude the chapter with an examination of the literature of the effects of environmental quality and policy upon productivity, site location decisions, job growth, and economic growth. Chapter 3 provides a description of the theory driving this research. I illustrate the reasoning that may lead policymakers to believe that they have to choose between economic growth or environmental quality. In Chapter 4 I address problems associated with available state environmental policy data and provide a description of the data to be utilized in testing my model of state economic performance. Because of the complexities surrounding the measurement of environmental policy across states over time, various researchers have utilized different tools as a measure of environmental policy. I examine these variables and determine which tool best captures the variable I seek to isolate in this research. Chapter 5 describes the research design used. I describe all dependent and independent variables in detail. Further, I present the full model used in the analysis. In Chapter 6 I present the results of my empirical analysis. I present the full findings of the analysis, providing a detailed examination of each of the models estimated. Finally, in the concluding Chapter 7 I summarize the findings of this research. I attempt to answer the key question driving this research – does the level of environmental stringency adopted by the states have an effect upon their economic growth?

CHAPTER 2:
LITERATURE REVIEW

> In general, the studies that attempt to analyze directly the effects of environmental regulations on trade and competitiveness are limited in number. If one casts a wide enough net, however, by defining competitiveness rather broadly and by searching for indirect as well as direct evidence, it is possible to identify more than one hundred studies potentially capable of shedding some light on the relationship. It is nearly the case, however, that no two of these studies ask the same questions or even examine the same problem. (Jaffe, Peterson, Portney, and Stavins, 1995, p. 135)

Political scientists have devoted much attention to the issues surrounding state economic growth and development policies. Literature on the subject ranges from general explorations of determinants of state growth to the study of how states can deliberately affect their economic development to examinations of the effect of specific policies/regulations upon economic development. I review this body of research in turn beginning with state economic growth and moving on to economic development. I then shift the review to the topic of particular concern to this research – i.e., environmental policy and economic performance. I first consider the literature discussing determinants of state environmental policy and then proceed to review analyses of the effect of environmental regulation upon productivity and state economic growth.

State Economic Growth and Development Policies

Researchers have expended much effort examining issues surrounding state economic growth and economic development policies. However, research on the determinants of state economic growth does not provide a definitive answer as to what factors are most critical in influencing the growth of state economies. Further, research on the effect of state economic development policies does not clearly indicate whether or not states can influence their economies by pursuing specific development policies. The

findings presented by various political scientists differ according to the variables used to examine the particular questions examined.

Economic Growth

A critical question in the area of state economic growth is exactly what factors exert the greatest influence upon state economies. Researchers try to determine whether states even have the ability to effect their economic growth or whether factors outside the control of state policymakers are more important determinants of state growth. Moreover, different variables are used by researchers to measure state economic growth. State variables used include change in per capita income, change in value added by manufacturing, change in levels of nonagricultural employment, change in living conditions, change in total personal income, real total personal income, capital levels, labor resources, and technological resources. The conclusions reached by scholars differ according to the variables used in their analyses.

Brace (1991) examines influences upon state economic growth. Working on the theory that state ability to influence economic conditions may fluctuate over different time periods examined, he seeks to determine whether states can have an impact on their own economic development or whether national economic conditions dominate state economies. Using change in per capita income as the measure of economic growth, Brace (1991) finds that states' abilities to affect their economic growth have changed over time. From 1968 to 1979, states exhibit no effect on their economies with the development policies pursued. However, Brace finds that this changes from 1980 to 1985. Changes in pressure placed upon the national economy from international markets have enabled states to exert more influence upon their economies. This is particularly

true in states possessing the institutional characteristics of strong gubernatorial capacity and more professional legislatures. State economic development and taxation policies do have an effect upon per capita income. Further, states with more professional legislatures and more powerful governors were able to achieve greater effects. Brace cautions, though, that during the 1980s the national economy was strained and this finding may not hold for long-term economic growth. He notes that "while the role of states in shaping their economic growth is on the rise, there may be many reasons to question the sufficiency of state activity for sustaining long-term economic growth" (p.312).

Brace (1993) confirms these findings in a further development of his model. In addition to change in per capita income, Brace examines whether states can have an effect upon levels of nonagricultural employment and change in value added by manufacturing. Again Brace finds that the ability of states to influence these factors of economic growth was altered during different time periods examined. Changes in value added by manufacturing exhibit a similar pattern to changes in per capita income. National economic conditions display more of an influence than do state economic development efforts until the 1980s. At this point states efforts begin to exert an influence upon economic growth. Employment trends are a bit different, however. Brace finds that state factors demonstrate more of an effect upon nonagricultural employment than do national conditions. While Brace does note the dominant role of the states in influencing employment and acknowledges the growing role of the state in influencing economic growth during the 1980s, he holds that overall national conditions exert greater influence over state economic growth than do state efforts.

In his exploration of the volatility of state economies, Crain (2003) questions the theoretical argument that national economic conditions dominate state economies. Crain examines national and state economic trends in the last half of the twentieth century. He notes that while overall U.S. income growth declined from 3.8% in the 1940s to a rate of 1.3% in the 1990s, there was not a similar pattern of slowdown in income growth in the states. Crain holds that over half of state economies did not follow the national trend, "the economies of 28 American states departed from the "national" pattern and showed no significant slowdown in the last half of the twentieth century" (p. 9). Indeed in examining different aspects of state economies (e.g., growth, living standards, volatility), Crain finds that there is much variation among the states' economic performance. He demonstrates that the individual states experienced very different economic trends from one other and from the nation throughout the twentieth century, thus, calling into question the idea that national economic conditions drive state economic growth.

Conversely, Hendrick and Garand (1991) find that national economic conditions are becoming increasingly important to state economic growth. They examine state economic data from 1945 to 1984. The variables used to capture state economic growth are yearly changes in total personal income, real (deflated) total personal income, and per capita income. By examining yearly means and standard deviations of state economic growth, they determine that immediately after World War II, deviations from the mean were high, but this has been decreasing since the 1960s. This increased centering around the mean leads the authors to hypothesize that state economies are becoming more influenced by forces outside their control. Indeed, when the authors then examine variation in growth, they find that, while conditions within states still account for much of

the variation, this trend has been steadily declining since the 1960s, as well. Hence, Hendrick and Garand determine that national factors are becoming increasingly important to state economic growth and should be considered in future research.

The findings of Brierly and Costello (1999) appear to support the theory that state economic growth is due largely to factors outside the control of state governments. The authors examine the influence of state economic conditions upon gross state product from 1963 to 1991. They determine that state level capital (measured as the value of bank assets), state labor resources (measured as the total number of civilian employees), and technological resources (determined through use of an error correction mechanism) are critical elements for state economic growth and development. This finding is supported by the research of Brierly and Feiock (1993) who examine the effects of state economic conditions and interest group organization upon state economic growth. This study notes the significance of capital and labor as determinants of economic growth, "economic resources, rather than organization, appear to matter more in determining income growth rates" (p. 667). Brierly and Costello (1999) posit that states actually have very little control over levels of state capital, labor, and technology. The consolidation of the banking industry to the detriment of local banks leads to forces outside of the states determining the capital flow into the states. The type of significant change in a state labor market that could effect economic growth is not likely to occur through state efforts alone. This requires long-term commitments from political leaders that are unlikely to pay off within their tenures, and thus, are unlikely to occur. Technological changes are not confined within state borders. Innovations occur throughout the economy and are not likely to produce immediate economic improvement in particular states. Thus, the

authors determine that while the state economic conditions of state level capital, labor, and technological resources are crucial components to state economic growth, they argue that these are exogenous variables outside the control of state policymakers.

The literature on the dominant influences upon state economic growth does not provide clear answers as to which factors are most important for state economic growth. Much of the literature does point to outside forces, such as national economic conditions, as playing a significant role in state economic growth. When change in specific state economic indicators and state level resources are used to measure state economic growth, variables outside of state control appear to exert greater influence over state economic growth than do state level variables. However, these results are not conclusive. When analysis focuses upon rates of growth within the states over time, variability does exist. Even during times when all states are subject to the same national economic conditions, their individual rates of growth differ. This calls into question the notion that state factors are less important in determining state economic growth than are national factors. Further explanation is necessary to clarify the factors that drive state economic growth.

Economic Development Policy

Before specifically addressing the topic of economic growth and environmental policies, I conduct a more general examination of the literature on economic development. The effectiveness of economic development policy is well-worn ground for political economy scholars. Researchers have examined issues surrounding the effect of local economic development policies, state locational incentive policies, state and local tax policies, state spending policies, and redistributional policies. They seek to understand whether states and localities can have an impact upon their economic growth

and their overall economic "health" through the use of specific economic development policies. Tools used to measure economic growth in the various analyses include unemployment rates, change in business indicators (e.g., number of firms), and changes in personal and per capita income. These measures have allowed researchers to isolate the effects of state and local economic development policies.

Feiock (1991) examines the effect of economic development policies upon local economic growth during the 1970s and 1980s. He surveys city officials in 212 U.S. cities to determine the use of various economic development policies (e.g., loan guarantees, tax abatements, industrial development bonds). His measures of economic performance focus on the manufacturing sector and include change in capital investment, change in the number of firms, and change in employment. He finds that local policies do have an effect upon capital investment, some effect upon the number of firms, but no apparent effect upon employment. However, Feiock does not include state policies in his analysis and as a result may be missing a large piece of the economic development puzzle by not including state factors such as regulatory policy.

Ambrosius (1989), on the other hand, focuses specifically on state policies by conducting a time-series analysis of eight state economic development/locational incentive policies. She examines the effect of state revenue bond financing, state funds for city/county development-related public works, accelerated depreciation of industrial equipment, tax breaks on equipment or machinery, tax breaks on land or capital improvements, state incentives for building in a high unemployment area, state supported training of the chronically unemployed, and state incentives to industry to train the chronically unemployed upon state economic health from 1969 to1985 (p. 285). She uses

two measures of economic health: per capita manufacturing value added and percentage unemployed. National measures of per capita manufacturing and unemployment are used as control variables. Ambrosius finds that none of the state economic development policies have a statistically significant effect upon state economic health. She finds no support for the use of these measures to aid a state's economic health. Consistent with the findings of Brace (1991) and Hendrick and Garand (1991), Ambrosius finds that the national economic control variables are significantly related to her measures of state economic health.

Dye (1980) examines a different set of state policies. He measures economic performance by examining growth in personal income, growth in employment, and growth in value added by manufacturing from 1972 to 1976. Dye focuses on three types of policies that he hypothesizes might effect state economic growth: taxes, spending (specifically, spending on education, highways, welfare and health and hospitals), and redistributional programs. Controlling for other state characteristics, Dye does not find that tax policies or redistributional policies have an effect upon any of his measures of economic growth. Only one of the spending policies examined exhibits an independent effect upon each of the measures of economic growth. State highway expenditures provide the strongest relationship with state economic growth. He speculates that infrastructure investment is the most effective policy that states can pursue in their efforts to improve economic growth.

Jones (1990) also examines how state spending affects economic growth. The dependent variables he uses to measure state economic growth from 1964 to 1984 are changes in employment, net business establishments created or lost, changes in personal

income, and changes in per capita income. The spending policies examined are education, highways, welfare, police/fire services, and health/hospitals. He finds that spending on welfare and health/hospitals is negatively related to economic growth. Spending on education and highways produces mixed results during different time periods studied, with a significantly positive relationship between these variables and economic growth in evidence during the late 1970s and early 1980s. Surprisingly, spending on police/fire services is positively related to growth. Jones speculates that the support he finds for the effects of police/fire services spending might be because these are generally locally-borne costs and these spending measures may be acting as a surrogate for other spending measures such as water, sewerage, etc. If this is the case, this study may lend support to Dye's infrastructure investment theory.

Helms (1985) takes a different approach in his study of economic growth. He is specifically interested in the effects of state and local tax policies on growth. Noting, though, that tax policies should not be "studied in isolation," he also examines state expenditures and characteristics of the labor force. He examines data from 1970 to 1979, with state personal income as the measure of economic growth. Consistent with research focusing on the effect of tax policies upon economic growth at the national level (King and Rebelo, 1990; Jorgenson and Yun, 1990), Helms finds that state tax policies do have an effect upon economic growth. He finds that tax increases decrease economic growth. He takes the analysis further, however, by examining how tax money collected is spent by state governments. Like Jones (1990), Helms determines that tax measures designed to increase spending on redistributional programs are negatively related to growth. On the other hand, tax measures designed to increase spending on programs such as

highways and education are positively related to growth. Helms speculates that the negative effects of higher taxes may be lessened if the taxes are used to fund (non-redistributional) programs that will make a state a more attractive site for business (re)location. He posits that such non-redistributional spending has a positive, "stimulative effect" upon a state's economy.

This body of research produces interesting results. Those studies that use some measure of change in an economic indicator as the dependent variable are more likely to find that economic development policies can have an impact upon economic growth. Studies that do find support for the effectiveness of economic development policies seem to indicate that infrastructure development policies are the types of policies which can produce a positive affect on state economic growth. State policymakers who wish to increase state economic growth are better served by implementing infrastructure development policies rather than redistributional policies. Thus, this research suggests that the type of dependent variable used is critical to understanding the impact of economic development policies. If the effect of economic development policies is to be understood, then dependent variables used to study these effects should be centered on understanding the change that these policies can produce. Further, not all economic development policies are equal. Some are more effective than others at producing the economic benefits pursued by state policymakers.

State Environmental Policy/Regulation

I am interested primarily in studying the effects that state environmental regulatory policy have on state economic growth. Researchers engage in various studies of environmental policymaking. States employ different levels of environmental

policymaking and researchers seek to understand the causes of these differences among the states. One area of research focuses on the reasons that states adopt specific environmental policies and the extent to which the states engage in environmental policymaking. Another area of research centers on the effect that environmental regulation has on business productivity. Still, other researchers specifically examine the economic effects of environmental regulations. In this section I examine these explorations surrounding the determinants of state environmental policy, the effects of environmental policy upon business activity, and the effects of environmental policy upon the economy.

Environmental Policy

Environmental policymaking varies considerably among the states. Efforts are undertaken to understand what factors influence state policymakers in determining which policies are enacted. Researchers explore broad environmental policies, specific pollutant policies, and enforcement policies within the states. Various factors are examined to ascertain which have the greatest influence upon policymakers when choosing to adopt environmental policies. These factors include environmental conditions, political influences, economic resources, ideology, federal activity, regional activity, and institutional characteristics. Thus, a broad range of variables are investigated to understand the extent to which states engage in environmental policymaking.

Hays, Esler, and Hays (1996) examine state influences upon the state level of commitment to environmental policies. They review six possible influences upon state environmental policy: environmental conditions, economic resources, political pressure,

elite ideology, institutional characteristics, and federal activity. They use the Green Index (Hall and Kerr, 1991) to measure state environmental commitment. Hays et al. determine that the strongest influences upon state environmental commitment are political pressure (measured as state public opinion liberalism, state membership in environmental groups, and percentage of employees in the manufacturing sector), elite ideology, and legislative professionalism. Of particular interest to the purpose of this research is the effect of political pressure. State membership in environmental groups and percentage of employees in the manufacturing sector both show a positive relationship to environmental policy. Hays et al. hypothesize that large businesses may have a competitive reason for supporting stricter environmental policies; stricter regulations may add to operational costs and keep smaller firms from entering the market. Thus, more stringent environmental regulations may add to the competitive advantage of large firms.

Another area of interest for researchers is that of the determinants of hazardous waste policy in the states (Lester, Franke, Bowman, and Kramer, 1983; Daley and Garand, 2002). Lester et al. (1983) examine factors such as technological pressure (problem severity), state economic resources, political demands, bureaucratic structure, and legislative professionalism. Using a 1979 survey of state toxic substances programs as a measure of state hazardous waste policy, the authors find that technological pressure, administrative authority, bureaucratic structure, and legislative professionalism are the strongest determinants of state hazardous waste policies. States respond to technical pressure, i.e., problem severity. These variables appear to interact with one another, though. In states where the hazardous waste levels are high, the legislature takes the

initiative in hazardous waste policymaking. In low hazardous waste states, the bureaucracy takes the initiative in policymaking. Similarly, Daley and Garand (2002) investigate the effects of problem severity and economic resources on state hazardous waste policy. They also test the effects of political influences, interest group influence, and regional influences upon hazardous waste policy. Daley and Garand find that problem severity, prior pro-environmental policy activity of a state, economic resources, and regional influences have an effect upon state hazardous waste policy.

The effect of regional influences upon state environmental policy is further explored by researchers (Pashigian, 1985; Fredriksson and Millimet, 2002). In his examination of the policy of prevention of significant deterioration (PSD) – a policy that mandates that areas that exceed the minimum air quality standards cannot allow significant deterioration of their air quality – Pashigian (1985) finds that regions' support of the policy reflect competitive self-interests. Regions that have "dirtier" air are much more supportive of the PSD, thereby, ensuring that other "cleaner" regions can not engage in the economic development policies that cause their "dirtier" air. Thus, the "clean" regions are not able to entice polluting industries to move from the "dirty" regions to the "clean" ones. Fredriksson and Millimet (2002) examine whether states respond to the environmental policies of their neighbors – whether evidence can be found for a "race to the bottom" (or top) among neighboring states. They determine that the neighbor effect moves in one direction – up. States are moved to adopt more stringent regulations if their neighbors enacted such policies, frequently surpassing the stringency of their neighbors. However, states do not follow their neighbors in adopting less

stringent environmental regulations. An environmental "race to the bottom" does not occur among less stringent states.

List and Gerking (2000) question whether the stringency of states' environmental regulations declined during the Reagan years when much authority over environmental regulation was passed back to the states. Again, evidence does not support a "race to the bottom." List and Gerking do not find that states relaxed their environmental standards when given greater control over environmental regulations. They note that "indicators of environmental quality on the state level either continued to improve or at least did not deteriorate" (p.454). Additionally they find weak support for a positive relationship between economic growth and environmental regulation. As income increases, there is an increase in environmental regulatory stringency. The authors suggest that as income increases, people are more willing to pay the costs associated with pollution abatement policies. However, there may something else at work here. It is possible that the variables are endogenous. Rather than income increases producing a willingness among people to pay for pollution costs, it may be that strong environmental regulations produce a business climate conducive to economic growth. Thus, the causal flow may not be in the direction presumed by the authors.

Crotty (1987) examines the issue of state primacy (authorization) under the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, and the Federal Insecticide, Fungicide and Rodenticide Act. The EPA allows states to apply for primacy in environmental enforcement. Once approved, the state becomes the primary enforcement agency regulating national (and state) environmental standards. Crotty outlines reasons why the federal government encourages state assumption of primacy: the federal

government wants the states to be the primary enforcement entity, the federal government wants to reduce the amount of money provided to states for pollution control, and the federal government hopes that states will enact even stricter environmental standards than those delineated by the EPA. Crotty determines that states quickly began to assume primacy once the option was made available by the EPA. Crotty further investigates the reasons state officials decide to assume primacy for the enforcement of environmental regulations within their states, finding that states with past histories of strong environmental regulation are quickest to apply for primacy. One aberrant finding, though, occurs in Southern states, which seek primacy but do not have strong histories of environmental protection. This is also consistent with the findings of Lester, et al. (1983) that Southern states are active in hazardous waste policy. Crotty (1987: 65) hypothesizes that Southern states' assumption of primacy has less to do with environmental protection and more to do with an interest in controlling the procedures of environmental regulation in an attempt to offer advantages to businesses within their states or entice new businesses to locate within their borders.

Sigman (2005) also examines primacy or authorization within the states. Her study focuses on whether states that are authorized under the Clean Water Act engage in free riding behavior to the detriment of neighbors who share a common water stream. Sigman examines whether states that are downstream of an authorized state experience lower water quality than the authorized upstream state, suggesting that an authorized state is not vigilant in its enforcement/monitoring responsibilities. She finds that "the coefficient on being downstream from an authorized state is negative and statistically significant, which is consistent with free riding [and] suggests a 4% reduction in the

water quality index" (p. 92). Thus, the downstream state bears the costs of environmental damage and cleanup that should have been managed by the authorized, upstream state. Hence, Sigman determines that authorization does allow free riding to occur.

Helland (1998) studies influences upon enforcement efforts in thirty states in 1990. Enacting a policy is only part of the environmental puzzle; implementation of enforcement is a necessary part of ensuring environmental compliance. A state may enact strict policies, but if these policies are not enforced, there is no need for industry to abide by pollution abatement requirements. Using EPA data on state enforcement of the Clean Water Act of the pulp and paper industry, Helland determines that both budgetary and political factors influence enforcement efforts of the states. States with smaller budgets conduct fewer inspections, but the inspections that are conducted are more comprehensive. States that pay their environmental regulators larger salaries are likely to conduct fewer comprehensive inspections. Local economic factors are taken into account when determining whether or not to conduct a rigorous inspection. In economically depressed areas, if a plant is likely to shut down due to violations, a comprehensive inspection is less likely to occur (p. 244). Overall, the enforcement decisions made by state regulatory agencies will take into account both budgetary and political-economic factors. It is interesting to note that Helland finds that a plant that has recently undergone a comprehensive inspection has lower pollution levels than other plants that have not been recently inspected. Related to this finding is that of Shimshack and Ward (2005). These authors determine that when a state regulatory agency imposes a fine on a firm for an environmental violation, both the fined plant and other plants under the authority of the agency will have reductions in violations. Thus, firms react to the enforcement

decisions made by regulators, whether or not they are the firm directly affected by the enforcement action.

An examination of the determinants of state environmental policy indicates that a variety of factors influence state environmental policymaking. Critical factors include political pressure, elite ideology, institutional capacity, environmental conditions (i.e., problem severity), regional influences, prior history of environmental policymaking, and economic resources. State policymakers respond to both internal state pressures and external influences. While internal pressures can result in policymakers going in either a more or less stringent direction in environmental policymaking, it appears that external regional pressures influence states to adopt more stringent environmental policies. Also important to note is that states can only act when they have the ability to act. Institutional capacity (e.g., legislative professionalism and bureaucratic authority) and economic resources are important determinants in state environmental policymakers. Thus, state officials respond to a diverse set of factors when adopting environmental policy.

Environmental Policy and Productivity

More closely related to the issue of environmental regulation and the impact that state policies have on businesses are studies conducted on the effect that such regulations have on business productivity. Researchers in this area examine the regulatory impact on specific industries. They seek to uncover the effect that various environmental and workplace regulations have had on the industries examined. This body of research focuses on whether businesses have experienced a decline in productivity and competitiveness as a result of regulations imposed by government.

Noting the decline in productivity in the U.S. from the mid-1960s and throughout the 1970s, researchers have sought to determine the effect of environmental regulations upon this decline. Christainsen and Haveman (1981) conduct a time-series regression of the manufacturing sector from 1958 to 1977. They determine that between 12% and 21% of the decline in productivity in the U.S. after 1973 was due to the introduction of stricter environmental regulations. Gollop and Roberts (1983) examine the specific effect of regulations of sulfur dioxide emissions upon the electric power industry each year from 1973 to 1979. They determine that environmental regulations had a negative effect upon the productivity rate of the electric power industry. They note that the initial effects of regulation result in larger negative effects on productivity, with the largest effect felt in 1976 – the year EPA standards went into full effect – but negative effects are persistent even after the initial shock of the implementation of the more stringent regulations. The authors find that "the annual average productivity growth for these firms would have been 44% higher had it not been for sulfur dioxide regulations" (p. 672).

Similarly, Gray (1987) studies the effects of OSHA and EPA regulations on the manufacturing sector (450 different industries within the sector) from 1958 to 1978. He estimates that 30% of the decline in productivity slowdown occurred as a result of increased regulations. Indeed, the most highly regulated industries in the sector experienced the greatest slowdowns in productivity. However, he does find that OSHA, rather than EPA, regulations have the greatest effect upon the slowdown in manufacturing productivity. Gray and Shadbegian (1998) explore a different productivity question. They examine the effect that a firm's investment in pollution abatement technology has upon the firm's investment in productive investment. They

find a negative relationship between these types of investments by firms, "a dollar of pollution abatement investment reduces productive investment by $1.88 at that plant" (p. 254). Thus, adhering to more stringent environmental regulations may cause firms to invest less in improving production technologies.

However, Barbera and McConnell (1986) have different findings when analyzing different sectors of the economy. Using a factor demand analysis, they examine productivity in four sectors: paper, chemicals, stone, and primary metals. The authors analyze the effect of environmental regulations upon these industries' demand for capital. They find a greater impact of the regulations upon productivity slowdown from 1960 to 1973 than from 1973 to 1980. They suggest that sometime after the implementation of harsher regulations "the marginal effect of an additional dollar of abatement capital on productivity fell, either because of technological changes in abatement techniques or the gradual adjustment to pollution regulation" (p. 167-168). Hence, Barbera and McConnell determine that since industries can adapt to regulations, for a productivity decline to result due to these environmental regulations the most heavily regulated industries must be faced with severe productivity changes.

Jaffe, Peterson, Portney, and Stavins (1995) center their inquiry on the effect of environmental regulation on competitiveness and productivity of firms. They review the costs associated with environmental compliance and conduct a review of the existing literature on the subject. Jaffe et al. argue that little evidence has been produced to link industry slowdowns in competitiveness to increased environmental regulations. They state that (1) stringency of regulations is hard to measure, (2) costs associated with compliance are generally small in comparison to total expenditures of firms, (3) evidence

has not shown that industries have migrated out of the country in large numbers to avoid regulation, and (4) when firms do locate out of the country they tend to build plants in line with U.S. standards. Further, they also argue that regulations have actually increased the competitiveness of some firms. The authors note that data in this area are poor and many researchers have failed to control for regulatory climate. Hence, the efforts to find a link are constrained. They conclude with the notion that the truth of the relationship may be somewhere in the middle of the two arguments. Some competitiveness/ productivity may be lost as a result of environmental regulation, but some may be gained as well.

Other researchers examine the potential benefit of more stringent environmental regulations upon productivity. Hart (2004) argues that strict regulations may lead firms to engage in new areas of production research designed to maximize profits. He posits that when industries are forced to engage in cleaner production methods, industrial research efforts will focus toward techniques that will both benefit the environment and improve productivity, "hence measures penalizing dirty technologies may not only raise social utility, but also boost the growth rate of production" (p. 1097). Porter and van der Linde (1995) contend that more stringent, "properly designed" regulations can lead to "innovation offsets" in industrial processes that improve productivity and lead to more cost effective methods of business operations. They provide case studies to support their theory of a production benefit of strict environmental regulation, "[1] Ciba-Geigy's . . . two changes in production process . . . boosted yield by 40 percent . . . annual cost savings of $740,000, [2] allowed 3M to reduce hazardous wastes by 10 tons per year at almost no cost, yielding an annual savings of more than $200,000, [3] Dow redesigned its

production process . . . change cost $250,000 . . . savings of $2.4 million per year" (pgs. 102-103). Thus, the authors make a case that environmental regulation can push industries toward innovations that will not only benefit the environment, but that also result in greater productivity and cost savings.

The literature examining the effects of environmental regulations upon business productivity produces mixed results. Studies that focus on individual industries during the 1960s and 1970s (a period marked by increased federal regulation) find that regulations do costs businesses in terms of lost of productivity. Increased regulations caused a decline in productivity. However, studies that examine multiple industries after the initial increase in regulations in the 1960s and 1970s find a less severe impact of regulation on business productivity. Indeed, some authors theorize that increased regulations actually force businesses to be more creative in research development and this may result in productivity increases for business and industry. Research results in this area are dependent upon the number of industries included in the study and the time period examined.

Economic Effects of Environmental Policy

Environmental policy can effect economic growth in a number of ways. Researchers attempt to identify the specific impacts that regulations have on business and industry and how these impacts affect the overall economy. Regulations can have an effect on employment levels. If businesses must assume greater costs as a result of increased regulations, they may lay off employees in order to offset these expenses. Regulations may also influence business decisions to either expand an existing facility or to locate in a new area. Costs associated with regulations may be critical in making such

business choices. These employment and site location decisions will ultimately affect the local economies in which these businesses operate. Economic growth or economic decline can result from businesses deciding to hire or fire employees and whether business decide to remain in or leave a locality. Research examines effects upon employment, plant location decisions, and overall economic performance.

Predictive Models of Economic Growth

Bovenberg and Smulders (1996) directly examine the link between environmental policy and economic growth. However, they take a unique approach. They consider the environment as a public good with two potential uses: consumption or production input. The authors consider factors of production such as technology, preferences, income, savings, knowledge, and man-made production factors in developing their endogenous growth model. Ultimately, they determine that (in the long run) if the environment is a consumption good, then economic growth will decline as regulations prevent its use. Conversely, if the environment is a production input, then economic growth will increase as regulations enhance the quality of this input.

Jorgenson and Wilcoxen (1990) model U.S. economic growth both with environmental regulations and without them. They take into account historical exogenous variables, and based on past performance, project their future value. They assume inelastic capital. They use as a base case the economy with pollution regulations and simulate an economy without these regulations. By focusing on three costs associated with environmental regulation – operating costs associated with pollution abatement, costs of investments to meet environmental standards, and cost of emissions controls – they determine that U.S. economic growth would have been 0.034% points

higher from 1973 to 1985 without environmental regulations. Further, GNP would have been 0.074% points higher. Jorgenson and Wilcoxen, thus, conclude that environmental regulations "lowered the long-run capital stock, reduced long-term consumption . . . [and] reduced the rate of capital accumulation" (p. 338).

Effects upon Employment Levels

In contrast to these predictive models, Goodstein (1999) examines the effect of environmental regulation on job loss. He finds that environmental regulation has not hindered employment, pointing out that in the 1990s, when spending for environmental clean-up/regulation was at its all time high, unemployment was at its lowest since the 1960s. He finds that lay-offs directly attributed to increased environmental regulations account for less than one tenth of one percent per year. Further, he does not find support for mass relocation of plants into weak regulated areas, so-called "pollution havens." Finally, while he does find some support for environmentally created jobs, he discounts this other side of the environment-jobs debate by pointing out that, while environmental regulation does not cause drastic unemployment, it does not cure it either.

Wagner (2005) proposes a theory that under different sets of conditions environmental regulation will have differing effects upon the employment sector. In a setting in which environmental control efforts do not add significant costs to firms, there is no financial incentive for firms to move toward abatement efforts. Thus, jobs will be kept at the expense of the environment. In a setting that does place significant regulatory costs upon polluting firms, an abatement industry will develop to assist in pollution control. Jobs will be created in this new abatement industry. Thus, jobs that may be lost in the polluting industry as a result of increased pollution abatement costs may be created

in the new abatement industry, "aggregate employment and environmental quality are complementary goals" (p. 154). In Wagner's view, employment and environment are not in conflict, but instead will find a balance within the regulatory path chosen by policymakers.

Effect upon Site Location Decisions

Other research examines how business location decisions may be affected by environmental regulations. Bartik (1988) investigates location decisions of Fortune 500 companies from 1972 to 1978. State spending devoted to environmental efforts are used to measure environmental stringency. Specifically, Bartik uses spending on air and water pollution control efforts divided by state manufacturing employment (p. 28). Using these measures, he does not find a statistically significant relationship between environmental regulations and site location decisions of new firms. Bartik hypothesizes that pollution control costs are only a small part of the total operating costs for businesses, therefore, these costs only account for a small portion of the location decision calculus. Thus, evidence does not support the theory that environmental regulations will negatively effect business location decisions because business leaders do not consider these costs to be large enough to have a strong impact upon their decision.

McConnell and Schwab (1990) focus specifically on location decisions within the motor vehicle sector in their analysis of the effects of environmental regulations upon site selection. The authors examine environmental regulations at the county level. They use measures of environmental conditions and industry pollution abatement costs to determine stringency of environmental regulations. They do not find evidence to support the theory that strict regulations deter plants from locating in an area. Further, they find

weak support for firms choosing not to locate in an area with poor environmental conditions. Levinson (1995) reviews studies examining international and domestic business location decisions. His examination supports the finding of McConnell and Schwab. He notes that "the literature as a whole presents fairly compelling evidence across a broad range of industries, time periods, and economic specifications, that regulations do not matter to site choice" (p. 23).

Conversely, List and Co (2000) do find a negative effect of state environmental regulations upon location decisions by foreign firms. These authors use state spending on environmental programs, industry pollution abatement spending, and an index of state policies to measure the stringency of environmental regulations. They examine site location decisions of foreign firms from 1986 to 1993. They determine that a "one percentage increase or decrease in the independent variable changes the predicted probability of a foreign firm choosing the most affected, median affected, and least affected state" (p. 10). Interestingly, they find this effect for both pollution intensive and non-pollution intensive firms. Thus, at least with regards to foreign direct investment, state environmental policy does matter in the business location decisions of firms. Becker and Henderson (2000) find similar results in their examination of air quality regulations at the county level. The authors focus on plant location decision in four industries: industrial organic chemicals, metal containers, plastics, and wood furniture. Using environmental conditions as a measure of environmental policy, the authors determine that industries in these sectors will move to "less polluted areas to avoid stricter regulations in more polluted areas" (p. 380). More highly regulated areas have a

35% - 45% less probability of having new firms locate within their borders. Hence, strict environmental regulation deters the entry of new businesses.

Effect upon Economic Growth

Grossman and Krueger (1995) explore the economic growth/environmental quality question from a different angle. They investigate whether countries that experience higher levels of economic growth experience deterioration in environmental conditions from 1977 to 1990. Using four measures of environmental conditions (i.e., urban air pollution, oxygen regime in river basins, fecal contamination of river basins, and heavy metal contamination of river basins), the authors do not find that countries with higher levels of economic growth suffer greater levels of environmental pollution. Rather, "as nations or regions experience greater prosperity, their citizens demand that more attention be paid to the noneconomic aspects of their living conditions" (p. 372).

Templet (1995) presents the question from the perspective of the effect of environmental conditions upon economic growth. Rather than focusing on regulation in his examination of the environment-economy debate, Templet analyzes environmental risks and economic conditions. He finds that states which possess greater environmentally risky conditions (e.g., chemical plants with high emissions) exhibit poorer economic conditions. Templet argues that "an impacted or diminished environmental base . . . reduces the long-term economic welfare because it can contribute to less service to the economy . . . environmental abuse will also result in lowered public welfare" (p. 38). Specifically, environmentally poor states have lower personal income, greater income disparity, greater poverty, greater unemployment, poorer economic "health scores," lower retail sales growth, and greater numbers of business failures.

Hence, Templet does not find that states with lower environmental standards are gaining an economic benefit. Rather, these less environmentally healthy states become less attractive to potential businesses and economic growth does not occur as a result of business investment.

Similar results are found by Goetz, Ready, and Stone (1996). Using the Renew America policy index of 1987 to 1989 and the Green Index ranking of environmental quality, these authors examine the effect of environmental policies and conditions upon economic growth in U.S. states from 1982 to 1991. They determine that better environmental conditions had a positive effect upon per capita personal income growth. They do not find a significant negative effect of environmental regulations upon growth, "the coefficient estimate for environmental policies was positive but not statistically significant, suggesting that any impact of stricter policies on economic growth was negligible" (p. 104). The analysis seems to suggest that stricter environmental regulations lead to better environmental conditions that, in turn, lead to higher economic growth.

Meyer (1992) examines the effect of state environmental regulations upon four different economic indicators: annual gross state product, state annual non-farm employment growth, state annual manufacturing employment growth, and state annual business failures. He creates a state environmental policy score based upon two policy indexes from 1982 and 1990. He conducts the analysis for two time periods: 1982 to 1989 and 1990 to 1992. For the 1982 to 1989 time period, Meyer does not find a statistically negative relationship between environmental stringency among any of his economic indicators. Thus, he finds that the evidence does not support the contention

that strict environmental regulations depress economic growth. In fact, while not statistically significant, his results hint at a weak positive relationship between environmental regulations and economic growth. However, when examining the recessionary period of 1990 to 1992, Meyer finds that the coefficients do indicate a negative relationship between environmental regulations and growth. However, once again the coefficients are not statistically significant and no conclusions should be drawn based on this finding alone. This leads Meyer to conclude that the evidence does not support the contention that more stringent policies result in economic decline.

Feiock and Stream (2001) specifically examine the relationship between state environmental policy and economic development from 1983 to 1994. Using new state capital investment as the dependent variable, the authors develop measures for state environmental policy using state spending on environmental programs, the cost of state regulations upon polluters, tax incentives for pollution control, and the stability of environmental policymaking institutions/decisions. They determine that different policies have different effects upon economic development. Regulatory policies that increase compliance costs for business have a negative impact upon new investment; higher pollution control costs have a negative effect upon private sector growth rates (p. 318). However, increased state spending on environmental programs and state efforts to establish clear administrative authority over and guidelines for environmental regulation appear to have a positive impact upon economic development. When the uncertainty surrounding potential environmental regulations is removed, businesses are more likely to increase investments.

The literature provides mixed results regarding the effect that environmental regulations have upon state economic growth. Depending upon the time period studied and the variables used to measure levels of environmental stringency, research studies produce conflicting results. While there does not appear to be a link between environmental regulations and unemployment, there is also no evidence to support the idea that environmental regulations create employment. Research conducted in the early 1990s exploring the relationship between environmental regulations and business site location decisions does not find that environmental regulations have an impact on site location. However, more recent research finds support for the theory that environmental regulations can have an impact upon site location decisions. Most of the research exploring the relationship between environmental regulations and economic growth does not find support for the theory that environmental regulation lowers economic growth. Typically measures of state spending, environmental conditions, policy indexes, and costs to business are used to measure environmental regulatory stringency. When environmental policies are studied in isolation from one another, though, support is found for the idea that regulations that increase pollution costs can lower growth rates. However, environmental policies that increase state spending and clarify regulations are found to have a positive impact upon economic growth.

Conclusion

The existing literature does not provide a conclusive understanding of the relationship between environmental policy and economic growth. I have reviewed research that explores questions surrounding state economic growth in general, the ability of policymakers to affect growth through economic development policies, the

determinants of state environmental policy, and the impact that environmental regulation can have both on business productivity and economic growth. Quite often, researchers focus their inquiries into specific sectors of the economy and caution must be used in making generalizations from these results. When examining the relationship between regulation and the economy, researchers are hampered in their efforts by the poor measurement tools available. Measures that are specifically policy measures are cross-sectional and do not allow the authors to examine variance in policies over time. Alternative measures that are not policy-specific, but are longitudinal, serve as proxies for policy variables in these longitudinal studies.

Missing from the literature is a longitudinal study that takes state characteristics, national economic conditions, state fiscal conditions, business policies, environmental conditions, and environmental stringency into account. In order to understand how one variable affects another, all other possible variables that can affect the relationship must be considered. To understand fully the potential effects that environmental regulations can have upon state economic growth, other variables with the potential to effect economic growth must be included in the study. In order to develop a comprehensive model, the theory driving the environment versus economy debate must be examined in detail. In Chapter 3, I explore the theory guiding this research project.

CHAPTER 3:
THEORETICAL PERSPECTIVE

> We have . . . taken the position that the need for . . . stimulation to our economy justified . . . serious tradeoffs, where the environment became either totally or partially damaged. None of us . . . in positions of authority in the state apologize for that. We did what we thought was best for the people and the economy of Louisiana. We accommodated industry where we thought we could in order to get the jobs and the developments, and in some instances we knowingly and advisedly accepted environmental tradeoffs.
>
> --Edwin Edwards, Governor of Louisiana, 1979 (Levinson, 1995, p. 17)

This quote by former Louisiana Governor Edwin Edwards is a perfect statement of the rationale behind enacting less stringent environmental regulations with the hopes of enhancing state economic growth. Strong economic performance is viewed by government officials as necessary to ensure the prosperity of their states. State governmental officials frequently make decisions designed to lure high income individuals and businesses to their states in order to stimulate economic growth. These officials are rational actors participating in a competitive struggle with other states – in today's global economy, even with other nations – to attract industries which will be boons to their state economies. State officials actively seek corporate and individual citizens who will add to their tax base in order to augment the services government can provide. The wealthier the tax base, the more resources government has, and the more it can provide to its citizens. A wealthy tax base also provides another benefit to government. With a populace consisting of more persons at the higher end of the socioeconomic scale, fewer government resources are needed to fund social welfare programs. Wealthier citizens are less expensive to government than are poorer citizens. They do not need to ask as much of government. Thus, strong economic growth reduces

the need for government services. In pursuing individual and corporate citizens who will enhance state economies, state policymakers attempt to add to state coffers and reduce the need for government funded social welfare programs.

Referring again to the state of Louisiana, Williams (1999) illustrates how this state pursued the chemical industry and successfully stole it from states such as New Jersey. But while states like Louisiana, which generally rank at the bottom in environmental conditions and environmental policy stringency, have succeeded in attracting these businesses, have they succeeded in achieving the economic growth for which they hoped? A quick perusal of the Green Index (Hall and Kerr, 1991) reveals that Alabama, Louisiana, Arkansas, Mississippi, and Texas rank last in environmental conditions/policies. Another quick look - this time at the *2006 Statistical Abstract* - shows that with the exception of Texas, the states with less stringent environmental regulatory venues ranked in the bottom eleven states on economic performance, as measured by per capita personal income. As of yet, it appears that these state have failed to achieve the improved economic performance desired.

Of course, it may be that these states have experienced growth but have much further to go to achieve the same level of economic performance of other states. Indeed, according to Crain (2003), the very states mentioned above all ranked in the top 25 states for real income per capita growth from 1969 to 1999. Further, they all rank in the top 20 states for real income per worker growth in the same time period. However, even with high rankings in these two economic growth indicators, these states still lag behind other states in overall economic performance. Policymakers have not yet realized the economic benefits they hope to attain by enacting specific policies. While strong

economic growth is the desired outcome of the decisions made by these state leaders, there are limitations to their ability to act effectively. State economic performance is a function of a variety of influences, including national conditions, institutional capacity, state fiscal conditions, demographic characteristics of the states, and state policy choices.

The Ability of State Policymakers to Influence Economic Growth

State policymakers are constrained in the options available to them to enhance state economic growth. They make decisions in an imperfect world with imperfect choices. In the environmental policy setting, it may seem illogical to think that any state policymaker would be willing to subject his or her state and its citizens to potential environmental hazards as a result of a less stringent regulatory setting. However, given other factors that play into the decision calculus of state officials, it may be entirely logical to weigh the potential for environmental hazards against the potential for steady economic decline and decide that a healthy economy is worth the risk. Policymakers arrive at such decisions based on their own preconceived notions about what is the best course of action and by evaluating outside forces that influence their internal state economies.

When policymakers engage in such a decision making calculus as this they are operating within the notion of bounded rationality. They are limited from making perfectly rational decisions by their own cognitive limitations and their perceptions of the actions of others. Arthur (1994) describes two reasons for perfect rational decision making to break down: "[1] beyond a certain level of complexity human logical capacity ceases to cope . . . [2] in interactive situations of complication, agents cannot rely on other agents . . . to be under perfect rationality" (p. 406). Thus, policymakers are bound

in their decision making by both their own limitations and by the assumptions they make about the decision making of other policymakers.

National Economic Effect

Prior research (Brace, 1993; Hendrick and Garand, 1991) indicates that national economic conditions exert great influence upon state economic performance. Growth in national economic performance determines, in large measure, growth in state economies. As the nation's economy grows, so do most state economies. Conditions that serve to stimulate national economic growth can also serve to stimulate state growth. Indeed, because state economies make up the national economy this alignment in economic performance levels makes sense intuitively. Similarly, as slowdowns in national economic growth occur, state economic growth will slow as well. Brace (1991) finds an exception to this trend. States with greater energy resources are less dependent upon national economic conditions. These economies are not as responsive to the national economic environment. States not reliant on the energy sector, though, do tend to follow national trends. Thus, scholars suspect that states will follow similar economic performance patterns to that of the nation's economic performance.

State Institutional Capacity

States are also limited in their ability to effect economic performance, both by their capacity to act and by the resources within their states. Good intentions will only get policymakers so far. Officials must have the ability to affect change. Without the institutional capability to effectively institute the reforms needed to spur economic growth, governors and state legislatures are hindered from having an affect upon their economies (Brace, 1991). For instance, if a governor wishes to grant incentive packages

to businesses in order to entice them to move into his or her state, the governor must be sure that these types of incentives can be authorized by the executive branch. Without such authority, the governor would lack the institutional capacity to lure the business into the state. In order to affect positive changes in economic performance, policymakers must be able to institute change. Institutional processes or administrative rules that block policymakers from either proactively providing incentives to attract industrial development or prevent them from responding to changing external factors will limit the role of policymakers in pursuing economic growth. Thus, the institutions of state government must possess the capacity to act in a manner able to influence economic performance.

State Demographic and Economic Capacity

State policymakers are also affected by their available resources in their ability to affect economic growth. Demographic characteristics such as educational attainment of the citizenry, the urban-rural make-up of the state, and infrastructure capabilities all have the ability either to limit or expand the economic growth potential of a state. A well-educated workforce has a better capacity to grow and adjust to new and emerging industries and technologies. Industries looking for new location sites or existing industries trying to determine if a change of location might be more cost effective may be more interested in states with an educated workforce since fewer industry resources will be needed to devote to training and development. States with better educated populaces may be perceived as having lower training costs, and hence, lower business costs.

Further, states that do not depend highly upon the agricultural sector may give the appearance of being more open to greater industrial growth. While certain agriculture-

related industries (e.g., insecticide producers, heavy equipment manufacturers, etc.) may be present in states with a large agricultural sector, the opportunity for large scale industrial growth may be greater in states that do not rely heavily upon the agricultural sector for the make-up of their economies. These states may be perceived as being more "pro-business" since they are not as dependent upon the agricultural sector for their prosperity. States with a historical tradition of dedication to agricultural endeavors may be perceived as more reluctant to make the changes necessary to encourage industrial growth (e.g., transforming farm land into sites for urban development). Thus, businesses and industries looking for new location sites may be attracted to states that have a proven record of industrial development.

Along these lines, states with strong infrastructures may be more appealing to potential new industries. States and localities that have already dedicated funding and resources to strong infrastructure improvements may be perceived as committed to industrial development. Further, businesses and industries will have lower costs if a strong infrastructure is already in place to supplement their activities. Thus, the better resources that states possess to aid industrial development, the greater the likelihood of strong economic growth.

Policymaking Capacity

Of more interest to the purpose of this research is the ability of policymakers to have an effect on economic performance through the enactment of specific policies (Brace, 1991; Brace, 1993; Goetz, Ready, and Stone, 1996). Many policies have the potential to influence economic performance. Business, education, environmental, law enforcement, and transportation development policies are just a few of the areas in which

governmental leaders can enact changes with the hope of attaining better economic performance. However, there is no guarantee that such policy enactments will produce the desired economic growth. Outside forces can often have a greater impact upon a state's economy than the internal efforts of policymakers. While state officials may attempt to aid economic growth through policymaking, such efforts may produce limited results. Officials develop policies hoping to make their states attractive to potential newcomers. They want to provide an environment that is viewed as economically healthy. These state leaders seek policy changes that result in economic growth in order to improve overall economic performance. Though, it is unclear whether state policymakers have the capacity to exert the influence over economic conditions that they are seeking.

The State as Marketplace, The Citizen as Consumer

Researchers have attempted to describe how the choices made by policymakers influence residency decisions of citizens (Tiebout, 1956; Ostrom, Tiebout, and Warren, 1961; Schneider, 1989; Percy and Hawkins, 1992; Teske, Schneider, Mintrom, and Best, 1993; Lowery, Lyons, and DeHoog, 1995; Teske, Schneider, Mintrom, and Best, 1995; Percy, Hawkins, and Maier, 1995; Lowery, 1998; Preuhs, 1999). At the forefront of this literature Tiebout (1956) describes the mechanisms by which local governments attempt to provide their citizens with the optimum level of public services in order to gain and maintain the optimum population level. Citizens are consumers of public services and will move to the location that provides their preferred level of services. If leaders of a locality find that that the population is below an optimum level, they will attempt to provide services that will attract more residents. For example, if leaders are hoping to

attract more young families to their area, they may devote more government resources toward funding the public school system. By putting more money into schools, local leaders hope to have better schools than neighboring localities and entice young families into moving into their area with the promise of a better education for children. Thus, the local jurisdiction is the market and the family is the consumer. As a consumer, the family seeks to live in an area that provides its preferred services. The family's top priority may be the educational quality available for their children. Thus, they may well move to a municipality that devotes a significant amount of its budget to funding public schools, hoping that the benefit of the greater level of educational spending will result in better schools. However, the family may weigh the quality of the education against the taxation level required to pay for the education. If the tax level becomes too burdensome, the family may prefer a locality that provides a "decent" school system in addition to a low tax burden. Hence, citizen-consumers "vote with their feet" and move to the locality that provides their preferred level of government services and tax burden.

This theory extends to the present discussion of state environmental policy. In the same way that individual citizens "vote with their feet" and choose to move to a particular locality based on preferred policies, corporate/industrial citizen-consumers can make similar calculations by which they choose the states within which to locate their firms. States are the markets in which these corporate citizen-consumers "shop" for preferred environmental regulatory policies. In efforts to spur economic growth, states will enact policies that will attract these corporate citizens. State policymakers will attempt to provide the preferred regulatory climate of potential corporate/industrial citizen-consumers. Borrowing heavily from Tiebout (1956), it is assumed that the

corporate citizen-consumer is "fully mobile." Corporate/industrial citizens will move to the state that offers the most preferred set of environmental regulations. These corporate-consumers have full knowledge of the environmental regulatory climate of all states. States will seek to attract new corporate/industrial citizens and retain existing corporate citizens in order to achieve the optimum level of economic performance. States will provide the preferred environmental regulatory policies for corporate citizen-consumers so that these consumers will "vote with their feet" by either moving to or remaining within the state borders.

Both state policymakers and corporate/industrial decisions makers are rational actors within this theoretical framework. State officials attempt to improve economic conditions within their states by appealing to corporate interests. Policymakers hope to entice new industry to move into their states, retain existing industries, and spur the creation of new industries by adopting environmental regulatory policies which are perceived by corporate decision makers as business-friendly, and thus, are the preferred policies of businesses. By appealing to industrial interests, state policymakers make a rational calculus designed to attract the corporate citizen that will be a boon to overall state economic growth. By the same token, corporate/industrial decision makers (i.e., consumers) are rational actors calculating the costs and benefits of operating a firm within a particular state. Part of the decision making calculus is the regulatory costs associated with environmental regulations. The corporate decision makers/consumers weigh the policy options provided by a particular state when deciding whether to locate within a new state, retain a facility within a state, or create a new firm within a particular state. Any number of policy options could affect the corporate consumer's decision

calculus: tax laws, financial incentives, environmental regulations, infrastructure, etc. The corporate consumer will make a rational choice to locate to or remain within the state that offers the set of policies closest to the corporation's optimum preferences.

An Environmental "Race to the Bottom"?

If state policymakers are rational actors responding to citizen-consumers that "vote with their feet," these policymakers will engage in active competition with their neighbors to win the optimum number of citizen-consumers. Much research has been conducted around the notion that states will enact policies intended to attract individual and corporate citizens who will enhance the potential for economic growth within their borders rather than retain or attract those who will be a drag on economic performance. States compete with one another for citizens who will be an asset to economic growth. Part of this competition may include policy options that lower benefits for the poorer producing segments of the economy. Welfare reform is a prime example of a policy area in which state officials make decisions designed to enhance economic growth. A great deal of literature focuses around the notion that in such a competitive environment states will "race to the bottom" in welfare policy development in order to achieve the end result of higher economic performance (Peterson and Rom, 1989; Piven, 1998; Rom, Peterson, and Scheve, 1998; Brueckner, 2000; Lurie, 1998; Schram, 1998; Schram and Soss, 1998; Beer, 1998; Piven, 2001; Allard and Danziger, 2000; Volden, 2002; Bailey, 2005). The "race to the bottom" in the context of welfare policy involves the state lowering benefits to those who receive welfare payments in order to dissuade welfare recipients from residing within the state.

The policy of enacting lower welfare benefits may produce a variety of outcomes that could increase state economic growth. First, lower benefits may discourage would-be welfare recipients from moving into a state with low benefits. Thus, there is limited possibility of those who would receive welfare moving into the state and draining state resources. Second, lowering benefits may encourage the migration of recipients to other states with higher benefits. In this scenario, those welfare beneficiaries who had previously been a recipient of state resources move to higher welfare benefit states and no longer consume the resources of their original state of residence. The burden of supporting the welfare beneficiaries transfers to the state with the higher level of benefits. Finally, if lower benefits are in place then overall state taxes may be lower since the government need for revenue to fund welfare would not be as great. Hence, those with higher incomes may be enticed to move to a state with lower tax rates. Thus, the "race to the bottom" in welfare policy produces a population with the resources to enhance a state economy.

States also compete to have corporate citizens locate within their borders. A recent example of this competition is provided by the states of Louisiana, Alabama, and Arkansas (*Baton Rouge Daily Report*, October 24, 2006). State economic development teams from all three states traveled to Germany to convince corporate leaders to locate a three billion dollar steel mill within their state. No doubt all three states will offer incentives and government services to attract this new industry to their states. Indeed a quick perusal of the economic development websites of all three states results in listings of the incentives and services that each state offers to businesses that locate within their jurisdictions. States can go beyond services and incentives, though. They may well

choose to promote a regulatory environment that will be attractive to new and existing industries.

Thus, the "race to the bottom" theory can be applied to state environmental policy as well. State officials may seek to attract industry by lowering regulatory costs. While his discussion focuses on welfare policy, Piven (1998) depicts the conditions under which businesses can "pit one locality against another as they search for the most advantageous package of services and taxes" (p. 40). In their efforts to improve economic conditions within their states, officials will try to provide business environments that will convince industries to move (or remain) within their jurisdictions. As noted by Piven, state policymakers "depend for their electoral success on economic prosperity, which means they depend on investors . . . depend on revenues gained by taxing those who have assets . . . when those who have economic resources are mobile, they can bargain hard with political leaders over the terms on which they will agree to invest or to be taxed" (p. 39). Thus, state officials may perceive that in order to attract industries with the resources to positively affect state economies, they must lower the cost of doing business within their borders. One method of decreasing economic burdens/regulatory costs on businesses is to lower the cost of pollution abatement by enacting less stringent environmental regulations.

In making site location decisions, businesses (as most people) are always in favor of a 'helping hand' to get them started. As noted by Jaffe et al. (1995), there exists "a widespread belief that environmental regulations have a significant effect on the siting of new plants in the United States . . . Public comments and private actions of legislators and lobbyists, for example, certainly indicate that they believe that environmental

regulations affect plant location decision" (p. 148). One method chosen by some state leaders to achieve better economic performance has been to attract industry with the lure of quicker industrial growth due to less stringent environmental regulations. These state officials believe that by enacting less stringent environmental policies, they will accomplish two goals necessary for strong growth: prevent existing firms from leaving their states and induce new businesses to locate within their states. Conversely, by enacting strict environmental policies, states increase business costs within their borders, resulting in a slow down in business growth and development and, hence, decrease state economic growth and long-term benefits. Thus, state officials may believe that the enactment of less stringent state environmental policies will make their states more appealing as a place to do business.

In addition to having an impact on site selection decisions, environmental policies also play a role in the productivity of existing businesses (Christiansen and Haveman, 1981; Gray, 1987; Barbera and McConnell, 1986; Jaffe, Peterson, Portney, and Stevens, 1995; Jorgenson and Wilcoxen, 1990). State policymakers who advocate less stringent environmental regulations believe that they are enacting policies that will allow businesses within their states to maintain higher levels of productivity. According to Jaffe et al. (1995) "environmental regulations affect a firm's cost of production, both directly through its own expenditures on pollution reduction and indirectly through the higher prices it must pay for certain factors of production that are affected by regulation" (p.138). Jaffe et al. specify five effects more stringent environmental regulations may have on a firm's productivity levels:

> "[1] measured productivity of the affected industry will fall because measured inputs of capital, labor, and energy are being diverted to the production of an additional output – environmental quality . . . [2] when and if firms undertake process or management changes in response to environmental regulations, the new practices may be less efficient than the old ones . . . [3] environmental investments could conceivably crowd out other investments by firms . . . [4] many environmental regulations exempt older plants from requirements, in effect mandating higher standards for new plants . . . discouraging investments in new, more efficient facilities . . . [5] requirements that firms use the 'best available control technology' for pollution abatement may increase the adoption of these new technologies at the time regulation go into effect, but subsequently blunt firms' incentives to develop new pollution control or prevention approaches over time" (pgs. 150-151).

Thus, although less stringent regulations do not guarantee high productivity, they do not add additional costs to business operations. Businesses are not forced to divert resources toward satisfying more stringent regulatory requirements and are able to maintain high levels of production without increasing their costs. By ensuring that regulatory cost do not dramatically increase, state officials attempt both to protect the productivity levels of existing industries within their borders and to attract new industries with the opportunity of higher productivity levels, as compared to operating in states with stricter environmental regulations. Hence, policymakers try to ensure economic growth by keeping the "cost of doing business" at a minimum.

Or a "Race to the Top"?

A contradictory theory regarding state environmental policy is offered by other scholars. Rather than attract businesses with lax regulations, others propose that stricter environmental policies will benefit businesses (Porter, 1990; Meyer, 1992; Porter and van der Linde, 1995; Goetz, Ready, and Stone, 1996). Again Jaffe et al. (1995) provide a good summary of this theory from the perspective of the firms affected:

> "Some sectors of private industry, in particular, environmental, will benefit directly from more stringent environmental regulations on their customers . . . some regulated firms will benefit competitively at the expense of other regulated firms . . . can provide some firms with 'early mover' advantages by pushing them to produce products that will in the future be in demand in the market place . . . can increase domestic efficiency, either by wringing inefficiencies out of the production process as firms struggle to meet new constraints or by spurring innovation in the long term through 'outside-the-box thinking' . . . [and] by forcing exceptionally inefficient plants to close" (pgs. 154-155).

Thus, the benefits of stricter environmental regulatory policies are examined entirely in light of the operating effect on firms. More strict regulations provide the opportunity for a new area of industrial growth. Once stricter regulations are enacted, many existing firms need guidance in following the regulations. Environmental service firms provide such expertise. Further, the costs of complying with regulations differ among individual firms. Larger firms may more easily absorb the additional costs than smaller firms. These firms that can more easily adjust to pollution abatement costs will benefit competitively against those that cannot. Firms that can anticipate future abatement needs

and provide products to meet these needs will profit from the regulations that establish the need for these new products. Finally, more strict regulations may cause the shutdown of firms that were operating inefficiently. The additional costs for improving pollution control can force inefficient firms to recognize that their processes are too unproductive to keep up with innovations. Thus, from a purely operations perspective, stricter environmental regulations can have a positive affect upon the marketplace.

Scholars focus their research around the notion that stricter environmental regulations produce environmental conditions within states that actually attract business and industry to the states that enforce such policies. Goetz et al. (1996) argue that while states that choose stricter environmental regulations may suffer a temporary economic slowdown, in the long run the benefits of a "greener" environment will be beneficial to states; specifically, "a region that imposes stricter environmental regulations may (at least initially) experience slower economic growth. However, if regulations result in higher levels of environmental quality over time, growth rates may subsequently increase" (p. 100). States that have more stringent environmental regulations and enforcement policies should reap an environmental reward for such policies. It is assumed that states that are more proactive with their environmental regulatory powers will have cleaner air to breath and cleaner water to drink than states that choose to be more lax with their environmental regulatory authority. Businesses and industries looking for a new location site may be attracted to a state that offers a more environmentally safe place to live. States with healthier environments offer the employees of businesses a better quality of life than do states that become "pollution havens" in their efforts to attract industry. Thus, by choosing to locate in states with more stringent environmental regulations, industrial

employers provide a better home for their employees. This could actually serve as a benefit to businesses in recruiting higher quality employees. As noted by Tannenwald (1997) and Gray (1997) some employees may even be willing to work for less pay if the location that they live in has a higher quality of life. Just as states may be willing to sacrifice short-term economic benefits in favor of long-term environmental benefits, so may individuals. Thus, employers may find that locating in a "greener" state will aid in attracting high quality employees. Since businesses often claim that employees are their most valuable asset, providing a pleasant and safe place to live for these employees may be a critical factor in the site location decision making process.

In addition to offering a quality of life benefit on the front end, states with more stringent environmental policies may also offer a long-term economic incentive to businesses and industries as well. With all else being equal, states with more stringent environmental regulations should have better environments than states with less stringent regulations. A better environment may not only result in more satisfied employees, but it also may translate into healthier employees. If a business locates in a state with a good environmental backdrop, it may expect that their employees will be at a lower risk for certain environmental-related illnesses. With lower risk factors come lower insurance and healthcare costs for the employer. Thus, while businesses may pay higher pollution abatement costs as a result of more stringent environmental regulations, these businesses may save on personnel costs associated with insurance and healthcare as a result of choosing to locate within a state with overall better environmental conditions. As noted by Graham (1998), "environmental measures that contribute to critical infrastructure,

attract skilled workers, or satisfy the needs of particular businesses are rightly seen as having economic value" (p. 4).

Further, by choosing to locate in "greener" states, businesses and industries may actually lower some of their production costs. Jaffe et al. (1995) point out that "environmental regulations can reduce costs for some firms or industries, by lowering input prices or by increasing the productivity of their inputs" (p. 138). Thus, if a business locates in a state with stricter environmental regulations, the resources they utilize for production (e.g., water) will be less likely to be polluted. These unpolluted resources will lower the cost of production since the business will not need to spend additional resources cleaning the inputs of production. Hence, while some state policymakers may argue for the economic benefits of less stringent environmental regulations, other state policymakers may make the same economic benefits argument in favor of more stringent environmental regulations.

A Model of Economic Growth

Goetz et al. (1996) illustrate how environmental regulations and conditions may effect economic growth in Figure 3.1. In the first section of the figure, the authors indicate that better environmental conditions will influence four areas that can have an impact upon economic growth. First, better conditions may serve to attract firms to an area. These firms are drawn to an area that offers its workers a better quality of life and/or provides cleaner inputs of production. Better environmental conditions may also attract a more skilled labor force. Individuals may choose to locate and find employment in an area that offers a "cleaner" setting. Similarly, wealthy retires may be drawn to settle in areas perceived as more healthy to live. These better environmental conditions

affect more than people and the decisions they make. Conditions also have an impact upon productivity. If the inputs into productions are clean, time and money is not wasted on making these inputs ready for use. Better environmental conditions can reduce costs to businesses leading to higher productivity. These potential benefits of more firms, more skilled workers, more wealthy retirees adding to the tax base, and increased productivity can all contribute to increased economic growth.

The second part of Figure 3.1 illustrates how environmental policy can have a negative impact on economic growth. Stricter regulation can increase business costs. Firms may be forced to purchase specific equipment pollution abatement equipment that can drive up their costs. They may be forced to hire additional technical staff to ensure compliance with complicated regulations. Further, regulations may force them to change processes toward more abatement-related activities, forcing businesses to spend more money. Such a diversion of resources away from production and toward pollution abatement processes can increase the cost of production. This type of diversion of resources can also lower output. When time and money are spent in areas other than production, output declines. Thus, while spending more on pollution control activities, businesses may end up producing less. Such a scenario of increased costs and lowered output could result in a negative impact upon economic growth.

Of course, the theories of environmental regulation and economic development discussed above are not necessarily in competition, but instead may be applicable under different sets of state circumstances. There may be intervening variables that have effects that cause states both to choose a specific set of policies and to see a different set of results from those policies. State socioeconomic conditions matter in efforts to

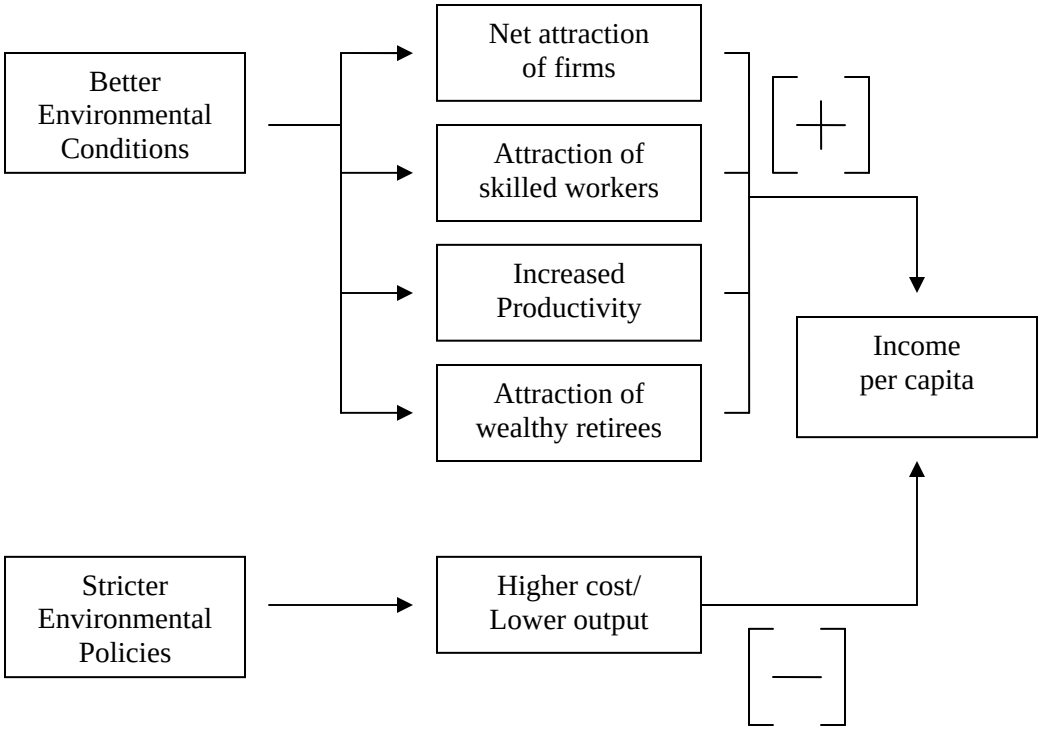

Figure 3.1. Relationship between Environmental Conditions and Policies and Economic Growth. Taken from Goetz et al. (1996, p. 99).

encourage economic growth. States with demographic advantages, such as a more highly educated workforce, may not feel compelled to lower regulatory costs in order to make their areas more appealing to potential corporate residents. These states may believe that they have a great deal to offer industry without needing to add the enticement of lower regulatory costs.

On the other hand, officials in states with fewer demographic advantages may feel compelled to lower the regulatory burden on businesses in order to compete with other states that may appear more attractive at first glance. Since these states may not have the advantages of skilled workers, for example, they will use policy to create an attractive regulatory environment. Williams (1999) points out that "states with lower per capita income and less educated workforces have pursued an economic development strategy

that depends on attracting industrial facilities with more severe environmental impacts that are attracted by less stringent environmental oversight . . . among these states, devolution of responsibility leads to a "race for the bottom" in environmental protections" (451-453).

However, competition does not drive all states to lower regulatory costs. State policymakers who operate in states with more resources (e.g., better educated workforce, lower poverty levels) may perceive that better demographic and economic conditions enhance their position, i.e. enhance their competitive edge, and therefore, enact more stringent environmental policies. With state socioeconomic conditions working for them in attracting new businesses and industries, there is less pressure to lower regulatory standards in order to appeal to industry. Conversely, policymakers that are faced with fewer advantages as compared to other states, thus, choose to have less stringent regulations in order to compete for business and industry. By lowering the cost of doing business within their states, they are able at least to "level the playing field" when it comes to competing against better educated and more wealthy states. One could argue that a "race for the bottom" occurs between those states that already find themselves at the bottom.

Thus the model provided by Goetz et al. (1996) can be refined to include a calculus that leads state policymakers to either enact less stringent or more stringent environmental policies. When choosing which type of environmental policies to enact, state policymakers will be influenced by their internal resources and by policies being offered by their neighboring states. Figure 3.2 illustrates the effect that these factors will

have on the environmental policies chosen and in turn how these policies will effect economic growth, measured as income per capita.

As illustrated in the lower left-hand portion of Figure 3.2, when states do not possess demographic characteristics that can be used to either retain or attract industry (e.g., highly educated workforce, strong infrastructure), they will feel compelled to lower regulatory burdens upon industries in order to compete with other states to have industries locate within their borders. The consequences of less appealing demographic characteristics may be less stringent environmental regulations. Conversely, states that posses better characteristics will not feel pressured to lower costs to compete and will enact more stringent environmental regulations.

As the "race to the bottom" theory suggests, a further factor for states to consider is the environmental policies enacted by their neighbors. Since states are indeed in competition with one another, they will be aware of what types of environmental policies that other states are enacting. Figure 3.2 shows this element factored into the policy decision making calculus. Critical to a state's environmental policy decision will be the policies enacted by neighboring states. If a neighboring state enacts less stringent regulations, then a state will not want to enact environmental policies that are more stringent, and thus more costly to businesses. After all, why should a business locate in state A when state B, located right next door, has a lower regulatory burden in effect? A state that does enact more stringent environmental policies than its neighbor risks its ability to compete for industry by adding costs to both existing industries and potential new industries to locate within the state.

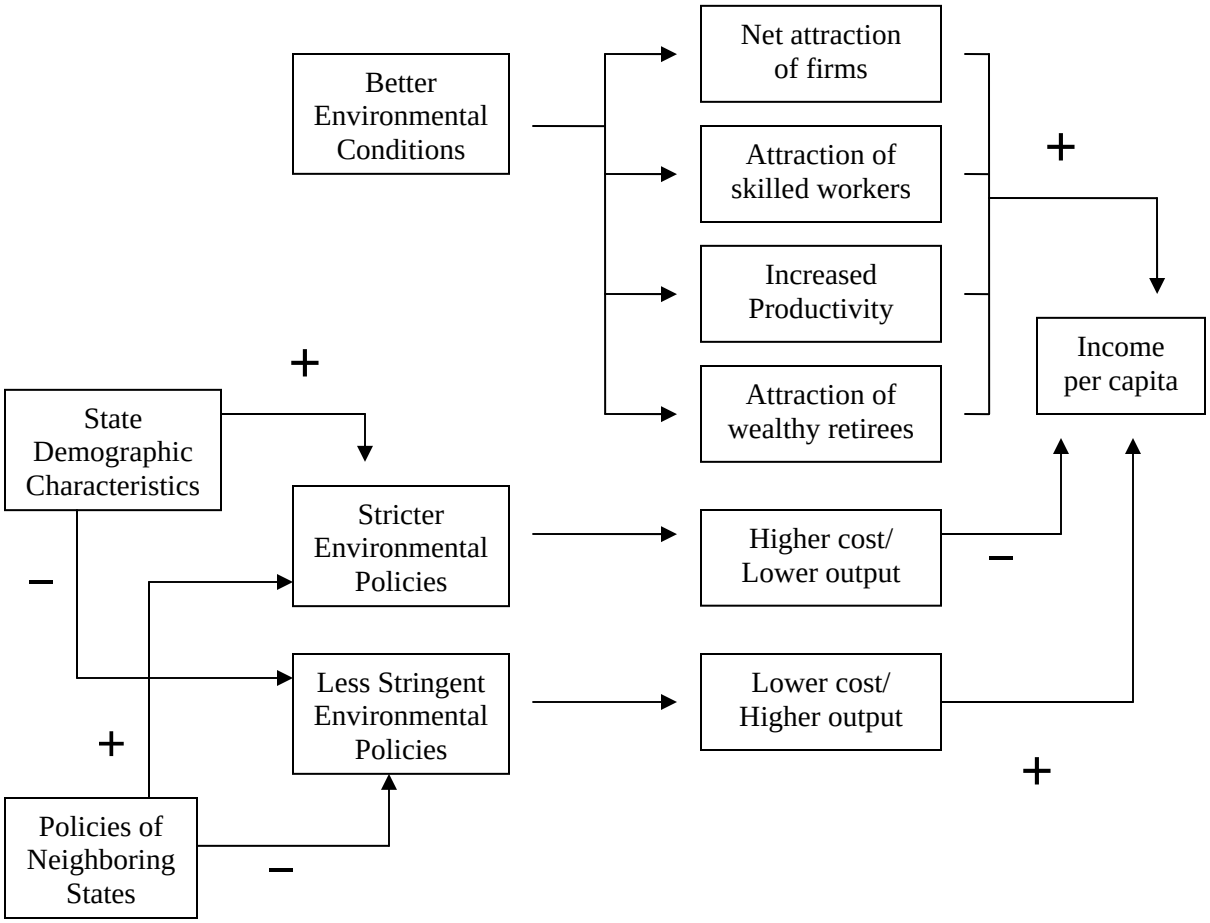

Figure 3.2. Factors Affecting the Enactment of Environmental Policies and the Subsequent Relationship Between Environmental Policies and Environmental Conditions upon Economic Growth.

By the same token, when a neighboring state has stricter environmental policies in effect, a state will not feel pressured to lower environmental standards in order to compete. State policymakers are free to choose to enact stricter environmental policies without worry of losing their ability to compete with their neighbors. In fact, if the first part of this model is correct and better environmental conditions do result in a net attraction of firms, then states with neighbors that have stricter environmental policies may feel compelled to be just as strict with their environmental regulations. In such a

case, a state does not want to be viewed as having a less pristine environment than its neighbors, thus, losing its ability to compete with its neighbors over quality of life issues. Hence, instead of a "race to the bottom," these states may engage in a "race to the top" when enacting environmental policies.

Conclusion

Still, Brace (1993) finds that states are limited in their ability to effect economic performance within their borders. States do not operate in a vacuum. In addition to the competition they face from neighboring states, state economies often fluctuate according to national economic conditions. This fluctuation is determined by how dependent a state's economy is upon the national economy. Brace finds that the ability of states to influence economic development seems to be limited to their influence over per capita personal income. He indicates that this may come at the expense of employment, though, since income and job growth are inversely related. He concludes by reiterating that states are limited by national constraints in their ability to effect economic changes.

Thus, while state officials may enact weak environmental laws with the best possible motive -- to ensure economic growth -- states may only possess limited ability to effect such changes. States exist in a much broader world than the one drawn by their boundary lines. State capacity to act effectively towards greater economic growth is hampered by national economic conditions. This study attempts to discover whether there is a significant relationship between state environmental policies and state economic growth. Are policymakers making reasonable decisions in enacting specific environmental regulations/policies with the hope of having an effect upon state economic

growth? Do states which enact strict environmental policies sacrifice economic growth while states which enact less stringent environmental policies reap an economic reward?

I develop a model for analysis to discover the relationship between environmental regulation and economic growth. Factors that can constrain policymakers' abilities to influence growth are included in the model. In addition to environmental policy variables, I include variables to capture the effects of business policies, national economic conditions, state fiscal conditions, and state demographic factors. The full model is described in Chapter 5. Before discussing this model, it is necessary to review issues concerning environmental policy variables. The selection of a measure for environmental policy is problematic. Concerns related to this variable are discussed in the next chapter.

CHAPTER 4:
EXAMINATION OF STATE ENVIRONMENTAL DATA

> [S]tudies struggle with the issue of how to measure regulatory stringency. This is perhaps the most difficult problem encountered. Measures of regulatory stringency often are not comparable across states, are highly industry-specific, or partially reflect state-specific characteristics that have nothing to do with stringency. (Tannenwald, 1997, p. 86)

A review of the literature of environmental policy reveals that researchers continually struggle to develop an adequate measure for state policy stringency. Some researchers focus on state environmental spending as a measure of state policy (Bartik, 1988). Others use various policy indices as their measure (Goetz, Ready and Stone, 1996; Meyer, 1992). State environmental conditions is the measure selected by some researchers (Templet, 1995; Grossman and Krueger, 1995). Other studies utilize the Census Bureau's Pollution Abatement Control Expenditure survey (Gray and Shadbegian, 1998; Levinson, 1999). Specific industry costs are used in other studies (Gray, 1987; Gollop and Roberts, 1983). Still other studies use some combination of these measures (Feiock and Stream, 2001; List and Co, 2000; Barbera and McConnell, 1986; Daley and Garand, 2002; McConnell and Schwab, 1990; Bacot and Dawes, 1997).

There is no "ideal" measure available to study state environmental policy stringency. In a data "perfect" world, a longitudinal measure tracking the multiple dimensions of environmental policy in all fifty states would exist. This measure would consistently examine state environmental policy and provide a value of regulatory stringency for state policies. While cross-sectional measures do provide a measure of stringency for a single point in time, no such measure exists over time. Thus, researchers use rather imperfect tools to arrive at an adequate measure of state environmental stringency.

Each of the measures noted has advantages and disadvantages. Spending measures provide a level of the commitment that states have toward environmental programs, but it is an imperfect proxy for policy goals. The use of a policy index is a good cross-sectional tool but does not allow for the study of states over time. Environmental conditions illustrate the need for policy, but do not address whether states are addressing the need. The Pollution Abatement Expenditure (PACE) survey describes industry costs but does not control for state specific industry characteristics. Specific industry costs studies only provide results in the particular area studied. Whether the results of these studies can be considered reliable in other sectors is subject to some debate.

In this chapter, I consider a variety of measurement tools. However, a refinement of the PACE survey created by Levinson (1999) is the primary tool I use to measure environmental stringency. This Levinson Index best captures the main variable of interest in my study. The measures to be used in the model are discussed in turn.

State Environmental Spending

State policymakers can enact any number of policies, but commitment to particular polices is reflected by the amount of resources they dedicate to the policies with budgetary measures. Bacot and Dawes (1997) note that environmental programs are "only as effective as their funding levels allow them to be" (p.366). Hence, budget information can reveal the level of a state's commitment to environmental regulation. The Environmental Council of the States (ECOS) and the Council of State Governments (CSG) have collected state environmental and natural resource spending data in the years 1986, 1988, 1991, 1994, 1996, 2000, and 2003. Initial collections of state budget data

were conducted by the Council of State Government, but these have been conducted by the Environmental Council of the States since 1998.

To be included in the ECOS budget survey, funds must be directly included in the state budget bills to operate state and federal environmental and natural resource programs (Brown and Keifer, 2003). Budget categories included in the spending survey include water, land management, fish and wildlife, waste management, and air quality. Budget allocations in the water category consist of state spending for water quality, water resources, drinking water, and marine and coastal issues. Allocations in the land management category include state spending on forestry, soil conservation, mining reclamation, land management for state-owned resources, pesticide control, and geological surveys. The fish and wildlife category includes state spending for all efforts to protect state fish and gaming resources and to enforce state fish and gaming laws. The waste management category encompasses state spending on hazardous, solid, and nuclear wastes management programs. The air quality category includes all state spending to administer the Clean Air Act.

The drawback in relying on spending levels as a measure of environmental stringency is that certain states may have characteristics that spending measures will not capture. For example, a state may have a history of not encouraging industrial growth, instead choosing to preserve lands and the environment. Such a state would not have the need to spend a great deal on pollution control efforts since its pollution levels would be lower than states with large industrial sectors. Alternatively, a state with a large industrial sector may be forced to spend greater levels on pollution control. However, this spending could be a result, not of state policymakers' preferences, but of federal

mandates. Until federal environmental legislation was passed in the 1970s and 1980s, some states did not choose to allocate significant funds toward environmental policies. Increased environmental spending in these states occurred as a response to federal action, and not as a result of state initiative.

Further, state spending levels may be a function of the overall state economy. Some states may spend more on environmental programs because they have more money to spend. Other states, with fewer financial resources, may spend less on environmental programs, not due to a lack of will, but due to a lack of funds. Compounding this problem for some states is the fact that, if they do experience budget shortfalls that require a reduction in environmental budgets, they may become ineligible for federal monies due to a lack of matching state funds. Such states may spend less on environmental efforts because they have less to spend generally. Thus, the use of budget allocations as a measure of environmental stringency may be complicated by specific state characteristics.

However, the study of state budget allocations for environmental and natural resource spending can demonstrate state dedication to these programs. Funding provides state agencies the ability to implement policy programs. If state policymakers are truly interested in carrying out effective environmental programs, they must provide the monies necessary to run these programs. Without adequate funding, no action can be taken by agencies charged with executing environmental programs. Budget allocations are indicators of the importance policymakers give to the programs they develop. Through the dedication of state funds to environmental programs, state regulations are put into practice. Thus, budget data can reveal intent to implement environmental policy.

State Environmental Conditions

As explained by Bacot and Dawes (1997), "states with less environmental legislation, and consequently fewer programs to assure environmental protection regularly, likely will experience higher levels of pollution production in their state"(p. 362). Higher levels of pollution can be indicative that state policymakers are not enacting strict environmental standards. More lax environmental policies would create a setting in which industries prone to heavy pollution levels could more comfortably operate. This could lead to poorer environmental conditions within a state. States with more stringent environmental standards should have mechanisms (policies) in place to ensure lower pollution levels. Thus, a state's environmental conditions can provide a clue as to the environmental regulatory venue.

The Emergency Planning and Community Right-to-Know Act passed in 1986 provided the EPA with the authority to collect information regarding potential hazards in communities. Under this act, businesses and industries are required to report the type and amount of chemicals stored at their facilities. They are also required to report any toxic transfers or releases into the environment. This information is collected annually by the EPA in the Toxic Release Inventory (TRI) which was developed in 1987. In 1990 The Pollution Prevention Act added the requirement that waste management and source reduction activities also be reported in the TRI. Currently, the TRI provides information on the release of approximately 650 chemicals into the environment by industrial facilities. This industrial pollution information provides data on what chemicals are released into the environment so the public can understand the environmental risk factors evident in their areas. Thus, it is a comprehensive listing of industrial polluting activities.

There are limitations to the use of TRI reports as a measure of environmental conditions. The TRI report only tracks industrial emissions/releases. Other releases, e.g., vehicle emissions, are not included. As a result, overall state pollution levels are not completely captured by the TRI data. Only pollution as a result of industrial activity is reported. Also, as noted by the EPA, the TRI does not provide an estimation of exposure risks to the public. The focus is on releases, not potential harm as a result of the releases. Nor does the TRI differentiate between most and least harmful chemicals (Bacot and Dawes, 1997). For the purposes of this study, though, release information is useful in determining state environmental conditions. It is not necessary to know the immediate risks of a particular release to have an understanding of broad environmental conditions within a state. Finally, some express concerns that the TRI relies on industry self-reports for the data collected (Bacot and Dawes, 1997). Industry is expected to fully disclose all releases that occur within a year. Thus, while the TRI does provide a thorough data source for industrial pollution, there are limitations to the information available.

However, the TRI is strictly monitored by the EPA in its regulatory efforts regarding the states. The report clearly tracks industrial pollutants in communities. These releases are valuable in order to understand environmental hazards that exist in a given community. Therefore, it will be utilized as a measure of environmental conditions. Concerns that the TRI is limited because it provides pollutant information solely on industrial activities are not a worry of this study. I am particularly interested in industrial activities and how these activities are affected by state environmental policy. Information of industrial releases can be an indicator of how strictly these industries are

regulated. The TRI provides insight into how proactive a state may be in ensuring "good" environmental conditions.

State Environmental Policy Data

Longitudinal measures of state environmental policy are not available. However, researchers have developed a few good cross-sectional measures of state environmental policies. The years for which such measures are available are 1983, 1987, and 1991. Three different indices are constructed looking at various environmental policies at these different points in time. The first index was created by the Conservation Foundation. The second index was created by the Fund for Renewable Energy and the Environment. The third index is the Green Index created by Bob Hall and May Lee Kerr at the Institute of Southern Studies. All three serve to capture the "greenness" of the fifty states at the time period they study. Each study takes into account policies and conditions at the time of observation. As these three indices are frequently used in studies of state environmental policy, I discuss them in detail here.

The Conservation Foundation Index

In 1983 the Conservation Foundation created a ranking to determine the level of effort each state puts towards ensuring a quality environment (Duerksen, 1983). The focus of the study is to rank the intensity with which states approached their environmental programs. Two main indicators are used in developing the index: environmental and land-use. Table 4.1 provides a listing of the indicators used to compile this state ranking.

Under this index created by the Conservation Foundation, states can earn up to 63 points. At the time of the study, no state achieved a score this high. Minnesota earned

Table 4.1. Environmental Indicators used to Compile Conservation Foundation Ranking, Including Score Ranges for each Indicator

Environmental Indicators	Score Range
Congressional Voting Record on Environmental Issues	0 – 4
Existence of a State Environmental Impact Statement Process	0, 2, 4
State Legislature's Commitment to Environmental Protection	0 – 4
Tax-Check Off for Wildlife & Fisheries Funds	0, 1
Per Capita Spending on Air, Water, & Land Pollution Programs	0 – 6
RCRA Authorization	0 – 2
Single Oversight Agency for Monitoring Air, Water, Hazardous Waste, & Noise Pollution	0, 1
Tax Breaks for Solar Energy	0 – 2
Protected Rivers for Wildlife, Scenic, of Recreation Purposes	0 – 2
Per Capita Spending on Noise Control Programs	0 – 2
Land Use Indicators	
Legislation Protecting Wetlands or Endangered Species Habitats	0 – 2
Power Plant Siting Law	0 – 3
Environmental Protection as Specific Land Use Goal	0 – 2
Required Comprehensive Land Use Plans	0 – 4
Surface-Mine Reclamation Program	0 – 3
State Floodplain Laws and Development Rules	0 – 2
Extent of State Involvement in Land Use Decision Making	0 – 6
Adoption of Aesthetic Rationale for Eminent Domain	0 – 2
Per Capita Spending on Natural Resources, Parks, Sewerage/ Sanitation, & Housing and Urban Renewal	0 – 2
Approved Solid Waste Plan under RCRA	0 – 2

the highest ranking in the index with a score of 47. Alabama ranked last with a score of 10. Only five states achieved a score of over 40. A majority of states failed to earn a score greater than 31. The study provides a breakdown of the range of scores. Five states scored 40 or higher. Six states scored within the range of 35-39. Nine states scored in the 30-34 range. Eleven states scored in the range of 25-29. Thirteen states earned between 30-24. Six states scored a 19 or lower. Thus, at the time of the first comprehensive ranking of state environmental effort, states appear to have limited commitment to widespread environmental programs. Each state's rank in the Conservation Index is found in Table 4.4. This index uses a variety of indicators to

measure state environmental effort. These include environmental related expenditures, enactment of specific policies, conservation-related tax breaks, political support for environmental policies, and authorization for specific environmental programs.

The FREE Index

In 1987 the Fund for Renewable Energy and the Environment (FREE) compiled an index of environmental program strength within the states. The FREE index considers issues surrounding air pollution, soil conservation, solid waste, groundwater protection, hazardous waste, and energy conservation. A score of 0-10 for each of these six indicators is possible. This index takes into consideration states' existing environmental conditions and subsequent responses to these conditions in assessing environmental program strength. A matrix for each environmental area is developed. The states are ranked within each matrix. This study is another attempt at a comprehensive review of state programs to address environmental concerns.

Table 4.2 presents the indicators used in the development of each matrix. Using these six matrices, each state is awarded a score from 0-60 on the FREE index. The higher a state scores on the index, the "greener" the state programs. The state of Wisconsin ranked highest on the index with a score of 49. Mississippi ranked last with a score of 14. Ten states earned a score of 40 or higher. Fourteen states scored within the range of 30-39. Sixteen states scored within the 20-29 range. Ten states scored below 19. FREE Index rankings of the states are found in Table 4.4. The Conservation Foundation and FREE Index use different indicators to create their rankings, and thus, cannot be compared directly. However, it interesting to note that in the Conservation Foundation index a majority of states (31) failed to reach a score of half of the index

total. In the FREE Index, calculated four years later just under half of the states (24) achieved a score greater than half of the index total. As a whole, the states appear to have improved their environmental scores on the FREE Index. Again, the two indices measure different polices so caution is taken when making assumptions based on the scores. However, while not directly comparable, the states' performances on these two different indices appear to indicate that state environmental programs are growing stronger.

Table 4.2. Environmental Indicators used to create FREE Index Matrices

Air Pollution Matrix: Indicators
Number of Counties with State Implementation Plans (SIP) Deficiencies
Criteria Pollutants Exceeding Primary Standards One or More Areas
Total Number of Monitors for Criteria Pollutants
Total Enforcement Action
EPA Sanctions Imposes as Consequence for SIP Deficiencies
Toxic Pollutant Control Program in Place
Acid Deposition Control Program in Place
Research on Acid Rain
1982 Total Air Program Budget
1985 Total Air Program Budget

Soil Conservation Matrix: Indicators
Statewide Conservation Program
Erosion and Sediment Control Laws
Established Soil Loss Limits
Approved Plan Required before Soil can be Disturbed
Provisions for Enforcement and Penalties
Cost-Sharing for Soil Conservation
Average Tons Lost Per Acre on Total Cropland – 1982
Percentage of Cropland Needing Erosion Control
Percentage of Total Cultivated Tillage – 1982
Funds Appropriated by State & Local Government for Soil Conservation – 1985

Solid Waste & Recycling Matrix: Indicators
Solid Waste Management Plan
Regulations for Landfill Safety and Control
Recycling Program
Total Monitoring of Groundwater
Total Inspection
Frequency of Inspections
Number of Groundwater Violations
Number of Subtitle D Landfills
Number of Subtitle D Surface Impoundments
Estimated Solid Waste Tonnage

Table 4.2 (continued).

Solid Waste & Recycling Matrix: Indicators
State Superfund Statutes
Small Quantity Generator Regulations
Underground Injection Restrictions
Pre-HSWA Final Authorization
Community Right to Know Laws
Incentives to Reduce/Recycle
Household Hazardous Waste Collection
Number of National Priority List (NPL) Sites
Number of ERRIS List Sites
Ranking by Hazardous Waste Generation

Groundwater Protection Matrix: Indicators
Legislative Authority to Implement Strategy Management Plan
Groundwater Strategy Management Plan in Place
Strategy Plan Includes Mapping
Leaking Underground Storage Tank Legislation
Non-Degradation or Limited Degradation as State Policy
Monitoring for Pesticides, Salt Water Intrusion, Hazardous Waste & Non-Hazardous Waste
State Policy for Controlled Land Use Areas
Percentage of Population Served by Groundwater
Groundwater Withdrawal Per Day

Energy Matrix: Indicators
Least Cost Provisions & Regulations
Income Tax Credits for Solar and Renewable Energy Systems
Tax Credit Expiration Date
Percentage of Available Solar Energy & Energy Conservation Bank 1982 – 1986
Building Code Provisions
Appliance Efficiency Standards
Construction Work in Progress Policy

The Green Index

Arguably the most comprehensive index of state environmental program ranking is developed in 1991 with the Green Index (Hall and Kerr, 1991). This study takes into account 256 indicators of state environmental health, including measures of environmental conditions, spending on environmental programs, state congressional leadership on environmental programs, and state environmental policy initiatives. Specific environmental factors examined include air pollution, water pollution, energy

use, automobile emissions, toxic and hazardous waste, workplace environment, farmlands, forests, and wildlife. The Green Index covers much of the same ground as previous studies, but goes into greater detail. When specific environmental conditions are examined, many more indicators are used to rank a state's health. The Green Index is much more inclusive in the indicators examined. It is a more comprehensive ranking of state environmental health. Table 4.3 provides a listing of the numerous indicators used to create the Green Index.

The Green Index provides a detailed snapshot of the states' environmental effort in 1991. Table 4.4 shows the state ranking in the Green Index. It also provides the ranking of states according to the two main categories of the Green Index: environmental policies and environmental conditions. According to the overall composite index score, Oregon ranks highest in environmental health. Alabama ranks last. The index ranks states according to environmental conditions and policy initiatives. Some of the states with poor environmental conditions responded to these conditions with aggressive policy initiatives (p. 135). On the other hand, some states that rank high on policy initiatives rank low on spending. These states do not provide the funding needed to follow through with policy implementation. Thus, the Green Index presents a comprehensive picture of state environmental conditions and state response to these conditions. The limitation of the Green Index is that it only provides this picture at one point in time. While it serves as an excellent tool for a cross-sectional study, it does not allow for studying states' environmental effort over time.

Table 4.3. Environmental Indicators used in the Green Index

Air Pollution
Population with Air Violating Standards for Ozone
Population with Air Violating Standards for Carbon Dioxide
State Per Capita Spending on Air Pollution
Density of Motor Vehicle Traffic & Pollution
Toxic Chemical Releases by Industry to Air
Toxic Emissions without End-of-Stack Controls
High Risk Cancer Facilities
Ozone-Depleting Emissions
Acid Rain
Air Emissions from U.S. Electric Utilities
Carbon Dioxide Emissions from all Fuels

Water Pollution
Total Chemical Underground Injections
Public Sewers in Non-Compliance
Investment for Sewer Needs to Year 2008
Miles of Rivers, Streams, Lakes, & Reservoirs
Percentage of Rivers, Streams, Lakes, & Reservoirs Unusable
Spending on Water Quality & Development

Water Pollution (continued)
People Served by Groundwater
Households Served by Own Wells
Households with Septic Tank Only
Pesticide Contaminated Groundwater
Surface & Groundwater Systems Failing SDWA
Percentage of Water Systems in Significant Non-Compliance
Population with SDWA Violations
Percentage of Water use for Drinking & Cooking

Congressional Leadership & Policy Initiatives
State Congressional Votes on Energy Bills
Contributions Received by Congressmen from Energy-Related Groups
Recycling Programs
Landfill Requirements
Toxic Waste Plans
Acid Rain Plans
Water Quality Monitoring
Agricultural Monitoring
Energy & Transportation Monitoring and Tests
Place & Pollution Management Plans

Table 4.3 (continued).

Toxic Waste
Toxic Chemical Releases to the Land
Toxic Chemical Transfers Off Site
Cancer-Causing Chemicals Released to the Environment
Birth Defect Toxins Released to the Environment
Nerve Damaging Toxins Released to Environment
Total Toxic Chemicals Releases to Environment
Personal Income from Chemical Industry
Hazardous Waste Generated
Hazardous Waste Remaining in State
Hazardous Waste RCRA Generators
Hazardous Waste Management Facilities
Hazardous Materials Transport Accidents
Military Hazardous Sites
State Spending to Manage Solid & Hazardous Waste
Superfund NPL Sites
Cleanup of NPL Sites
Non-Superfund Waste Sites
Non-Hazardous Subtitle D Impoundments
Municipal Solid Waste Generated
Municipal Waste Recycles
Curbside Recycling Programs
Open Municipal Landfills
Municipal Incineration

Energy
Coal Production
Oil Production
Natural Gas Production
Gross State Product from Energy
Pipelines in Non-Compliance
Oil Spills in State Water
Oil & Gas Injections Wells
Growth of Carbon Emissions (1966 - 1986)
Carbon Emissions (Tons Per GSP)
Growth in Per Capita Energy Consumption
Energy Growth vs. Population Growth
Low-Income Homes Weatherized
Percentage of Electric Capacity in Nuclear Power
Citations at Nuclear Plants
Low-Level Radioactive Waste sent for Disposal
Total Radioactive Waste in State
Gasoline Use Per Capita
Miles Per Gallon Gas Consumed
Highway Deaths per Billon Miles Driven
Persons Per Motor Vehicle
Cars Per Transit Buses
Dependency on Vehicle & Related Industries

Table 4.3 (continued).

Highway Spending as a Percentage of Vehicle-Related Revenue
Mass Transit Spending as a Percentage of Highway Spending
Mass Transit Used in Urban Areas
Renewables as a Percentage of All Energy
Renewables as a Percentage of All Electricity
Non-Hydro Renewables of Electricity
Energy from Municipal Waste
Solar Collection Systems

Community & Workplace Health
Cancer Cases & Deaths
Premature Deaths
Population in Underserved Areas
Population without Insurance
Public Health Spending
State Medicaid Program
Households without Plumbing
Infant Mortality
Workplace Deaths
Workers in High-Risk Jobs
Workers in most Toxic Industries
Workers in High-Injury Industries
Hazardous Waste Workers
Maximum Unemployment Benefits

Community & Workplace Health (continued)
Unemployment Rates
Population with Workplace Insurance
Union Membership
Laws for Workplace Safety

Farms, Forest, Fish, & Recreation
Number of Farms
Farms Gained or Lost
Farmland in State
Fertilizer Use Per Capita
Herbicides per Acre
Pesticide Use Per Capita
Pesticides Tainted Ground water
Unsafe Nitrates in Wells
Cropland Irrigated
Cropland Erosion
Conservation Tillage
Acres in Conservation & Reserve
Agriculture as a Percent of State Gross Product
Forest Products
Forest as a Percent of all Land

Table 4.3 (continued).

Forests Owned by Timber Firms
Change in Forest
Private Tree Farms
Lumber as a Percentage of Gross State Product
Paper Mills
Wetlands Lost
Shellfish Fishing Water Limited
Commercial Fish Landings
Fishing Licenses
Adults who Hunt of Fish
Registered Motorboats
Recreational Waters
Total Land
Land Owned by Federal Government
Land Owned by Fish & Wildlife Services
Land in State Park Areas
Budget for State Parks
Natural Resources as a Percentage of State Gross Product
Population
Conservation Members

Environmental Stringency – The Levinson Index

After conducting a thorough examination of state environmental policy measures, it becomes apparent that the effort to study the economic effects of environmental policy across states over time is problematic. While there has been research specifically focused upon state environmental policy, none of this research is longitudinal. The most cited environmental policy measures are cross sectional, thus only provide a snapshot of environmental policy in the states at single points in time. In order to select a measure that accurately provides a representation of the variable that I am most interested in isolating, it becomes necessary to revisit the theory driving this research.

Some states approach the development of environmental policy from an economic perspective. These states hope that by enacting environmental regulations that are less stringent than other states, they will entice businesses to locate new facilities or expand

existing facilities within their borders. By providing a lower regulatory burden, states hope to lower operational costs for businesses. Businesses are not forced to divert resources to pollution abatement measures, and thus, have the potential to reap greater profits by locating in states with weaker environmental policies. Less stringent environmental regulations lower business costs and make the states more attractive as a siting location. Thus, environmental stringency directly affects business cost.

Levinson (1999) develops a longitudinal measure that directly addresses the issue of business costs in an environmental regulatory setting. Levinson begins with the Census Bureau's Pollution Abatement Costs and Expenditures (PACE) survey. This survey was conducted from 1977 to 1994 (excluding 1987 when PACE data were not collected) and again in 1999. Manufacturing industries are surveyed regarding their pollution abatement operating and capital costs. Thus, the very factor that can influence industry location decisions is specifically asked of industries in this survey. While some researchers use the PACE data as a longitudinal measure of environmental stringency, they fail to control for the fact that some states having higher numbers of polluting industries. States with greater numbers of polluting industries will have greater amounts spent on pollution abatement costs by those industries. This does not necessarily reflect greater environmental stringency of the states, however. Greater levels of pollutions abatement spending is a function of greater numbers of polluting industries. By the same token states with a lower concentration of pollution intensive industries will have overall lower industrial pollution abatement spending. These states are not necessarily less stringent in their environmental policy, they just have fewer polluting industries within

their jurisdictions. The industrial composition of the state is simply not considered. It is a state characteristic that is not controlled for in the measure of the variable.

Levinson creates an "industry-adjusted index" in order to control for the industrial composition of a state. According to Levinson (1999) "the index compares the actual pollution abatement costs in each state, unadjusted for industrial composition, to the predicted abatement costs in each state, where the predictions are based solely on nationwide abatement expenditures by industry and each state's industrial composition" (p. 3). Levinson accounts for both the pollution abatement spending by industries within a state and the industrial composition of the state. His index is a reflection of what industries in each state are spending for pollution abatement purposes yearly, while controlling for the overall industrial composition in each state. This index provides a measure of pollution spending in the states without "punishing" states that contain large numbers of polluting industries with poor scores on the index. Essentially this index takes into account what similar businesses are spending in different states. Levinson does not just tally up the cost of pollution abatement to businesses in each state. He determines industrial pollution costs across the nation and then uses this to establish what these same industries spend in each state on pollution abatement. By controlling for industrial composition, the Levinson Index resolves which states are costing businesses more for pollution abatement efforts. Thus, he provides a measure of the environmental costs of conducting business within a particular state.

This measure allows for the comparison of industry environmental costs across the states. If environmental costs are higher in some states than in others, there must be reasons for this. Industries would all build the most cost effective plants with similar

operating costs in every state in which they were located if their were not external factors causing them to do otherwise. These external factors are state environmental policies. More stringent policies can increase the environmental operating costs of industries. Thus, states that have industries spending greater amounts on environmental/pollution abatement expenses are likely to have more stringent environmental policies/regulations in place. However, Levinson does caution that factors other than stringency may also be affecting pollution control costs. Labor costs for environmental workers may vary across states and have an effect upon pollution abatement costs. Further, age of facilities is not taken into account. New facilities are often subject to higher environmental standards than existing plants, adding to their pollution abatement costs. This measure does not take these other factors into account. While these limitations are important, the Levinson Index does provide a useful tool for evaluating industry environmental costs across the states. These costs can be affected by state policy decisions.

Table 4.4 illustrates how the states rank in environmental effort/stringency according to the most frequently used cross-sectional measures and Levinson's industry-adjusted index. The ranking of the Conservation Foundation Index, FREE Index, and the Green Index are presented. The Green Index ranking is also divided into its component parts of state environmental conditions ranking and state policy ranking. A quick glance at Table 4.4 shows that while the three "conventional" indices have similar ranking patterns, there are some large differences between these and the Levinson Index. For example, California is ranked in the top four of the "conventional" indices, but ranks 29th on the Levinson Index. Mississippi has rankings of 48, 28, and 47 on the "conventional" indices, but ranks 7th on the Levinson Index. Levinson runs correlations on the indices

Table 4.4. Rankings of State Environmental Effort/Stringency According to Various Indices

	Conservation Foundation Index	FREE Index	Green Index	Green Cond.	Green Policy	Levinson Index
Alabama	50	26	50	47	49	14
Alaska	33	25	34	18	47	
Arizona	32	19	35	26	39	9
Arkansas	26	25	48	40	50	15
California	2	2	4	19	1	29
Colorado	27	21	16	10	26	20
Connecticut	14	4	11	23	4	44
Delaware	21	21	24	27	25	11
Florida	17	7	18	30	13	13
Georgia	29	20	39	38	29	28
Hawaii	12	24	12	1	24	
Idaho	47	25	19	11	36	1
Illinois	23	7	31	42	17	26
Indiana	11	10	43	49	27	17
Iowa	21	8	20	29	16	24
Kansas	33	17	42	43	28	38
Kentucky	12	18	41	39	33	22
Louisiana	43	21	49	50	34	5
Maine	14	10	2	4	5	4
Maryland	7	12	13	14	15	16
Massachusetts	4	7	6	6	9	43
Michigan	18	5	17	32	11	19
Minnesota	1	9	5	5	7	46
Mississippi	48	28	47	44	46	7
Missouri	49	15	30	33	23	35
Montana	7	22	21	15	31	6
Nebraska	39	31	29	24	30	31
Nevada	39	22	22	9	43	47
New Hampshire	43	14	15	8	20	39
New Jersey	3	3	14	28	3	34
New Mexico	46	22	28	20	38	2
New York	7	5	8	17	8	36
North Carolina	29	6	23	37	18	33
North Dakota	39	26	25	16	37	37
Ohio	18	12	37	46	19	32
Oklahoma	45	17	40	31	42	48
Oregon	5	11	1	3	2	12
Pennsylvania	23	14	26	34	21	27
Rhode Island	27	16	7	7	10	41
South Carolina	29	15	36	35	32	21
South Dakota	18	22	27	12	48	42
Tennessee	33	17	45	45	40	18
Texas	39	20	46	48	35	8
Utah	33	26	33	22	41	25
Vermont	14	18	3	2	12	45
Virginia	23	13	32	36	22	23
Washington	6	17	9	13	14	6
West Virginia	33	27	44	41	45	3
Wisconsin	7	1	10	21	6	30
Wyoming	33	26	38	25	44	40

and finds that the Conservation Foundation Index, FREE Index, and Green Index are highly positively correlated. However, these indices are negatively correlated with his index.

Levinson suggests reasons for a lack of correlation with the "conventional" indices. The "conventional" indices all include state environmental conditions in their measures. Levinson's index is based on industry expenditures. These expenditures may be higher in states with poor environmental conditions because they are mandated to meet federal requirements. Thus, poor conditions which lead to a low ranking on the "conventional" indices can cause increased industry spending which leads to a higher ranking on the Levinson Index. Further, Levinson points out that the other indices frequently include policies that have nothing to do with industry costs (e.g., curbside recycling). Consequently, the indices are measuring different concepts. The "conventional" indices focus on state environmental effort and policy. The Levinson Index focuses on the costs of state policies upon the industries they regulate. As stated by Levinson, the "index measures how much it costs to locate a manufacturing facility in any one state, relative to others, in terms of pollution abatement costs" (p. 12).

Conclusion

Researchers have used many ways to measure environmental policy in the states. State environmental spending levels, state environmental conditions, and state environmental policy/effort indices are commonly used. In this study I seek to determine if states can spur economic growth by getting new industries to locate within their borders or by having existing industries expand their operations with the inducement of lower environmental costs. In other words, can states reap an economic reward by

enacting environmental regulations that will result in lower operating costs for business and industry? The Levinson Index provides a measurement tool that specifically examines the environmental/pollution abatement costs of industries in the states across time. Since this is the variable I am most interested in isolating, it is used as the main independent variable of interest in this study. The next chapter presents the model used in this analysis. All dependent and independent variables are thoroughly examined.

CHAPTER 5:
THE MODEL

> Existing studies tend to focus on one or two regulatory measures, and a single econometric specification. One worthwhile project would involve trying out a variety of these differences to see which matter the most. (Gray, 1997, p. 103)

In this research I attempt to discover whether state environmental policy has an impact upon state economic growth. Two conflicting theories are prevalent in the environment versus economy debate. The first theory posits that stringent environmental regulations increase the operating costs of businesses, thereby, decreasing the likelihood that businesses will locate (or expand operations) in states with more strict regulations. Without business expansions to stimulate growth, state economies will suffer. Moreover, stringent environmental regulations lower the efficiency of state businesses by imposing costs on their production activities. The second theory holds that states with more stringent regulations have better environmental conditions that serve to attract both businesses and high quality workers needed by these businesses. Thus, environmental regulations improve state characteristics that are appealing to potential businesses. As a result, businesses locate in these "greener" states, stimulating the state economies and enhancing state economic growth.

In this study, I model state economic growth as a function of state environmental policy stringency. Three variables are used as measures of state economic growth. Because of limitations of the availability of the data used as measures of environmental stringency, separate models are estimated for the time periods of 1977 to 1994 and 1986 to 2003. Data for this study are drawn mainly from the *Statistical Abstract of the United States*, published by the U.S. Department of Commerce, although other sources were used for specific variables. All fifty states are examined in the analysis. The data is

analyzed to determine whether environmental policies enacted by states effect state economic growth. The dependent and independent variables utilized in this study are discussed in turn.

Dependent Variable: State Economic Performance and Growth

The dependent variable of interest is state economic performance, measured primarily in terms of state economic growth. I seek to understand the impact of environmental policy upon state economies. State policymakers who support more lax regulations generally argue that a less stringent regulatory environment will encourage business development and result in overall economic growth. Three different measures are used in an attempt to capture the basic elements of the concept of state economic performance. I estimate separate models for each of the three variables.

State economic growth can be measured in a number of ways. I focus on measures related to state income and employment. The first measure of state economic growth is change in state total personal income. I collect data on real (deflated) total personal income by state for each year. To capture change in personal income, I lagged this variable by one year and calculated the percentage change from year t-1 to year t. This was done in order to reflect growth in income that might have come about as a result of state policies enacted in the prior year. The use of a lagged dependent variable allows for the capture of change in economic conditions (Brace, 1991). The second measure of state economic growth is change in state per capita income. I collect data for real (deflated) state per capita income and, as with the first measure, this variable is lagged by one year in order to attain a measure of growth in per capita income. The final measure of state economic performance is state unemployment rates. If state economies grow as a

result of growth in new or existing businesses, more citizens should be able to find work in these businesses. The measure is simply the unemployment levels in the states for each year. This variable is the unemployment rate measured as the number of unemployed persons in the state as a percentage of the civilian non-institutional population over the age of 16 in each state for each year. These three variables provide an illustration of different factors that encompass a state's economic growth. Thus, these three state economic indicators that focus on change in state income and unemployment rates are used as measures of state economic growth.

Independent Variable: Environmental Policy

As discussed in the previous chapter, many different indicators are used by researchers as measures of state environmental policy. In this study, I emphasize the Levinson Index, since this measure focuses on the environmental regulatory costs for businesses in the states. However, since this measure is only available from 1977 to 1994, two other commonly used (but less valid) measures are examined for the time period from 1986 to 2003. State spending on environmental programs and state environmental conditions will also be included in the analysis in separate models accounting for a different time period. In the full analysis presented in Chapter 6, I also present a brief model examining the effects of the Green Index and the Green Policy Index, the cross-sectional policy indexes discussed fully in Chapter 4. Since these indexes are described thoroughly in the preceding chapter and are discussed in the model in Chapter 6, I do not repeat that discussion in this section. Instead, I focus on the critical longitudinal independent variables of the Levinson Index, state environmental spending per capita, and state environmental conditions.

The Levinson Index

The Levinson Index is the main independent variable of interest in the analysis of the years 1977 through 1994. As discussed in the preceding chapter, the Levinson Index is created using data from the Census Bureau's Pollution Abatement Costs and Expenditures (PACE) survey that details the costs to business and industry of complying with environmental regulations. As the Census Bureau did not conduct the PACE survey in 1987, the Levinson Index does not contain data for this year. However, using the available years of the index, data were imputed using linear interpolation to produce a value for 1987 for each state.

The Levinson Index provides a yearly score for each state based on the PACE assessment of business costs. This index is based on the amount that business and industry in each state spend on pollution control measures while accounting for the industrial composition of the state. Thus, states are not ranked high on the index simply because they are home to larger numbers of polluting industries. The industrial composition of the state is factored into the score assigned to each state. This is used as a measure of environmental policy stringency because it is likely that business and industry will be forced to pay higher pollution costs if a state has more stringent environmental regulations. Further, for the purposes of this study, I am specifically interested in whether the costs imposed on businesses to comply with environmental regulations are a detriment to state economic growth. By using a variable that specifically measures such costs, I am able to explore the key question of interest in this dissertation.

If the policymakers who argue that environmental regulatory stringency has a negative effect on business growth that in turn has a negative impact upon a state's

economy are correct, I expect that there will be a negative relationship between the Levinson Index and growth in state total personal income and state per capita income. Further, there will be a positive relationship between the Levinson Index and state unemployment rates. However, if those who argue that more stringent environmental regulations produce positive environmental conditions that serve to attract business and industry to a state are correct, I expect to find the opposite results. The Levinson Index will be positively related to change in state total personal income and state per capita income and negatively related to state unemployment rates.

State Environmental Spending

Data collected by the Council of State Governments (CGS) and by the Environmental Council of the States (ECOS) on state environmental and natural resource spending is used as a measure of environmental policy for the second time period analyzed in this study. While this measure is not an ideal measure of environmental policy and the stringency of environmental regulation, it does capture the general willingness of each state to commit budgetary resources toward environmental goals. While specific policies are not accounted for in this variable, it does serve as a global measure of state commitment to environmental goals. This measure is used for the model estimates for the years from 1986 through 2003. The CGS collected these state spending data in 1986, 1988, 1991, 1994, and 1996, while ECOS collected these data for the more recent years of 2000 and 2003.

This spending data are reported in two forms. The total amount spent in each state on environmental and natural resources is available for all of the reporting years. The amount spent per capita in each state is available for the years 1994, 1996, 2000, and

2003. Population data from the *Statistical Abstract* and total environmental and natural resource spending for each state are used to calculate state per capita environmental and natural resource spending for the years of 1986, 1988, and 1991. The data are then imputed to provide values for the years in which the actual data are not collected.

If policymakers who argue for stronger environmental policies in order to provide "clean" conditions as an enticement to businesses to locate within their borders are correct, I expect greater environmental and natural resources spending to be positively related to change in state total personal income and state per capita income. Unemployment rates will be negatively related to environmental and natural resource spending. However, if those policymakers who worry that businesses will be deterred by a stricter environmental regulatory policy setting are correct, greater state spending on environmental and natural resources will be negatively related to growth in state total personal income and state per capita income. Further, there will be a positive relationship between state environmental and natural resource spending and state unemployment rates.

State Environmental Conditions

Since one of the key purposes of environmental regulations is to control and/or reduce pollution, those states with more stringent regulations should see a benefit from those regulations in the existence of better (i.e., cleaner) environmental conditions. Data regarding industrial chemical releases is collected annually by the Environmental Protection Agency (EPA) in the Toxic Release Inventory (TRI). This data is available for every year since 1988. Two indicators from the TRI are used in this analysis to measure environmental conditions: chemical air emissions and water releases. Data from

the TRI is utilized for information contained on these air and water releases. It is expected that states with stricter environmental regulations would have lower numbers reported on their TRI.

If officials who believe that strict environmental regulations harm a state's business climate are correct, I expect environmental conditions as reflected in the TRI will be positively related to change in state total personal income and state per capita income (i.e., the higher the emissions, the greater the income growth). Under these circumstances, environmental conditions will be negatively related to state unemployment rates. Conversely, if those who believe that "greener" conditions create a better climate for business development and subsequent economic growth are correct, then emissions will be negatively related to state total personal income and per capita income (i.e., the lower the emissions, the greater the income growth) and positively related to state unemployment rates.

Additional Independent Variables

In order to understand the relationship between state environmental policy and state economic growth, other variables that can have an impact upon state economic growth must be considered in the analysis. A variety of factors can have an influence upon state economies. These factors include business incentives offered by states to encourage industrial growth, the national economic climate in which the states operate, the internal fiscal conditions under which the states operate, state structural and institutional characteristics that can affect the policymaking environment, and demographic characteristics of the states that may make them more or less appealing as

siting locations to business and industry. The variables used to measure each of these elements in the analysis are discussed in turn.

State Business Policies

In an effort to support business and industrial development, many states actively engage in the adoption of pro-business policies. Policymakers in these states believe that by providing incentives to businesses, they can encourage expansion of existing businesses and the location of new businesses within their borders. The ultimate hope is that the expansion of the business sector will have a positive impact upon state economic growth. Thus, businesses and industries are offered incentives by states so that the states can grow their economies.

Each year *Site Selection* magazine (formally *Site Selection and Industrial Development Handbook*) conducts a survey of state economic officials to assess the legislative business climate within each state. The magazine survey indicates whether each state possesses eighteen different policies to provide financial assistance for industry (see Appendix A). An additive scale is created that provides a score of government financial assistance for each state for each year. The higher the state score, the more financial assistance policies a state has in place.

Data are not available for 1994. To create a value for this missing year, I estimate 1994 data based on an interpolation of data for policies in place in 1993 and 1995. If a policy is (or is not) in place in both 1993 and 1995, I assume that the policy is (or is not) in place in 1994. When a change does occur between 1993 and 1995, I assume that the change occurred in 1995. Hence, in these cases the 1994 value is assigned the same value as for 1993.

Policymakers enact these financial assistance policies with the expectation that such policies will encourage business expansions and/or entice new businesses to locate within their states. Thus, the enactment of these policies is done so with the expectation of spurring economic growth. I expect that this variable will be positively related to the state income variables and negatively related to state unemployment rates.

Site Selection magazine also has information available on the types of tax incentives states offer business and industry. Data on fifteen tax incentives are collected, including corporate income tax exemptions, incentives for the creation of jobs, and excise tax exemptions (see Appendix A). An additive scale is created for this variable as well, with higher scores indicating more tax incentives offered by the state. Once again, 1994 data are missing for this variable. The data are treated in the same manner as described for the state financial assistance variable to provide a value for the missing year.

Similar to the financial assistance variable, state policymakers enact these tax incentives hoping to stimulate growth and encourage expansion within the business sector. The ultimate goal of business tax incentive policies is to improve overall state economic growth. Therefore, the relationship between the tax incentive variable and the state income variables should be positive. The more tax incentives offered to businesses, the greater the growth in state total income and state per capita income. I expect to find a negative relationship between the unemployment variable and the tax incentive variables. The more tax incentives offered, the lower the state unemployment rate.

National Economic Conditions

As discussed in Chapter 2, research indicates that national economic conditions can have great influence upon state economic development. States exist and operate

within the national economy, and it is likely that national economic trends will have an impact upon state economic growth. While states may attempt to control the effect of economic conditions through the enactment of economic policies, they cannot eliminate the influence that the national economy will exert upon state economies.

The first national economic variable examined is change in national real Gross Domestic Product (GDP) per capita. This variable reflects the change in national per capita GDP from one year to the next. Data are collected from the Bureau of Economic Analysis and Economic History Services websites. I expect changes in national per capita GDP to be positively related to the state income variables and negatively related to state unemployment. This is consistent with Brace's (1993) findings that national economic conditions often have greater effects than state policies on state economic conditions.

The next national economic indicator examined is national unemployment. This variable is a measure of the nation's unemployment rate. Data are collected from the *Statistical Abstract.* I expect this variable will be negatively related to the state income variables and positively related to state unemployment.

While research does indicate that national economic conditions can exert a great deal of influence upon state economies (Brace, 1991; Garand and Hendrick, 1991), this effect is not necessarily consistent among all of the states. The effects of national economic conditions will vary among the states. Some states are more likely to be affected by national conditions than others. For example, Louisiana is a state that is heavily reliant upon the oil industry for its economic performance. While high oil prices may benefit Louisiana, the nation as a whole may see an economic downturn as a result

of rising oil prices. Indeed, the economies of non-oil producing states can be harmed by an increase in oil prices. An oil price increase can harm the national economy and states within that economy, while at the same time benefiting the economies of oil-producing states. Thus, some states may not be as influenced by national economic conditions as others. Indeed, Brace (1991) points out that states with energy resources faired better than the nation as a whole during the oil crises of the mid to late 1970s. These states were not as susceptible to the unstable economic conditions that influenced the national economy.

State Fiscal Conditions

The potential for state economic growth can be either limited or expanded by existing state fiscal conditions. States that are heavily indebted will be forced to allocate resources to paying off that debt. Instead of being able to invest dollars into areas that could benefit the state economically, these states must use resources to satisfy old obligations. Moreover, states with heavy debt will be constrained in their ability to make new investments, and some proposed investments may be limited by the greater difficulty that states with heavy debt may face when they attempt to borrow money. State economies are also affected by the level of federal dollars they receive each year. Such dollars can alleviate the needs for states to use their limited financial resources in areas that the federal government provides assistance. With federal monies used to cover some state costs, states can otherwise allocate some of their limited resources into areas designed to spur economic growth. To account for such fiscal conditions, measures of state debt and federal aid are included in this analysis.

Data are collected on the total debt outstanding for each state for each year from the *Statistical Abstract* for the years 1977 to 2003. A variable is then created that measures total state debt as a proportion of total state personal income. I expect that state economic growth will be lower in states that have greater debt as a proportion of total state income. Therefore, this state debt variable is expected to be negatively related to the state income variables and positively related to state unemployment rates.

The *Statistical Abstract* provides data on the total amount of federal aid received by each state. These data are collected for each state for each year from 1977 to 2003. A per capita measure of federal aid in each state is created for the analysis. I am unsure how this variable will affect the dependent variables. It may be that the more federal aid a state receives, the better it is able to increase its infrastructure and attract businesses which will help to increase economic performance. If this is the case, then the federal aid variable will be positively related to the state income variables and negatively related to state unemployment. On the other hand, receipt of greater federal aid may be a result of increased need due to poor state economic conditions. If greater federal aid is a response to state economic need, I expect this variable to be negatively related to the state income variables and positively related to state unemployment rates.

State Structural/Institutional Characteristics

Certain state structural or institutional characteristics have the potential to influence state economic growth. State tax structure, gubernatorial power, and legislative professionalism can contribute both to the amount of revenues that states can collect and the capacity of government to make effective use of those revenues in order to stimulate

economic growth. Thus, these factors must be considered in the analysis of influences upon state economic growth.

Tax structure is a critical variable in the discussion of a state's ability to affect its economic growth. The manner in which a state chooses to tax its citizens has an effect upon the revenue received and, hence, the state economy. As witnessed at the national level throughout the 1990s, there is great debate on how a tax system should be structured. Some argue the benefit of a progressive income tax system while others favor flat tax structures. Winters (1999) calculates the regressivity of states' tax systems by measuring the "percentage of income extracted in taxes from the lowest 40 percent of income earners as a percentage of the percent of income extracted from the top 5 percentage of income earners in each state" (p. 317). A higher number reflects a state with a more regressive tax structure. This measure of tax regressivity can be used as a measure of the state tax structure.

Regrettably, I must point out that this is a cross-sectional variable. Winters created this measure using 1991 tax data; thus, the measure does not vary over time for the states. While not an ideal measure for a longitudinal analysis, the variable does provide some insight into the tax structure of the states, allowing for the understanding of the role tax structure plays in state economic growth. Just how this variable will affect the economic growth variables depends upon which side of the tax structure argument is correct. If proponents of sales taxes are correct, then this number should positively effect economic growth. But if proponents of progressive incomes taxes are correct, then greater state tax regressivity should negatively effect state economic growth.

Since the 1990s, gubernatorial candidates have frequently stressed their abilities to positively enhance state economic growth in order to demonstrate their qualifications for the highest office in their states. In order for a governor to influence state economic conditions, he or she must possess the structural capacity to do so. Brace (1993) notes that states with more powerful governors achieved greater effects on per capita income. Greater institutional capability allows states to have a greater influence upon economic growth. Governors with the capacity to more effectively institute policies aimed at improving economic growth will be more successful than governors with weak institutional capacities. Beyle (1999) has developed a measure of gubernatorial institutional power by examining six factors: gubernatorial tenure, appointment power, budgetary power, veto power, party control, and whether a state's executive branch officials are elected separately or together. Beyle's score is used in this analysis. As with the tax structure variable, this measure is also cross-sectional and does not vary over time. However, it does provide some understanding of gubernatorial capacity for the purposes of this analysis. According to this index the higher the score a state receives, the greater the institutional power of the state's governor. I expect this variable to be positively related to the state income variables and negatively related to state unemployment rates.

While governors might like to imagine that sole responsibility for state policy lies in their hands, the legislature is a critical body in state policymaking. Much research has focused on the increased professionalism of state legislatures and the notion that increased professionalism enables a legislature to better affect state policy (Mooney,1995; Moncrief, Thompson, and Kurtz, 1996; Rosenthal, 1998; Dilger, Krause,

and Moffett,1995; King, 2000). King examines legislative professionalism over a thirty year period, providing a legislative score for each decade. This measure is used in this analysis. Since King calculates the score each decade, this variable does provide slight variation in the states over time. The score for each state changes in 1983 and again in 1993. Higher scores indicate greater levels of legislative professionalism in the states. Consistent with Brace's (1993) finding that states with more professional legislatures are able to affect per capita income due to greater institutional capability, I expect that greater legislative professionalism will be positively related to state income variables and negatively related to state unemployment rates. State legislatures that have the capacity to enact policies designed to achieve increased state economic growth will use that capacity to do so.

State Demographic Variables

In addition to the business policy, national economic conditions, state fiscal, and state structural/institutional variables, other variables that reflect demographic characteristics of the state have the potential to influence state economic growth. These types of variables can be important factors for businesses in making site location decisions. They can also be important to a state's ability to grow its industrial sector. Education, manufacturing employment, political culture, agricultural strength, region, urbanization, and race are variables that are used frequently in state economic studies to account for economic differences among the states. Thus, these demographic variables are included in the analysis.

The educational attainment of a state's citizenry can be critical is its efforts to court new business and industries. Educational attainment is measured in two ways. The

first variable is one that represents the percentage of a state's population that has a high school diploma. The second variable is the percentage of a state's population that has at least a college degree. These data are collected from the *Statistical Abstract*, the *Current Population Reports*, and the *American Community Survey*. Some explanation of how these variables are collected and created is necessary. Unfortunately, the Census Bureau has not been consistent in either how it has asked questions regarding educational attainment or how often it has asked these questions during the years covered in this study. Prior to 1989, the Census Bureau asked respondents whether they had completed four years or more of high school and whether they had completed four years or more of college. In 1989 the questions were changed to specifically ask whether a high school degree or its equivalent was attained and whether a college degree was earned. Obviously these questions are not providing the same information, as it is possible that a respondent before 1989 could have gone to either high school or college for more than four years without actually having attained a degree. In addition the ages of respondents examined changed during the period under examination. Prior to 1989, answers reported in various years were reported for the population over the age of 14, the population over the age of 15, the population over the age of 18, and the population over the age of 25. Since 1989, though, results have been consistently reported for the population over the age of 25. While these represent key differences in the data collected over the time period, for the purposes of this analysis, the data are treated as equivalent.

A second problem with the educational attainment data arises concerning the reporting years and reporting regions. The census occurs every ten years and the *Statistical Abstract* provides data for the census years for each state. The census years

covered in this analysis are 1980, 1990, and 2000. The *Current Population Reports* and *American Community Survey* provide estimates of these educational attainment data based on samples from the states for select years. *Current Population Reports* data available for the time period covered in this analysis are for the years 1977, 1979, 1981, 1983, 1987, 1989, 1991, and 1993 to 1999. A further complication involves the years 1977 to 1987. The *Current Population Reports* did not report the data for each state. Instead, regional educational attainment data is provided. The *American Community Survey* provides the educational attainment data through the Census Bureau website for the years 2001 to 2003. While complete data are available for each state from 1993 to 2003, reporting gaps exists from 1977 to 1992. The data are imputed to provide values for the missing years of 1978, 1982, 1984, 1985, 1986, 1988, and 1992. In order to prepare the data for imputation, I removed data for some states for some years that exhibited extreme outliers in the level of educational attainment. Hence the time series for these variables are slightly smoothed over time.

Business and industry looking for areas in which to develop often seek out locations with educated workforces so that the costs of training employees will be lower. States with better educated citizens should be more attractive for business developers. I expect these states to have an advantage in their potential for economic growth. Further, since educational attainment and income achievement are linked, I expect that states whose citizenries possess higher levels of educational attainment will have higher levels of economic performance. Thus, I expect the educational attainment variables will be positively related to the state income variables. Educational attainment will be negatively related to state unemployment.

The amount of a state's labor force that is employed in the manufacturing sector can also have an impact upon state economic growth. Data are collected from the *Statistical Abstract* on the number of employees in each state that are employed in the manufacturing sector. These data are used to create a variable that represents manufacturing employment as a proportion of the total state population. Just as business and industry may want to develop in a state with a more highly educated workforce to keep employee training costs lower, they may be attracted to an area with a large number of employees who are already trained in the manufacturing area. Such employees may be easier to train in industrial jobs. States with large proportions of their population already employed in this sector may be more appealing to new business and industrial developers. Thus, the manufacturing employment variable is expected to be positively related to the state income variables and negatively related to state unemployment rates.

Political culture is another state characteristic that can have an influence upon state economic growth. Johnson's (1976) reformulation of Elazar's classification of state political culture using discriminant analysis is utilized to assign a political culture score to each state. Traditional states are coded 0, individualistic states are coded 1, and moralistic states are coded 2. Johnson's categorization excluded Hawaii and Alaska. Multinomial logit is used to create a model of predicted political culture from the variables utilized in this model. The predicted political culture model had an R^2 of .594. Thus, the model was used to predict scores for the two missing states. Hawaii is classified as a moralistic state. Alaska is classified as an individualistic state. Categorization of political culture classifies moralistic states as more reliant upon government solutions to problems. These moralistic states are expected to actively use

government means to make their states more desirable areas to live (e.g., infrastructure development). Such improvements can make states more attractive to business and industrial development. Such development can lead to state economic growth. Therefore, moralistic political culture should be positively related to the state income variables and negatively related to the state unemployment rate variable.

The strength of the agricultural sector of a state can also have an impact upon state economic growth. Data on the number of farms in each state is collected using both the U.S. Department of Agriculture's *Agricultural Statistics* and the *Statistical Abstract*. These data are used to create a measure of the number of farms per capita in each state for each year. Data values are missing for 1981, so the available data are imputed to create a value for that year for each state. Brace (1993) suggests that since the 1970s, state economic development policy has "focus[ed] on the creation of new industries and markets and the expansion of existing ones" (p. 28). Since so much state effort has been put forth to develop business and industries, the presumption appears to be that these sectors are most economically advantageous for the states while the agricultural sector is not as ripe for economic growth. Since states with greater number of farms per capita are likely more reliant upon the agricultural sector, policymakers in these states may be less willing to adopt policies designed to increase industrial development. Hence this variable is expected to be negatively related to the state income variables. On the other hand, agriculture is a labor-intensive sector of the market, and an active agricultural sector may be a heavy employer that takes advantage of slack labor markets. Even as a large agricultural sector may generate less income than other economic sectors, it may reduce

unemployment, albeit with lower-paying jobs. Hence, I hypothesize that farms per capita will be negatively related to state unemployment.

Regional location is another factor that is important to the states. As Brace (1993) notes, globalization has had a negative effect upon the economies of southern states. For decades the southern region relied on low wages to attract industrial development. Globalization has made other nations, with significantly lower wage rates, more attractive for this purpose. Also, southern states have traditionally been more rural-based economies. As such, it is expected that their economic growth would be lower than other regions; though, this specific effect should be captured by the farms per capita variable. It is worth noting that in more recent years southern states have experienced higher levels of growth than in their past. Historically, though, growth in these states has been weaker than in other states so southern states had more potential for growth. This "south" variable is coded 1 for southern states and 0 for other states. While an argument can be made for increased growth in the south, I expect the effects of globalization and the strength of traditional agricultural sectors to outweigh the effects of more recent growth. Thus, I expect this variable to be negatively related to the state income variables and positively related to the state unemployment variable.

Urbanization levels can also have an important impact upon state economic growth. Data from the *Statistical Abstract* are utilized to develop a measure of the lagged urban population proportion of a state. More urban areas are expected to possess greater numbers of businesses which should enhance state economic growth. Therefore, the variable is expected to be positively related to the state income variables. The relationship with state unemployment is less conclusive, however. While greater

numbers of businesses should increase employment rates, stories are constantly told of the need for redevelopment in cities and the high unemployment rates of inner city residents. Fieock (1991) describes the fiscal crises in the mid-1970s and economic downturns in the 1980s which drove cities to pursue economic development policies. However, he does not find evidence that local economic development initiatives enhanced employment rates. Hence, it is inconclusive as to what the relationship will be between state urbanization levels and state unemployment.

A final state demographic characteristic examined in the analysis is that of racial composition. This variable is a measure of the lagged black population proportion of each state. Data are utilized from the *Statistical Abstract* to create this variable. Minority areas are generally regarded as poorer areas lacking economic growth. Stories are repeatedly told of the need for business development in minority neighborhoods in order to revitalize these areas. Thus, this variable is expected to be negatively related to the state income variables and positively related to unemployment.

Conclusion

The model described in this chapter explores the relationship between state environmental regulatory policy and state economic growth while controlling for other independent variables that can also have an impact upon state economic growth. The purpose of this analysis is to determine whether state environmental policy does have an effect on state economic growth. Specifically, I am trying to ascertain whether these environment policies influence the business climate within the states in a manner that directly effects state economic growth. To gain a full understanding of this relationship, other factors that can have an impact upon state economic growth must be considered. A

variety of factors can effect state economic growth. These include elements within the states that can influence business decisions that have an impact upon state economies. They can also include elements that are external to the states, but still influence the state economies. State business policies, the national economic climate, state fiscal conditions, state structural/institutional characteristics, and state demographic characteristics are included in the model. These variables are necessary to capture the true effect that environmental regulatory policy has upon economic growth. Without the inclusion of these control variables in the model, the accuracy of the results would be questionable.

Reasons for including each of the control variables are discussed in detail throughout this chapter. Table 5.1 provides an illustration of the expectations of the relationships between the dependent state economic growth variables and all of the independent variables. Two of the dependent variables are income variables and the third is an unemployment variable. As is readily noticed from a quick glance at the table, these variables work in opposite directions. When a positive relationship is expected with the income variables, a negative relationship is expected with the unemployment variable. Similarly, when a negative relationship is expected with the income variables, a positive relationship is expected with the unemployment variables. Since growing income suggests a growing economy with growing employment, this is not surprising. Income and unemployment should work in different ways.

The expected relationship between the dependent variables and the state environmental policy variables are illustrated as a function of the "pro-business, anti-regulation" side of the argument. For the purposes of this table, I assume that those who argue against strict environmental regulations in order to stimulate business and industrial

development are correct in their assertions that such regulations depress business growth, and hence, depress state economic growth. As discussed earlier in the chapter, if the proponents of more stringent regulations are correct in their assertions that "greener" environments actually attract business and stimulate economic growth, then the relationships would run in the opposite direction from that depicted in Table 5.1. The state income dependent variables would be positively related to the Levinson Index and state environmental spending and negatively related to the environmental conditions variables. The state unemployment variable would be negatively related to the Levinson Index and state environmental spending variables and positively related to environmental conditions.

The relationships between the dependent variables and independent variables are explored in the remaining chapters. Now that the model is prepared with the variables fully described, the analysis can occur. Regressions establish the nature of the relationship between state economic growth and the independent variables described in this chapter. The model is ready for scrutiny.

Table 5.1. Expectations of Relationships between Dependent and Independent Variables.

	Change in State Total Personal Income	Change in State Per Capita Income	State Unemployment Rate
Environmental Policy Variables *			
Levinson Index	-	-	+
State Environmental Spending	-	-	+
State Environmental Conditions			
Air Emissions	+	+	-
Water Emissions	+	+	-
Business Policy Variables			
Financial Assistance	+	+	-
Tax Incentives	+	+	-
National Economic Variables			
Change in Per Capita GDP	+	+	-
National Unemployment	-	-	+
State Fiscal Variables			
State Debt	-	-	+
Federal Aid **	?	?	?
Structural/Institutional Variables			
Tax Structure **	?	?	?
Gubernatorial Power	+	+	-
Legislative Professionalism	+	+	-
State Demographic Variables			
Educational Attainment			
High School Degree	+	+	-
College Degree	+	+	-
Manufacturing Employment	+	+	-
Political Culture (Moralistic)	+	+	-
Farms	-	-	+
South	-	-	+
Urbanization **	+	+	?
Black	-	-	+

* For the purposes of this table, expectations of relationships between environmental policy and economic growth are based upon the theory that strict environmental regulations harm economic growth.

** The expectation of the impact of this variable upon state economic growth is uncertain.

CHAPTER 6:
EMPIRICAL ANALYSIS

In this chapter, I present the empirical results of my analysis of the relationship between state environmental regulatory policy and state economic growth. The dependent variable examined is state economic performance and three indicators are used to measure this variable. These dependent variables are change in state total personal income, change in state per capita income, and state unemployment rates. The main independent variable of interest is state environmental policy. I seek to discover the degree to which states with more stringent environmental regulations realize an economic penalty for such regulations. Do states that enact tougher environmental regulations suffer a loss in economic growth? By the same token, do state that enact more lax environmental regulations experience greater economic growth?

The variables used as measures of environmental policy are the Levinson Index, state per capita environmental spending, and state environmental conditions. I review these variables briefly in the discussion of the analysis. I include a wide range of control variables in the model to ensure that the results present an accurate reflection of the relationship between state environmental policy and state economic growth. These control variables include state business policies, national economic conditions, state fiscal conditions, state structural and institutional characteristics, and state demographic characteristics. In the presentation of the model, I also include a discussion of the effect of these control variables on state economic performance, though the focus of my discussion is on the effects of state environmental policies.

The models used in this analysis are estimated using observations from all fifty states for subsets of years from the time period from 1977 to 2003. Because I use data

for state-year observations over time, my models are estimated using pooled cross-sectional time-series (or panel) data. In order to avoid violations of ordinary least squares (OLS) concerning the assumptions of homoskedasticity and uncorrelated error terms, my models are estimated using feasible generalized least squares (FGLS) regressions (Powell and Garand, 2006). A model using FGLS regression corrects for OLS violations of homoskedasticity and uncorrelated error terms by assuming "a heteroskedastic error structure across panels with no cross-sectional correlation and is estimated using panel-specific estimates of first-order autocorrelation" (p. 14). The result is a set of regression coefficients and test of statistical significance that are uncontaminated by the potential violations of these OLS assumptions.

The Green Index Model

Before presenting the results of my analysis using the Levinson Index and state environmental spending and environmental conditions variables, I first present a preliminary model using the Green Index as a predictor of state economic performance. As discussed in Chapter 4, the Green Index is a cross-sectional measure of the "greenness" of each state in 1991. In developing the Green Index, Hall and Kerr (1991) include 256 indicators of state environmental health. These indicators include measures of environmental conditions, state environmental spending, state congressional leadership on environmental programs, and state environmental policy initiatives. The Green Index is a comprehensive examination of each state's environmental health for the year the study is conducted, providing the most thorough analysis of the environmental setting of all fifty states. Indeed, if this variable were available for multiple years, it would be the

ideal independent variable to use in my analysis. Unfortunately, this widely used variable is available only as a cross-sectional variable.

In addition to providing a score of environmental health, the Green Index also provides each state with a Green Policies score. Both the Green Index and the Green Policies score are examined in this section. I estimate two separate models, with the Green Index and Green Policies variables serving as independent variables in these models, respectively. I consider the effects of each of these variables for two reasons. First, the overall Green Index composite score is the measure used by other researchers who rely on this variable as a policy measure. I follow their example to set my analysis into the context of previous studies. However, since policy is the variable I am most interested in examining, I estimate the model using the Green Policies score. This allows me to determine whether the inclusion of non-policy related environmental measures have a differing affect on state economic performance. This provides a good test for the validity of the policy measures utilized later in the analysis.

The Green Index scoring is such that a higher score represents a state with poorer environmental health. For example, the state of Alabama is ranked last on the Green Index and has an index score of 8,658. The state of Oregon achieves the best environmental health and receives an index score of 4,583. Thus, if those who advocate in favor of less stringent environmental regulation in order to stimulate economic growth are correct, I expect the Green Index and the Green Policies Index to be positively related to the state income variables and negatively related to state unemployment. If those who argue that more stringent environmental policies enhance economic growth, I expect the Green Index and Green Policies Index to be negatively related to the state income

variables and positively related to unemployment. I estimate two models. The first uses the composite Green Index score as the main independent variable of interest, while the second model uses Green Policies score as the main independent variable of interest. The results of these two models are presented for changes in state personal income, changes in state per capita income, and state unemployment rates in Tables 6.1, 6.2, and 6.3, respectively.

Models for Change in Total State Personal Income

Table 6.1 displays the FGLS estimates[1] for the model of change in total state personal income, depicted as a function of the Green Index (Model 1) and Green Policies (Model 2) and the independent variables described in the model in the previous chapters. In Model (1) of Table 6.1, I find that the coefficient for the Green Index is negative and highly significant (b = -0.005, t = -6.03). This finding suggests that a "greener" a state experiences higher growth in overall state total personal income. As states enact more stringent environmental policies and attain "better" environmental conditions, they will experience positive growth in total personal income. While the coefficient for this variable appears to be small, it achieves significance at the stricter .01 level. This significance level lends greater confidence to the indication that a low Green Index score will help states attain growth in total state income.

Several control variables are found to have a significant effect on growth of state total personal income. Indeed, four of the variables achieve significance at the .01 level. As expected, the national economic variables exhibit a strong effect on state total personal income growth, and the relationships are in the expected direction. Change in national per capita GDP (b= 0.565, t = 23.23) is positively related to state total personal

Table 6.1. FGLS estimate for Green Index and Change in Total State Personal Income

	(1)		(2)	
	b	t	b	t
Intercept	0.091	7.13***	0.077	5.80***
Environmental Policy Variable				
The Green Index [1]	-0.005	-6.03***		
Green Policies Index [1]			-0.003	-2.07**
Business Policy Variables				
Financial Assistance [1]	-0.006	-0.03	0.052	0.27
Tax Incentives	-0.007	-2.06**	-0.758 [1]	-2.03**
National Economic Variables				
Change in Per Capita GDP	0.565	23.23***	0.561	22.81***
National Unemployment	-0.003	-7.20***	-0.003	-7.01***
State Fiscal Variables				
State Debt	-0.019	-1.08	-0.009	-0.53
Federal Aid [1]	-0.010	-3.60***	-0.011	-3.97***
Structural/Institutional Variables				
Tax Structure [1]	0.026	2.31**	0.016	1.40
Gubernatorial Power	-0.003	-1.73*	-0.006	-3.01***
Legislative Professionalism	-0.280	-4.59***	-0.024	-3.58***
State Demographic Variables				
Educational Attainment				
High School Degree [1]	0.141	0.86	0.038	0.23
College Degree [1]	-0.370	-1.41	-0.080	-0.29
Manufacturing Employment	0.002	0.08	-0.001	-0.02
Political Culture (Moralistic)	-0.001	-0.77	0.002	1.29
Farms	-0.160	-2.13**	-0.191	-2.47**
South	0.005	1.79*	0.007	2.38**
Urbanization [1]	0.136	1.91*	0.111	1.49
Black [1]	0.107	0.90	-0.119	-0.94
N	1350		1350	
Pseudo R^2	0.2872		0.2745	
Wald chi-square	954.87		888.10	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

income; this suggests that state economies typically move hand-in-hand with the national economy. Moreover, the national unemployment rate (b = -0.003, t = -7.20) is negatively related to growth in state total personal income. Two other independent variables also achieved significance at the .01 level. Federal aid (b = -0.010, t = -3.60) exhibits a negative relationship to total growth in total state personal income. This indicates that the more federal dollars states receive, the lower their growth in total personal income. This is surprising, since the influx of federal funds might be expected to increase state economic performance, with all else being equal. Legislative professionalism also attained the .01 level of significance. However, the results are a bit curious, as a negative relationship emerges (b = -0.281, t = -4.59). This indicates that the more professional a state legislature, the lower the growth in total personal income. Hence, this relationship is not the expected direction. I hypothesize that more professional legislatures have the capacity to adopt and ensure the implementation of policies to stimulate state economic growth. These results do not lend much support to this hypothesis.

Other control variables also exhibit a significant relationship to state total personal income growth, though at lower levels of statistical significance. Variables achieving significance at the standard .05 level are farms per capita, tax structure, state tax incentive policies, and gubernatorial institutional power. As expected, a negative relationship exists between farms per capita and growth in total state personal income (b= -0.160, t = -2.13). The model suggests that the more farms in a state, the lower the growth in state total personal income. The coefficient for the tax structure variable (b = 0.260, t = 2.31) is positive, indicating that the more regressive a state's code, the greater the growth in total personal income. More curious results are the negative coefficients

displayed by the tax incentive variable (b = -0.007, t = -2.06) and the gubernatorial power variable (b = -0.003, t = -1.73), both of which are in the unexpected direction. The results indicate that offering more tax incentives to businesses and having a governor with greater institutional capacity leads to lower state total personal income growth.

Two other variables achieve significance at the more relaxed .10 level of significance. States with higher levels of urbanization experienced greater growth in state total personal income. The southern region variable produced results contrary to expectations. Southern states experienced a positive relationship to state total personal income. This finding could indicate that while many southern states have lagged behind the rest of the nation in overall economic indicators, these states have managed to experience higher levels of growth than other areas. This growth has not yet allowed states in the south to reflect more robust economies because these states have had much more "catching up" to do as compared to the economic performance of other states.

In Model (2) of table 6.1, I find that the Green Policies Index results share some of the same results as the Green Index. In this second model, I find the Green Policies Index (b = -0.003, t = -2.07) is negatively related to state total personal income. Thus, states with better environmental policy scores on the index exhibit *greater* growth in total personal income, indicating higher growth rates for states with more stringent environmental policies. Coefficients for the controls variables in Model (2) are of similar magnitude and significance as in the first model. Only two variables that achieved significance in the first model failed to do so in the second model. The coefficients for the tax structure and urbanization variables are not statistically significant in the second model. All other control variables exhibit similar results to those of Model (1). Further,

those variables that maintained their significance in both models had their coefficients in the same direction in both models – even when theses results were in an unexpected direction.

Models for Change in State Per Capita Income

The models are estimated for the second dependent variable representing state economic growth, change in state per capita income. The results of this estimation are presented in Table 6.2. Model (1) presents results using the Green Index as the main independent variable of interest. The Green Index (b = -0.002, t = -3.21) achieves the more rigorous .01 level of significance in this model. The variable is negatively related to change in state per capita income, indicating that states with greater environmental health over the course of the time period under study achieve higher growth rates in per capita income.

In Table 6.2 Model (1), other independent variables are found to have significant relationships to growth in state per capita income. National economic indicators achieve highly significant relationships (.01 level) to this dependent variable. The coefficients for these variables are in the expected direction. National per capita income growth (b = 0.591, t = 27.30) is positively related to state per capita income growth, and national unemployment (b = -0.003, t =-7.71) is negatively related to state per capita income growth. Clearly the national economy shapes economic performance, at least in most of the American states.

Four variables achieve the standard .05 significance level. The federal aid variable (b = -0.006, t = -2.96) is negatively related to state per capita income. Higher levels of federal aid result in lower levels of growth in state per capita income. The

Table 6.2. FGLS estimate for Green Index and Change in State Per Capita Income

	(1)		(2)	
	b	t	b	t
Intercept	0.059	6.00***	0.052	5.34***
Environmental Policy Variable				
The Green Index [1]	-0.002	-3.21***		
Green Policies Index [1]			-0.011	-0.99
Business Policy Variables				
Financial Assistance [1]	0.026	1.82*	0.292	2.03**
Tax Incentives [1]	-0.133	-0.48	-0.177	-0.63
National Economic Variables				
Change in Per Capita GDP	0.591	27.30***	0.591	27.27***
National Unemployment	-0.003	-7.71***	-0.003	-7.66***
State Fiscal Variables				
State Debt	-0.022	-1.68*	-0.019	-1.46
Federal Aid [1]	-0.006	-2.96**	-0.007	-3.38***
Structural/Institutional Variables				
Tax Structure [1]	0.007	0.91	0.003	0.45
Gubernatorial Power [1]	-0.333	0.26	-0.790	-0.61
Legislative Professionalism	-0.012	-2.50**	-0.009	-1.85*
State Demographic Variables				
Educational Attainment				
High School Degree [1]	0.126	-1.00	-0.151	-1.20
College Degree [1]	-0.162	-0.80	-0.032	-0.16
Manufacturing Employment	0.048	2.37**	0.048	2.19**
Political Culture (Moralistic) [1]	-0.176	-0.17	0.966	0.98
Farms	-0.143	0.25	0.003	0.05
South	0.001	0.54	0.002	0.96
Urbanization [1]	-0.090	-1.74*	-0.106	-2.02**
Black [1]	0.046	0.53	-0.051	-0.58
N	1350		1350	
Pseudo R^2	0.3053		0.3005	
Wald chi-square	1173.83		1165.01	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

proportion of a state's population that is employed in the manufacturing sector (b = 0.048, t = 2.37) is positively related to growth in per capita income, indicating that the more manufacturing employees in a state the higher the per capita income growth rate. States that offer more financial assistance programs (b = 0.026, t = 1.82) for businesses, achieve higher growth in per capita income. The coefficient for legislative professionalism (b = -0.012, t = -2.50) is in an unexpected direction. States that have more professional legislatures experience lower growth in per capita income. The coefficient of the urbanization variable achieves significance at the more relaxed .10 level. Contrary to the result for the dependent variable of change in total state personal income, urbanization (b = -0.090, t = -1.74) is negatively related to growth in state per capita income.

Table 6.2 Model (2) presents the results of the estimation when the Green Policies Index is used as the main independent variable of interest. Green policies do not have a significant effect on growth in state per capita income in this model. Hence, there is insufficient evidence to support the contention that state environmental policies have an impact upon state per capita income growth. The coefficients of the remaining independent variables in Model (2) are of a similar magnitude and significance as are found in the first model. The only variable that is not significant in both models is state debt. The coefficient for this variable loses significance in the second model. When Green Policies is the main independent variable of interest, state debt is not found to be a significant influence upon change in state per capita income. On the other hand, the coefficient for the urbanization variable (b = -0.106, t = -2.02) achieves the standard .05

level of significance in Model (2). Thus, the performance of this variable is stronger in the second model.

Models for State Unemployment Rate

In Table 6.3 I present the FGLS estimates for the two models with state unemployment rate as the dependent variable. Model (1) contains the Green Index as the main independent variable of interest. The Green Index (b = 0.313, t = 2.99) is found to be positively related to state unemployment rates. This finding suggests that states with better environmental health experience lower levels of unemployment over the course of the time period under study than states with weaker environmental conditions.

Other control variables are also significant in Table 7.3 Model (1). Consistent with expectations, national unemployment (b = 0.905, t = 38.61) is positively related to state unemployment. As national unemployment rates increase, state unemployment rates will also increase. State debt (b = 3.286, t = 3.19) also has the expected positive relationship with state unemployment. States with greater proportions of total state income that is absorbed by state debt will experience higher unemployment rates. As expected, the manufacturing sector variable (b = 10.202, t =3.56) has a negative relationship with state unemployment. States with more employees in the manufacturing sector have lower levels of unemployment. Further, as expected, the farms per capita variable (b = -34.809, t = -5.52) is negatively related to state unemployment. State unemployment decreases as the number of farms increase. Once again, the coefficient for legislative professionalism (b = 2.496, t =4.40) confounds expectations and is positively related to unemployment suggesting that states with more professional legislatures have higher unemployment rates.

Table 6.3. FGLS estimate for Green Index and State Unemployment Rate

	(1)		(2)	
	b	t	b	t
Intercept	2.203658	7.13*	3.126921	2.36**
Environmental Policy Variable				
The Green Index [1]	0.313	2.99**		
Green Policies Index [1]			0.047	0.28
Business Policy Variables				
Financial Assistance	0.003	0.19	-0.002	-0.14
Tax Incentives	0.015	0.66	0.008	0.35
National Economic Variables				
Change in Per Capita GDP	-0.614	-0.69	-0.734	-0.83
National Unemployment	0.905	38.61***	0.899	38.36***
State Fiscal Variables				
State Debt	3.286	3.19***	3.408	3.23***
Federal Aid [1]	-0.195	-1.09	-0.203	-1.12
Structural/Institutional Variables				
Tax Structure	-0.001	-1.03	-0.402 [1]	-0.32
Gubernatorial Power	-0.304	-1.32	0.018	0.07
Legislative Professionalism	2.496	4.40***	1.820	2.85***
State Demographic Variables				
Educational Attainment				
High School Degree	-0.022	-1.71*	-0.019	-1.49
College Degree	0.003	0.12	-0.003	-0.12
Manufacturing Employment	-10.202	-3.56***	-12.054	-3.73***
Political Culture (Moralistic)	-0.017	-0.09	-0.300	-1.74*
Farms	-34.809	-5.52***	-28.978	-4.58***
South	-0.353	-1.08	-0.600	-1.70*
Urbanization	-0.162	-2.03**	-0.012	-1.45
Black	0.009	0.66	0.034	2.30**
N	1350		1350	
Pseudo R^2	0.5532		0.5202	
Wald chi-square	2191.18		2158.50	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

Two other demographic variables are important in this model. Urbanization (b = -0.162, t = -2.03) is negatively related to state unemployment, suggesting that state-year cases with higher levels of urbanization experience lower levels of unemployment. High school educational attainment (b = -0.022, t =-1.71) is negatively related to state. The larger the percentage of a state population with a high school degree, the lower the unemployment rate in that state.

In Model (2) in Table 6.3 I present estimates for the model with the Green Policies Index utilized as the main independent variable of interest. The Green Policies variable fails to achieve significance in this model. It appears that environmental policy is not related to state unemployment rates. Other independent variables perform very much as in the first model, achieving similar magnitudes and significance levels. Though, two other variables achieve statistical significance in the second model as well. The coefficient for the black variable (b = 0.034, t = 2.30) has a positive relationship to state unemployment. As the proportion of the state population that is black increases, state unemployment rates increase. This result is significant at the .05 level. Finally, as expected, states with a moralistic political culture (b = -0.300, t = -1.74) experience lower levels of unemployment.

The Green Index is significant to the economic growth measures in all three models. Further, the coefficient for all three sets of results suggests that states which are more environmentally healthy experience greater economic growth. This supports the argument of those who advocate for more stringent environmental policies in order to enhance economic growth. However, when the Green Index is stripped of all non-policy related indicators, the results are less conclusive. The Green Policies Index only achieves

significance in one model (Table 6.1, Model (2)). The results of this model do support the results of the Green Index estimations since the .05 level of significance is achieved. It is interesting, though, that there is no indication that environmental policy has an effect upon change in state per capita income and change in state unemployment. Other results of particular note are that the national economic variables consistently show a strong relationship to the state economic variables. National economic conditions appear to have a great effect upon state economies. Another consistent, and surprising, result is that of the institutional variables. In particular, legislative professionalism continuously exhibits a negative relationship with economic growth. These preliminary models suggest that more professional legislatures do nothing to enhance state economic growth.

Summary

In this section I begin my analysis by exploring the effects of environmental quality and environmental policies on state economic performance. I estimate separate models for change in state personal income, change in state per capita income, and state unemployment rates, with environmental quality the key independent variable in one set of models and environmental policy the key independent variable in a second set of models. Overall, the results suggest that environmental quality has a consistent effect on state economic performance, controlling for the effects of other independent variables. The effect of environmental policy on economic performance is somewhat less consistent across models.

I estimate these models in order to make explicit comparisons with the findings of previous research that uses the Green Index and Green Policies Index to predict state economic performance. However, it is important to note that the empirical results from

these models are somewhat limited, since the Green Index and Green Policies Index are measured for only one year. Hence the coefficients for these two variables indicate the mean state economic performance levels across the time frame under study for different levels of environmental quality and policy, controlling for the effects of other independent variables.

What is necessary is to measure state environmental policy and quality for each state over time. Having such a measure would permit me to estimate directly the effect of these independent variables on state economic performance, with state environmental quality and policy in one year linked explicitly to state economic performance in a given year. Without having such data, the preceding analyses are not definitive but rather are suggestive.

The Levinson Index Model

As explained in Chapter 5, the Levinson Index is used as a measure of environmental stringency. This is a measure of the cost to industry of compliance with pollution abatement regulations for each state-year case during the time period from 1977 to 1994. The industrial composition of the state is factored into the score assigned to each state so that states are not ranked high on the index simply because they are home to larger numbers of polluting industries. This measure is particularly appealing as a measure of environmental stringency because it gets to the core of the theory driving this study. The Levinson Index is a measure of how much compliance with environmental regulations costs industries in each state over time. Thus, the analysis reveals whether states that put a higher price tag on pollution abatement suffer an economic loss as a result of policies that put these regulatory costs into place. The model is estimated

separately for each of the three dependent variables representing state economic performance.

Model of Change in Total State Personal Income

Table 6.4 presents the results of the model using change in total state personal income as the dependent variable, depicted as a function of the Levinson Index. The index coefficient (b = -0.005, t = -1.99) is in the expected negative direction and is significant at the .05 level. Hence, it appears that environmental stringency is negatively and significantly related to change in total personal income. A higher score on the Levinson Index results in a decrease in total state personal income growth. States with regulations that impose the highest costs on businesses to comply with pollution abatement measures exhibit a decline in total personal income growth. This finding supports the position of those who contend that stricter environmental policy will harm the efficiency and performance of states' economies. The finding suggests that when environmental regulatory costs increase, states will see a decline in economic growth.

The business incentives policy variables produce interesting results in this model. Included in this estimation is a variable for pollution control incentives[2] offered by states to businesses. This variable is taken from an annual survey from *Site Selection* magazine. An additive index is created based on nine pollution control incentives. The survey was discontinued in 1994, so this measure is only available from the years 1977 to 1993. The pollution control incentives variable (b = -0.001, t = -2.57) is highly significant, reaching the .01 level of significance. A negative relationship is found between pollution control incentives and total state personal income growth. States that offer more incentives for pollution control measures experience a decrease in total personal income growth. This

Table 6.4. FGLS estimate for Levinson Index and Change in Total State Personal Income

	b	t
Intercept	0.088	5.11***
Environmental Policy Variable		
The Levinson Index	-0.005	-1.99**
Business Policy Variables		
Financial Assistance [1]	-0.066	-0.27
Tax Incentives [1]	-0.236	-0.51
Pollution Control Incentive	-0.001	-2.57***
National Economic Variables		
Change in Per Capita GDP	0.573	21.77***
National Unemployment	-0.002	-3.23***
State Fiscal Variables		
State Debt	-0.034	-1.20
Federal Aid [1]	0.001	1.54
Structural/Institutional Variables		
Tax Structure [1]	-0.044	-0.32
Gubernatorial Power	-0.006	-2.50**
Legislative Professionalism	-0.022	-2.81***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.168	-0.62
College Degree	-0.001	-1.52
Manufacturing Employment	-0.018	-0.44
Political Culture (Moralistic)	0.001	0.60
Farms	-0.459	-4.24***
South	0.011	2.53**
Urbanization [1]	0.222	2.10**
Black [1]	-0.340	-2.27**
N	768	
Pseudo R^2	0.3260	
Wald chi-square	717.64	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

result seems counterintuitive. These pollution control incentives are not required regulations of the states. It is a policy which is dependent upon voluntary compliance. In return for voluntary compliance, the states reward businesses for their good environmental behavior. Even if the argument that environmental policies create costs that harm economic growth is correct, I do not expect a negative relationship between this variable and economic growth. Compliance is voluntary. If businesses choose to accept the costs through voluntary compliance, it seems odd that they would then move out of a state because of those increased costs. Thus, the results for this variable are a bit curious. While the coefficient for the pollution control variable produces surprising results, the other two business policy variables fail to achieve significance in this model. Thus, there is no evidence that financial assistance programs and tax incentives have an impact upon change in total state personal income.

The coefficients for national economic indicators are extremely significant in this and in the expected direction. Growth in the national GDP ($b = 0.573$, $t = 21.77$) is positively related to total state personal income. As national GDP increases, state personal income will also increase. National unemployment rates ($b = -0.002$, $t = -3.23$) are negatively related to total state personal income growth. If national unemployment increases, then growth in total state personal income will decrease. National conditions assert a great deal of influence over total state personal income growth. There is no evidence, though, that state fiscal variables effect change in total state personal income. These variables fail to achieve significance in this model.

Once again, the structural/institutional characteristics are highly significant, with coefficients performing in the opposite directions than expected. The coefficient for the

legislative professionalism variable (b = -0.022, t = -2.81) attains significance at the more rigorous .01 level. This variable is negatively related to total state personal income growth. This suggests that states with more professional legislatures experience declines in total personal income growth. Further, the coefficient for the gubernatorial power variable (b = -0.006, t = -2.50) is significant at the standard .05 level. States that have governors with greater executive powers have decreased growth in total state personal income.

Some of the demographic characteristics of the states influence total personal income growth. The number of farms per capita variable (b = -0.459, t = -4.24) is highly significant and in the expected direction. States with more farms per capita have decreased growth in total personal income. The coefficients for the level of state urbanization (b = 0.222, t = 2.10) and the lagged proportion of the population that is black (b = -0.340, t = -2.27) are significant at the .05 level and perform in the expected direction. The urbanization variable is positively related to total state personal income growth, indicating that greater urbanization leads to greater growth. The black population percentage variable is negatively related to total personal income growth, indicating that as black population increases, total personal income growth decreases. The variable for the southern region (b = 0.011, t = 2.53) also reaches the .05 level of significance, but the coefficient is in an unexpected direction. There is a positive relationship between location in the south and growth in total state personal income. Southern states attain greater growths rates for this dependent variable than do non-southern states.

Model of Change in State Per Capita Income

Estimates of the effects of the independent variables on growth in state per capita income are presented in Table 6.5. The Levinson Index (b = -0.003, t = -1.52) does not have a statistically significant effect upon change in state per capita income. While the coefficient is in the expected negative direction, no conclusions can be drawn about the relationship between these two variables since the coefficient fails to achieve conventional levels of statistical significance.

National economic conditions are highly significant and in the expected direction. Change in per capita GDP (b = 0.604, t = 26.80) has a positive relationship with state per capita income growth. As national GDP increases, state per capita income also increases. National unemployment (b = -0.002, t = -3.71) performs in the expected negative direction. When national unemployment levels increase, states will experience declines in per capita income growth.

The demographic variables produce interesting results in this model. The coefficient for the farms per capita variable (b = -.0134, t = -1.71) reaches the .05 level of significance. As expected the greater the farms per capita in a state, the lower the growth in per capita income. The coefficient for college attainment (b = -0.789, t = -2.39) also achieves significance at the .05 level in this model. However, the coefficient is in an unexpected direction. The proportion of the state population that attains a college degree is negatively related to change in per capita income. Contrary to expectations, this finding indicates that states with more highly educated citizens experience decreases in per capita income growth. Also performing in an unexpected direction is the coefficient for legislative professionalism (b = -.010, t = -1.88). Though the significance reached

Table 6.5. FGLS estimate for Levinson Index and Change in State Per Capita Income

	b	t
Intercept	0.047	3.78***
Environmental Policy Variable		
The Levinson Index	-0.003	-1.52
Business Policy Variables		
Financial Assistance [1]	0.193	1.09
Tax Incentives [1]	0.205	0.61
Pollution Control Incentive [1]	-0.503	-1.47
National Economic Variables		
Change in Per Capita GDP	0.604	26.80***
National Unemployment	-0.002	-3.71***
State Fiscal Variables		
State Debt	-0.020	-1.01
Federal Aid [1]	0.006	1.05
Structural/Institutional Variables		
Tax Structure [1]	-0.004	-0.39
Gubernatorial Power [1]	-0.442	-0.29
Legislative Professionalism	-0.010	-1.88*
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.117	-0.59
College Degree [1]	-0.789	-2.39**
Manufacturing Employment	0.029	1.06
Political Culture (Moralistic) [1]	0.148	0.11
Farms	-0.134	-1.71*
South	0.005	1.72*
Urbanization [1]	-0.017	-0.25
Black [1]	-0.143	-1.41
N	768	
Pseudo R^2	0.3436	
Wald chi-square	969.89	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

is at the more relaxed .10 level, these results indicate that when a state has a more professional legislature, it will have lower growth in per capita income. The southern states coefficient (b = 0.005, t = 1.72) also performs in the opposite direction than expected, but at the more relaxed .10 level of significance. Southern states are more likely to have an increase in per capita income growth.

Model for State Unemployment Rate

In Table 6.6 I present the results of the model with state unemployment utilized as the dependent variable for economic growth. The coefficient for Levinson Index (b = 0.634, t = 4343) is both positive and highly significant in this model, reaching the .01 level. Clearly there is a positive relationship between the Levinson Index and state unemployment. As states score higher on the Levinson Index, state unemployment rates increase. Similar to the findings presented in Table 6.4, these results suggest that environmental regulations can have a negative impact upon state economies. The results of Table 6.6 indicate that when business costs for pollution abatement activities increase in a state, that state will notice an increase in unemployment rates. Thus, increased environmental regulatory stringency imposes costs on a given state economy. This finding lends support to those who argue in favor of the enactment of less stringent environmental policies in order to stimulate economic growth.

Other independent variables exert significant influence upon state unemployment rates. As expected, national unemployment (b = 0.933, t = 31.02) is positively related to state unemployment. When national unemployment rates increase, state unemployment rates also increase. This relationship is significant at the .01 level. Reaching a similar level of significance are the state fiscal variables. As expected, the coefficient for state

Table 6.6. FGLS estimate for Levinson Index and State Unemployment

	b	t
Intercept	2.440	1.50
Environmental Policy Variable		
The Levinson Index	0.634	4.43***
Business Policy Variables		
Financial Assistance [1]	0.128	0.01
Tax Incentives	0.449	0.15
Pollution Control Incentives	0.166	0.42
National Economic Variables		
Change in Per Capita GDP	-0.555	-.049
National Unemployment	0.933	31.02***
State Fiscal Variables		
State Debt	8.890	4.35***
Federal Aid	-0.002	-3.18***
Structural/Institutional Variables		
Tax Structure [1]	-0.847	-0.61
Gubernatorial Power	-0.404	-1.36
Legislative Professionalism	2.254	2.72***
State Demographic Variables		
Educational Attainment		
High School Degree	0.002	0.11
College Degree	0.012	0.31
Manufacturing Employment	-12.628	-3.33***
Political Culture (Moralistic)	-0.147	-0.86
Farms	-22.929	-2.95***
South	-0.879	-1.83*
Urbanization	-0.192	-1.75*
Black	0.497	2.54**
N	768	
Pseudo R^2	0.4334	
Wald chi-square	1361.15	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

debt (b = 8.890, t = 4.35) is positively related to state unemployment, indicating that states that have larger proportions of total state personal income absorbed by debt have greater unemployment rates. Federal aid (b = -0.002, t = -3.18) is negatively related to state unemployment. States that receive a greater per capita amount of federal aid experience lower unemployment rates. Once again, the coefficient for the legislative professionalism variable (b = 2.254, t = 2.72) performs in an unexpected direction. A positive relationship is present indicating that states with more professional legislatures have higher unemployment rates.

State demographic variables also display evidence of significant relationships to state unemployment rates. The coefficients for the manufacturing employment (b = -12.628, t = -3.33) and farms per capita (b = -22.929, t = -2.95) variables are both negative and significant at the .01 level of significance. Hence, both variables exhibit a negative relationship to state unemployment. As expected, states with greater numbers of people employed in the manufacturing sector have lower levels of unemployment. Also as expected, the coefficient for farms per capita is negative. States with higher numbers of farms have lower unemployment rates. Achieving significance at the .05 level, the black population variable (b = 0.497, t = 2.54) is positively related to state unemployment. States with greater proportions of the population that are black have higher unemployment rates. Two other variables achieve significance at the more relaxed .10 level. States in the south (b = -0.879, t = -1.83) and states with more urbanization (b = -0.192, t = -1.75) exhibit a negative relationship to unemployment. The model indicates that southern states have lower unemployment rates. This may indicate that southern states are experiencing “catch-up” growth and as a result have larger

numbers of citizens in their states employed. States that have greater proportions of the population in urban areas also exhibit lower unemployment rates. Thus, cities appear to have greater opportunities for employment than more rural areas.

Summary

Results from the models estimated using the Levinson Index as the measure of environmental policy point to different effects of environmental policy than the results of the Green Index models. In two of the models, the Levinson Index produced results indicating that states that increase the pollution abatement regulatory burden on businesses experience a negative impact on economic growth. States with higher scores on the Levinson Index have systematically decreased total state personal income growth and higher rates of unemployment. These results lend support to the argument of those who hold that the enactment of strict environmental regulations is a detriment state to economic performance. Other findings of note include the strength of the national economic conditions variables. These variables consistently exert a strong effect upon state economic conditions. It appears that state economies are heavily influenced by national conditions. Another variable continues to produce confounding results. State legislative professionalism appears to be a deterrent to state economic growth. While the significance varies in the models, the legislative professionalism variable continues to produce coefficients in the direction opposite to expectations. However, caution is necessary in the interpretation of the results of this variable. The variable is somewhat cross-sectional, only changing at three points in time for the time period I examine. Thus, the observations do not change each year and the results may not be an accurate reflection of the true effect of legislative professionalism. Overall, the Levinson Index

models indicate that state environmental policies that add to the pollution abatement costs of businesses may lead to a decline in the economic performance of the states.

Environmental Spending Models

The careful reader will note that I have estimated the models of state economic performance during a limited time frame. Even though data on state economic growth and unemployment are available until the present, it is perhaps surprising that I am unable to estimate a model of environmental effects for the entire time period for which economic data are available. The Census Bureau discontinued the survey used to create the Levinson Index, so this variable is only available for the years 1977 to 1994. Conclusions based on results that are focused on these years alone should be met with caution. The 1970s was a time of extreme environmental regulation. The federal government and the states became very active regulators for pollution control efforts. Prior to this high regulatory period, business and industry were not mandated to spend large amounts for environmental regulations. Thus, when regulations did change, one can speculate that the initial costs to business and industry were high. Since environmental compliance costs are not inexpensive to business and industry, the effects of these initial costs may have lasted for an extended period.

It is necessary to extend the analysis further than the 17 years covered by the Levinson Index. At the initiation of the environmental regulatory movement, businesses may have let regulations become a large part of their site location decision making calculus. However, once business and industry adjusted to the "start-up" costs of environmental regulation and these costs became routine, the effects of regulatory costs to businesses may have changed. It is quite conceivable that such an adjustment reduced

the importance of environmental regulation to business costs. Thus, focusing on the first years of heavy regulation may produce results that are skewed by the initial shocks felt to business and industry. It is necessary to extend the years of analysis in order to determine if the effects found in the Levinson Index models are constant over time. Since the Levinson Index is only available through 1994, I use two other measures of environmental policy to continue the analysis. Separate models are estimated using state environmental spending and state environmental conditions as measures of state environmental policy. Clearly, the results of this analysis are not directly comparable to those based on the Levinson Index, but they may be suggestive about the effects of environmental stringency beyond the time period for which the Levinson Index is available.

The importance that government places on a policy area can often be determined by the resources it is willing to allocate toward that initiative. Without the proper funds to implement a policy, the goals of a given program are unlikely to be realized. The amount of money that states spend on environmental programs indicates the level of commitment the states have towards addressing environmental issues. States that devote significant budgetary resources toward environmental programs have placed a priority on environmental goals relative to other possible targets of those funds. Thus, state spending on environmental programs is used as a proxy measure of environmental policy stringency. As described in detail in Chapter 4, data on state environmental and natural resource spending are available for the years from 1986 to 2003. I estimate separate models for each of the three dependent variables of economic growth for these years using environmental spending as the main independent variable of interest.

Two models are estimated for each dependent variable. The first model includes all the years for which the spending data are available. The second model includes all of the same independent variables as the first model, but I also include the variable for the index on the state business policy offering pollution control incentives to business. Data on this business policy is collected until 1993, but these data are not available after that date. Given this, the first model includes the years from 1986 to 2003 and the second model includes the years from 1986 to 1993.

Models for Change in Total State Personal Income

In Table 6.7 I present the results for the first model of state economic performance, using state environmental spending as the measure of state environmental policy. Change in total state personal income growth is the dependent variable. For Model (1), the coefficient for state environmental spending ($b = 0.425$, $t = 1.71$) is statistically significant at the .05 level in a one-tailed test. The relationship between environmental spending and change in total personal income growth is positive, indicating that as state environmental spending increases growth in total personal income increases. This model lends limited support to those who argue that strong environmental regulations enhance economic growth, though caution should be used in drawing this conclusion since this represent a very different measure of state environmental stringency.

As expected, national economic variables have a highly significant effect on the dependent variable in this model. The coefficients for both variables attain significance at the .01 level. Change in national per capita GDP ($b = 0.781$, $t = 18.57$) is positively related to change in total state personal income growth, indicating that as national per

Table 6.7. FGLS estimate for State Environmental Spending and Change in Total State Personal Income

	(1)		(2)	
	b	t	b	t
Intercept	0.462	2.67***	-0.007	-0.28
Environmental Policy Variable				
Environmental Spending [1]	0.425	1.71**	0.131	3.16***
Business Policy Variables				
Financial Assistance [1]	0.163	0.68	0.348	1.22
Tax Incentives [1]	-0.498	-1.05	0.081	0.13
Pollution Control Incentive			-0.001	-2.15**
National Economic Variables				
Change in Per Capita GDP	0.781	18.57***	0.872	18.19***
National Unemployment	-0.026	-3.68***	0.002	2.35**
State Fiscal Variables				
State Debt	-0.046	-2.25**	-0.108	-4.03***
Federal Aid [1]	-0.011	-3.83***	-0.002	-0.27
Structural/Institutional Variables				
Tax Structure [1]	0.009	0.68	-0.013	-0.68
Gubernatorial Power	-0.005	-2.22**	-0.005	-1.77*
Legislative Professionalism	-0.018	-2.63***	-0.029	-3.12**
State Demographic Variables				
Educational Attainment				
High School Degree [1]	0.068	0.30	0.443	1.21
College Degree [1]	0.163	0.56	-0.471	-0.90
Manufacturing Employment	0.076	2.10**	0.172	2.96***
Political Culture (Moralistic)	0.003	1.90*	-0.104 [1]	-0.04
Farms	-0.213	-2.30**	-0.598	-4.07***
South	0.007	1.89*	0.011	2.13**
Urbanization [1]	-0.001	-0.01	0.121	0.88
Black [1]	-0.130	-1.0	-0.297	-1.56
N	900		400	
Pseudo R^2	0.2857		0.2377	
Wald chi-square	562.06		490.85	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

capita GDP increases growth in total state personal income also increases. National unemployment (b = -0.026, t = -3.68) has a negative relationship with total state personal income. As national unemployment rises, growth in total state personal income declines. Based on these results, it is clear that most state economies march in lockstep with the national economy.

The state fiscal and institutional/structural variables also exhibit an impact upon total personal income growth, though; the relationships are not always in the expected direction. The coefficient for state debt (b = -0.046, t = -2.25) has a negative relationship with dependent variable; as state debt becomes a larger proportion of total state personal income, the growth in total state income is lower. The coefficient for the federal aid variable (b = -0.011, t = -3.83) attains the .01 level of significance and has a negative relationship to growth in total state personal income. States that receive larger amounts of federal aid have lower growth in total personal income. Contrary to expectations, but consistent with earlier models described in this chapter, state institutional variables are negatively related to total state personal income growth. States with greater gubernatorial power (b = -0.005, t = -2.22) and greater legislative professionalism (b = -0.018, t = -2.63) exhibit lower growth in total state personal income. Though, because of the cross-sectional nature of these last two variables, I am cautious in my interpretation of these results.

Some of the coefficients for state demographic characteristics were also significant. The coefficients for manufacturing employment (b = 0.076, t = 2.10) and farms per capita (b = -0.213, t = -2.30) are both in the expected direction and achieve conventional levels of statistical significance. As state employment in the manufacturing

sector increases, growth in total state personal income increases. The more farms a state has per capita, the lower the growth in total personal income. The coefficients for state political culture and southern location are both statistically significant. The model provides limited evidence that moralistic (b = 0.003, t = 1.90) states and southern states (b = 0.007, t = 1.89) having higher growth in total state personal income.

The results in Table 6.7 Model (2) are quite similar to those from Model (1). There are a few differences worthy of discussion, however. The coefficient for state spending on environmental and natural resources (b = 0.131, t = 3.16) becomes highly significant when the pollution abatement policy index is included in the analysis, though the magnitude of the coefficient is much smaller that in Model (1). Model (2) provides greater confidence of the effect that environmental spending has upon growth in total state per capita income, though the magnitude of the effect is considerably smaller. The results indicate that as state environmental spending increases growth in total state per capita also increases, supporting the contentions of those who argue that stringent environmental policies stimulate economic growth. Here again, one must urge caution because of the differences in measures for state environmental stringency.

The state pollution control incentives index coefficient (b = -0.001, t = -2.15) performs in the opposite direction as expected and is significant at the .05 level. These results indicate that states offering more incentives to business to engage in pollution abatement measures have lower total state personal income growth. The national economic variables remain highly significant reinforcing the results of earlier models. While the coefficient for the state debt variable (b = -0.108, t = -4.03) achieves a greater level of significance in Model (2), the federal aid variable (b = -0.002, t = -.027) loses its

significance in this model. Once again the coefficients of the state institutional variables perform in the opposite direction from expectations, though; both variables lose some of their significance in this model. With the exception of political culture, all other demographic variables that were significant in the first model remain so in the second model.

Models for Change in State Per Capita Income

Table 6.8 presents the estimates for the model using change in state per capita income as the dependent variable. In Model (1) the coefficient for state environmental spending (b = 0.034, t = 1.89) is positive and significant at the more conventional levels. As state environmental spending increases, change in growth in state per capita income increases as well. This model provides support for the argument that strict environmental policies result in improved economic growth.

As is the case for my other models, national economic conditions are strongly related to state economic performance. State per capita income growth increases as national per capita growth (b = 0.761, t = 21.17) increases, while increases in national unemployment rates (b = -0.004, t = -7.30) generate declines in state per capita income growth. Also significant in the model are the coefficients for the state fiscal variables. The coefficients for state debt (b = -0.037, t = -2.51) and federal aid to states (b = -0.008, t = -3.57) both exhibit negative relationships with state per capita income. Growth in state per capita income decreases as both state debt and federal aid increase. The financial assistance index (b = 0.373, t = 2.26) achieves the .05 level of significance and has a positive relationship to state per capita income, as expected. The more financial

Table 6.8 FGLS estimate for State Environmental Spending and Change in State Per Capita Income

	(1)		(2)	
	b	t	b	t
Intercept	0.648	5.38***	0.362	2.22**
Environmental Policy Variable				
Environmental Spending [1]	0.034	1.89*	0.181	2.95***
Business Policy Variables				
Financial Assistance [1]	0.373	2.26**	0.487	2.44**
Tax Incentives [1]	-0.097	-0.30	-0.135	-0.35
Pollution Control Incentive [1]			0.089	0.24
National Economic Variables				
Change in Per Capita GDP	0.761	21.17***	0.832	21.21***
National Unemployment	-0.004	-7.30***	0.057	0.08
State Fiscal Variables				
State Debt	-0.037	-2.51**	-0.068	-3.27***
Federal Aid [1]	-0.008	-3.57***	-0.004	-0.61
Structural/Institutional Variables				
Tax Structure [1]	0.013	1.49	0.023	1.97**
Gubernatorial Power	-0.001	-0.93	-0.002	-1.08
Legislative Professionalism	-0.006	-1.22	-0.195	-3.64***
State Demographic Variables				
Educational Attainment				
High School Degree [1]	-0.374	-2.41**	-0.337	-1.39
College Degree [1]	0.207	1.03	-0.242	-0.72
Manufacturing Employment	0.694	2.77***	0.110	2.91***
Political Culture (Moralistic)	0.003	2.26**	0.003	1.73*
Farms	0.042	0.66	-0.100	-0.96
South [1]	-0.869	-0.38	0.373	0.11
Urbanization [1]	-0.201	-3.16***	-0.129	-1.38
Black [1]	0.006	0.07	0.068	0.55
N	900		400	
Pseudo R^2	0.3274		0.3154	
Wald chi-square	897.77		762.84	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

assistance programs states offer to business, the greater the level of growth in state per capita income.

Four state demographic variables have significant effects on the dependent variable in Model (1). Manufacturing employment (b = 0.694, t = 2.77) and political culture (b = 0.003, t = 2.26) have coefficients that are both significant and in the expected direction. As manufacturing employment increases in a state, growth in state per capita income also increases, while states with a moralistic political culture have higher growth in per capita income. Variables with coefficients performing contrary to expectations are the variables for high school educational attainment (b = -0.374, t = -2.41) and level of urbanization (b = -0.201, t = -3.16). These results suggest that as more citizens of a state receive a high school degree, state per capita income growth decreases. This finding is troublesome. Conventional wisdom holds that states with better educated citizenries have better economies. This result suggests just the opposite. The urbanization variable also produces unexpected results, suggesting that states with higher levels of urbanization have lower levels of economic growth.

Table 6.8 Model (2) provides the results of the analysis with the inclusion of the pollution control incentives index variable. In this second model, the coefficient for the environmental spending variable (b = 0.181, t = 2.95) is both positive and significant. The results indicate that as state environmental spending increases, growth in state per capita income increases. This finding supports the contention that states with more stringent environmental policies experience greater economic growth. It should be noted that the magnitude and statistical significance of the state environmental spending coefficient is greater in Model (2) than in Model (1).

Similarities in the two models are that the coefficients of the variables for financial assistance programs (b = 0.487, t = 2.44), change in national GDP (b = 0.832, t = 21.21), state debt (b = -0.068, t = -3.27) and manufacturing employment (b = 0.110, t = 2.91) all retain their direction and significance in Model (2). The coefficient for the political culture variable (b = 0.003, t = 1.73) is again positive and statistically significant. Differences in Model (2) include the lack of significance of variables that are found to have an effect upon state per capita income growth in the first model. National unemployment, federal aid, high school attainment, and urbanization all lose significance in Model (2). The coefficients of two structural/institutional variables reach significance in the second model, though. Tax structure (b = 0.023, t = 1.97) has a positive effect on state per capita income growth. This finding indicates that states with more regressive tax policies have higher growth in per capita income. Legislative professionalism (b = -0.195, t = -3.64) achieves significance at the .01 level and, as in earlier models, has a coefficient in the opposite direction as expected. This suggests that states with more professional legislatures exhibit lower levels of growth in state per capita income. Though, once again, as this variable is cross-sectional in nature, caution is used in the interpretation of this result.

Models for State Unemployment Rates

The relationship between state unemployment rates and the independent variables is explored in Table 6.9. Model (1) does not show a significant relationship between state environmental spending and state unemployment. There is no evidence in this model that environmental spending has an effect on state unemployment. National

Table 6.9. FGLS estimate for State Environmental Spending and State Unemployment

	(1)		(2)	
	b	t	b	t
Intercept	7.826	6.96***	10.334	6.45***
Environmental Policy Variable				
Environmental Spending	-0.700 [1]	-0.52	-0.005	-2.36**
Business Policy Variables				
Financial Assistance	0.007	0.55	0.006	0.37
Tax Incentives	-0.095	-1.49	-0.123	-3.36***
Pollution Control Incentive			0.223	4.90***
National Economic Variables				
Change in Per Capita GDP	-1.548	-1.15	-1.820	-0.94
National Unemployment	0.781	27.57***	0.800	17.50***
State Fiscal Variables				
State Debt	3.238	2.87***	3.748	2.69***
Federal Aid [1]	0.131	0.91	-0.330	-0.71
Structural/Institutional Variables				
Tax Structure	0.001	1.19	0.005	2.83***
Gubernatorial Power	0.263	1.47	-0.066	-0.25
Legislative Professionalism	1.943	3.53***	3.125	3.75***
State Demographic Variables				
Educational Attainment				
High School Degree	-0.678	-5.31***	-0.094	-4.17***
College Degree	-0.004	-0.25	0.047	1.31
Manufacturing Employment	-18.496	-7.19***	-30.598	-7.10***
Political Culture (Moralistic)	-0.205	-1.65*	-0.129	-0.69
Farms	-23.827	-3.97***	-15.536	-1.77**
South	-0.233	-0.90	-0.648	-1.40
Urbanization	-0.018	-2.53**	-0.026	-2.25**
Black	0.016	1.41	0.013	0.68
N	900		400	
Psuedo R^2	0.4978		0.3515	
Wald chi-square	1484.78		600.71	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

unemployment (b = 0.781, t = 27.57) rates have a highly significant relationship to state unemployment; state unemployment rates increase (decrease) as national unemployment rates increase (decrease). The coefficient for state debt (b = 3.238, t = 2.87) also exhibits a strong positive relationship with state unemployment rates. This indicates that increases in state debt result in increases in state unemployment rates; conversely, lower rates of state debt are associated with lower state unemployment rates. The coefficient for legislative professionalism (b = 1.943, t = 3.53) is highly significant, but in the unexpected direction. This suggests that states with more professional legislatures have higher unemployment rates; though the cross-sectional nature of this variable may have an impact on this result.

State demographic variables also have a noticeable effect upon state unemployment rates. At least three demographic variables have coefficients that are both in the expected direction and statistically significant; high school educational attainment (b = -0.678, t = -5.31), manufacturing employment (b = -18.496, t = -7.19), and farms per capita (b = -23.828, t = -3.97). These results suggest that states with larger proportions of their citizens attaining high school degrees have lower unemployment rates. States with greater numbers of citizens employed in the manufacturing sector have lower unemployment rates. Further, states with greater numbers of farms per capita also exhibit lower unemployment rates. The coefficient for the urbanization variable (b = -0.018, t = -2.53) is both negative and significant at conventional levels. This suggests that higher levels of urbanization are associated with lower levels of unemployment. The final variable with a significant coefficient is for political culture, (b = -23.827, t = -1.65), though, the level of significance is marginal at the .05 level in a one-tailed test. Thus

there is some support for the finding that states with moralistic political cultures have lower unemployment rates.

I also estimate a revised version of this model to include pollution control incentive as an independent variable. The results are presented in Table 6.9 Model (2). The coefficient for state environmental spending (b = -0.005, t = -2.36) does exhibit a significant effect on state unemployment in this model. The relationship reaches the standard .05 level of significance and the coefficient is negative. This coefficient indicates that as states spend more on environmental and natural resources programs, unemployment rates will decrease. Thus, the model provides support to those who contend that more stringent environmental regulation stimulates economic growth.

Other results of note in Model (2) include the highly significant relationship of two of the business policy variables. The coefficient for tax incentive policies variable (b= -0.123, t = -3.36) displays a negative relationship to state unemployment. As expected, the more tax incentives that states offer to businesses, the lower the state unemployment rate. However, the coefficient for pollution control policies variable (b = 0.223, t = 4.90) has a positive effect on state unemployment. States that offer more incentives to business to engage in pollution control display higher levels of unemployment.

There are other differences evident in Model (2). The coefficient for the tax structure variable (b = 0.005, t = 2.83) becomes highly significant in the second model. The results indicate that states with more regressive tax structures have higher levels of unemployment. The coefficient for the farm variable (b = -15.536, t = -1.77) is approximately one-third smaller in magnitude and the level of statistical significance for

farms per capita is weaker. The political culture variable appears to have no effect on state unemployment in Model (2).

Summary

The results of the models using state environmental spending as a measure of environmental policy stringency provide mixed results. The strength of the relationship between spending and economic growth is enhanced in the models which take into account pollution control incentive policies. However, the models estimated that include this variable (Model (2) in Tables 6.7, 6.8, 6.9) capture a shorter time period than the models that exclude this variable. Thus, these models may not be capturing all of the variability in the measures needed to fully understand their relationship with state economic growth. When the models are estimated using the longer time period (Model (1) in Tables 6.7, 6.8, 6.9), state environmental spending exhibits only a weak relationship to growth in total state personal income and growth in state per capita income. The relationship is significant at the more relaxed .10 level in these models. No statistically significant relationship is detected between state environmental spending and state unemployment (Table 6.9 Model (1)). Thus, the models do not provide conclusive evidence of the relationship between state environmental spending and state economic growth. When meaningful significance is detected in this relationship, it comes as a result of using fewer observations. Consequently, these models may be missing important elements in the analysis.

State Environmental Conditions Models

States that enact more stringent environmental regulations are pursuing policy goals indicative of the desire for healthier environmental conditions. These states enact

regulations to control in a more effective manner the pollution levels within their jurisdictions. A result of these more stringent regulations should be an improvement in environmental conditions.

It is important to consider the possibility that state environmental conditions have an effect on state economic performance. Stringent environmental policies may help to lure some individuals and industries to a given state, but I suspect that it is a pristine environment that has a greater capacity of drawing individuals and industries. In order to estimate the effect of environmental conditions on state economic performance, I use the data reported annually in the Toxic Release Inventory (TRI) as a measure of environmental policy. TRI data on industrial chemical air emissions and water releases are often used as a measure of state environmental conditions. These measures provide an indication of the environmental hazard present in each state. TRI data are collected for the years of 1988 to 2003.

Models for Change in Total State Personal Income

Table 6.10 presents the results of the model estimated for environmental conditions and total state personal income growth. The model provides no evidence that state environmental conditions effect total state personal income growth. Neither the variable for chemical air emissions nor the variable for water emissions produces a statistically significant coefficient. These results hold constant in both Model (1) and (2). The inclusion of pollution control incentive policies does not change the relationship between environmental conditions and growth in total state personal income. Thus, no conclusions can be drawn about the relationship between environmental conditions and state economic growth from the results of this model estimation. It appears that this

Table 6.10. FGLS estimate for State Environmental Conditions and Change in Total State Personal Income

	(1)		(2)	
	b	t	b	t
Intercept	0.061	3.79***	0.029	1.33
Environmental Policy Variable				
Air Emissions [1]	-0.005	-1.27	-0.006	-1.44
Water Emissions [1]	-0.052	-0.55	0.006	0.70
Business Policy Variables				
Financial Assistance [2]	0.172	0.75	0.279	1.02
Tax Incentives	-0.001	-2.64***	-0.001	-2.12**
Pollution Control Incentive [2]			-0.826	-1.59
National Economic Variables				
Change in Per Capita GDP	0.784	18.63***	.829	20.69***
National Unemployment	-0.003	-3.85***	.006	5.40***
State Fiscal Variables				
State Debt	-0.022	-1.26	-0.017	-1.01
Federal Aid [2]	-0.011	-4.81***	-0.012	-1.91
Structural/Institutional Variables				
Tax Structure [2]	0.017	1.36	0.026	1.45
Gubernatorial Power	-0.004	-1.83*	-0.002	-0.63
Legislative Professionalism	-0.012	-1.97**	-0.018	-2.48**
State Demographic Variables				
Educational Attainment				
High School Degree [2]	-0.020	-0.10	-0.248	-0.70
College Degree [2]	0.025	0.10	-0.386	-1.00
Manufacturing Employment	0.018	0.53	0.082	1.53
Political Culture (Moralistic)	0.004	2.40**	0.006	2.42**
Farms	-0.137	-1.64	-0.472	-3.61***
South	0.006	1.95*	0.006	1.59
Urbanization [2]	-0.002	-0.47	-0.009	-1.64
Black [2]	-0.040	3.79	-0.024	-0.15
N	798		300	
Psuedo R^2	0.3265		0.3356	
Wald chi-square	604.94		670.42	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 100,000,000 to facilitate interpretation
[2] Coefficient has been multiplied by 1,000 to facilitate interpretation

dimension of state economic growth is unaffected by state environmental conditions.

State business policies, national economic conditions and state fiscal variables display statistically significant effects on state economic growth in Table 6.10. Tax incentives offered to businesses (b = -0.001, t = -2.645) do have a highly significant relationship to growth in total state personal income. Contrary to expectations, states that offer more tax incentives to businesses experience a decline in total state personal income growth. The effect is evident in both models. National economic conditions are found to have strong effects upon growth in total state personal income. Model (1) indicates that as national per capita GDP growth (b = 0.784, t = 18.63) increases, state growth in total personal income increases. National unemployment (b = -0.003, t = -3.85) has a negative effect upon the dependent variable. When national unemployment rates increase, growth in total state personal income decreases. The strong effects of the national economic variables are constant in both Model (1) and Model (2). The coefficient for the federal aid receipts variable (b = -0.011, t = -4.81) also exerts a highly significant negative effect upon growth in total state personal income in the first model estimated. States that receive more federal aid per capita experience lower growth. However, this effect is not evident in Model (2).

Defying expectations, the state institutional variables are negatively related to growth in total state personal income. In both models, states that have more professional legislatures experience lower growth in total state personal income. Gubernatorial power (b = -0.004, t = -1.83) exerts a weak effect on the dependent variable in the first model, but this effect is not evident in the Model (2). Though, once again it should be noted that

these variables are cross-sectional measures and this may have an impact on these counterintuitive results.

State demographic variables display some differences in the two models estimated in Table 6.10. The effect of political culture is significant at conventional levels and the relationship is positive in both models. States with a more moralistic political culture have greater growth in total state personal income. In Model (1), the coefficient for the southern regional variable (b = 0.006, t = 1.95) is significant at the .10 level. Thus, there is limited support for the view that southern states have higher levels of growth in total state personal income, though this finding is not reproduced in the second model. While not significant in Model (1), the coefficient for the variable for farms per capita is highly significant in Model (2). The second model indicates that states with more farms per capita (b = -0.472, t = -3.61) have lower growth in total state personal income.

Models for Change in State Per Capita Income

The results for the model estimation of economic conditions and growth in state per capita income are presented in Table 6.11. The findings are very similar to those of the total state personal income model. No statistically significant relationship is found between state environmental conditions and state per capita income growth. This result is consistent in both models. Thus, there is not support for the contention that state environmental conditions have any effect upon state per capita income growth.

State business policy variables and national economic variables display significant relationships with change in state per capita income in both model estimations in Table 6.11. Financial assistance policies exert highly significant positive effects upon state per capita income growth. States that offer more financial assistance to business

and industry experience higher growth in state per capita income. Tax incentive policies display a negative relationship with per capita income growth. States that offer more tax incentives to business and industry have lower growth in state per capita income. Though, the significance of this particular relationship is weak in Model (1), reaching significance at the .10 level. Moreover, the coefficient for change in national per capita GDP is highly significant and positive in both models. These results indicate that as national per capita GDP increases, growth in state per capita increases. National unemployment exerts a highly significant negative effect in Model (1). This suggests that increases in the national unemployment rate result in decreases in state per capita income growth. The relationship is not significant in Model (2), however.

Other variables produce notable effects as well. In Model (1), the coefficient for the variable for federal aid (b = -0.004, t = -2.62) has a highly significant negative effect upon growth in state per capita income. States with greater amounts of federal aid have lower levels of growth in per capita income. The high school educational attainment variable produces unexpected results in both models. The results indicate that the more citizens in a state with high school degrees, the lower state per capita income growth. Manufacturing employment (b = 0.052, t = 1.99) reaches the .05 significance level in Model (1), suggesting that states with more employees in the manufacturing sector experience greater growth in per capita income. This result is not duplicated in Model (2). Political culture displays weak significance in Model (1) and strong significance in Model (2). Both sets of findings indicate that states with a moralistic political culture have higher growth in per capita income. Model (1) presents an unexpected positive significant relationship between farms per capita (b = 0.1485631, t = 2.37) and growth in

Table 6.11. FGLS estimate for State Environmental Conditions and Change in State Per Capita Income

	(1)		(2)	
	b	t	b	t
Intercept	0.058	4.77***	0.045	2.90***
Environmental Policy Variable				
Air Emissions [1]	0.100	0.33	-0.008	-0.29
Water Emissions [1]	0.060	-0.80	-0.051	-0.90
Business Policy Variables				
Financial Assistance [2]	0.510	3.01***	0.722	3.56***
Tax Incentives	-0.580 [2]	-1.68*	-0.001	-2.29**
Pollution Control Incentive [2]			-0.416	-1.20
National Economic Variables				
Change in Per Capita GDP	0.759	20.45***	0.820	23.58***
National Unemployment	-0.004	-8.09***	0.001	1.34
State Fiscal Variables				
State Debt	0.007	0.62	0.017	1.26
Federal Aid [2]	-0.004	-2.62***	0.0007	0.15
Structural/Institutional Variables				
Tax Structure [2]	0.003	0.34	0.017	1.39
Gubernatorial Power [2]	-0.130	-0.09	0.699	0.37
Legislative Professionalism	-0.005	-1.03	-0.011	-1.60
State Demographic Variables				
Educational Attainment				
High School Degree [2]	-0.396	-2.48**	-0.694	-2.80***
College Degree [2]	0.016	0.08	-0.302	-1.04
Manufacturing Employment	0.052	1.99**	0.060	1.56
Political Culture (Moralistic)	0.002	1.93*	0.004	2.41**
Farms	0.149	2.37**	0.072	0.71
South	0.001	0.57	-0.001	-0.36
Urbanization [2]	0.0009	0.26	0.005	-0.30
Black [2]	-0.014	-0.16	0.223	1.78*
N	798		300	
Pseudo R^2	0.3510		0.3745	
Wald chi-square	859.45		819.30	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 100,000,000 to facilitate interpretation
[2] Coefficient has been multiplied by 1,000 to facilitate interpretation

per capita income. States with more farms per capita have higher per capita income growth. This relationship is not present in Model (2). Finally, Model (2) offers weak evidence that the greater proportion of a state's population that is black (b = 0.223, t= 1.78), the greater the growth in state per capita income. Though, this result is significant at the relaxed .10 level, is not evident in Model (1), and has a coefficient in the different direction in Model (1).

Models of State Unemployment Rates

The final model using environmental conditions as a measure of environmental policy is estimated in Table 6.12. State unemployment rate is the dependent variable in this model. As one can see, this model estimates suggest the only significant relationship between environmental conditions and economic growth. In both models of Table 6.12 the air emissions variable is positive and highly significant (.01 level), indicating that there is a positive relationship between air emissions and state unemployment. These results suggest that states with higher industrial air emissions experience higher levels of unemployment; conversely, unemployment is lowest in those state-year cases with lower levels of air emissions. This lends support to the contention that more stringent state environmental policy—which, presumably, leads to higher levels of environmental quality—results in stronger economic performance in terms of state unemployment.

State business policies produce different results in the two models. No significant relationship between business policies and state unemployment is evident in the first model. On the other hand, there is a strong negative relationship between tax incentives and state unemployment, coupled with a highly positive relationship with the pollution control incentives variable in Model (2). Thus, states that offer more business tax

Table 6.12. FGLS estimate for State Environmental Conditions and State Unemployment

	(1)		(2)	
	b	t	b	t
Intercept	6.005	6.41***	8.506	5.94***
Environmental Policy Variable				
Air Emissions [1]	0.007	3.30***	0.007	3.41***
Water Emissions [1]	0.044	0.95	0.016	0.23
Business Policy Variables				
Financial Assistance [2]	0.421	0.04	-0.010	-0.68
Tax Incentives	-0.009	-0.34	-0.080	-2.12**
Pollution Control Incentive			0.162	3.89***
National Economic Variables				
Change in Per Capita GDP	-1.494	-1.11	-3.621	-1.90*
National Unemployment	0.735	25.38***	0.773	13.80***
State Fiscal Variables				
State Debt	4.668	4.28***	3.174	2.89***
Federal Aid [2]	0.004	2.52**	0.038	0.09
Structural/Institutional Variables				
Tax Structure	0.021 [2]	0.02	0.003	1.83*
Gubernatorial Power	0.071	0.49	-0.498	-2.16**
Legislative Professionalism	1.241	2.66***	1.100	2.90***
State Demographic Variables				
Educational Attainment				
High School Degree	-0.045	-3.63***	-0.063	-2.80***
College Degree	-0.035	-2.19**	-0.004	-0.11
Manufacturing Employment	-17.303	-8.06***	-27.728	-7.10***
Political Culture (Moralistic)	-0.262	-2.62***	-0.172	-1.01
Farms	-21.282	-3.55***	0.515	0.05
South	-0.397	-1.68*	-0.766	-1.98**
Urbanization [2]	-0.810	-2.16**	-0.120	-0.18
Black	0.014	1.53	0.008	0.56
N	798		300	
Pseudo R^2	0.5286		0.3582	
Wald chi-square	1173.94		410.15	
Prob chi-square	0.0000		0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000,000 to facilitate interpretation
[2] Coefficient has been multiplied by 1,000 to facilitate interpretation

incentives (b = -0.080, t = -2.12) experience a decline in unemployment rates, while states that offer more pollution control incentives (b = 0.162, t = 3.89) to businesses experience an increase in unemployment rates.

National and state fiscal conditions also influence state unemployment rates. In both models I find that national unemployment rates have a highly significant positive effect upon state unemployment rates. These results indicate that when national unemployment rates increase, state unemployment rates also increase. This finding is consistent with all other models estimated in this chapter. Moreover, state debt produces a highly significant positive effect in both models. States that have higher levels of state debt as a proportion of total personal income have higher unemployment rates. The coefficient for federal aid (b = 0.004, t = 2.52) is significant at the .05 level in Model (1). This model indicates that the more federal aid a state receives the greater the state unemployment rate. This significant result is not duplicated in Model (2).

State structural/institutional variables produce mixed results. Legislative professionalism has a consistent, highly significant and positive effect in both models. This finding suggests that the more professional the state legislature, the higher the state unemployment rate. The gubernatorial power variable produces particularly confusing results. Although not statistically significant in Model (1), the coefficient for the variable is in the positive direction. However, in Model (2) the coefficient for gubernatorial power (b = -0.498, t = -2.16) is in the expected direction and achieves significance at conventional levels. This indicates that states that have governors with greater institutional powers have lower state unemployment rates. Though, the results for both of these institutional variables must be interpreted with caution since they are cross-

sectional measures. State tax structure (b = 0.003, t = 1.83) achieves a lower level of significance in Model (2) providing some support that states with more regressive tax structures have state lower unemployment.

The state demographic variables also produce mixed results across both models. The coefficients for state high school educational attainment, manufacturing employment, and location in the south are all negative and statistically significant in both models. The results suggest that the higher the high school educational attainment level of a state the lower the unemployment rate. States with higher numbers of workers employed in the manufacturing sector have lower unemployment rates. Southern states exhibit significantly lower unemployment rates in both models. None of the other demographic variables display a significant effect in Model (2). In Model (1) the coefficients for college educational attainment, political culture, farms per capita, and urbanization are statistically significant. As expected, states that have citizens with higher levels of college attainment (b = -0.035, t = -2.19) have lower levels of unemployment. States with a moralistic political culture (b = -0.262, t = -2.62) are more likely to have lower unemployment. As expected, states with more farms per capita (b = -21.28182, t = -3.55) exhibit lower unemployment rates. The findings of Model (1) also suggest that higher level of urbanization in a state (b = -0.810, t = -2.16) leads to lower unemployment levels.

Summary

The results of the model estimations using state environmental conditions as a measure of state environmental policy do not provide strong evidence that environmental policy has any effect upon economic growth. State environmental conditions have a

statistically significant relationship with only one of the dependent variables. Table 6.12 shows that state industrial air emissions exhibit a positive relationship with state unemployment rates. However, the second environmental policy measure in this model (water emissions) does not have a statistically significant effect on state unemployment. Even within this model there is not strong evidence of a relationship between state environmental conditions and state economic growth. Thus, the model estimated using environmental conditions as a measure of state environmental policy does not provide evidence that state economic growth is affected by state environmental policy.

Levinson Index and State Environmental Spending Models

The preceding estimations provide conflicting results regarding the effect that environmental regulatory policies have on state economic performance. The impact of these policies is dependent upon which measurement tool is used to represent environmental policy. Estimations utilizing the Levinson Index as a measure of environmental policy provide support for the contention that strict environmental policies have a negative impact on state economic performance. Conversely, estimations that utilize environmental spending as a measure of environmental policy provide support for the contention that strict environmental regulations have a positive impact on state economic performance.

Limitations in the availability of data for both measures make estimations over the entire period of enhanced environmental regulation impossible. However, there is a small range of years for which data for both the Levinson Index and state environmental spending are available. Models are estimated for each of the state economic performance dependent variables for these years. These models "tease out" the effects that each of the

environmental policies measures have on state economic performance. By including both measures of environmental policy, the estimation provides a more complete understanding of the effect these variables have on the state economic variables.

Data are available for both The Levinson Index and the state environmental spending measures for the time period from 1986 to 1994. The model estimations for each of the dependent variables are presented in Tables 6.13, 6.14, and 6.15. For the sake of brevity, I focus the discussion in this section on the two main independent variables of interest—the Levinson Index and state environmental spending. The remaining control variables are discussed in detail in the preceding sections and are not reviewed again in this stage of the analysis[3].

In Table 6.13 I present the results of estimation of the effects of the Levinson Index and state environmental spending on change in total personal income. The coefficient for environmental spending ($b = 0.184$, $t = 2.91$) is positive and highly significant. The result indicates that states that spend more on environmental and natural resource programs have higher growth in total state personal income. This is consistent with the earlier model that did not include the Levinson Index (Table 6.7). In contrast, the coefficient for the Levinson Index is not statistically significant in this model. This result is different from the earlier model that did not include state environmental spending (Table 6.4). In the original model without state spending, the Levinson Index exhibited a negative relationship to change in total state personal income. While this negative relationship is still evident, the lack of statistical significance in Table 6.13 means that I cannot conclude that the Levinson Index has a negative effect on change in

Table 6.13. FGLS estimate for Levinson Index & State Environmental Spending and Change in Total State Personal Income, Years 1986 - 1994

	b	t
Intercept	0.010	6.71***
Environmental Policy Variable		
Levinson Index	-0.002	-0.65
Environmental Spending [1]	0.184	2.91***
Business Policy Variables		
Financial Assistance [1]	0.264	0.97
Tax Incentives [1]	-0.848	-1.47
National Economic Variables		
Change in Per Capita GDP	0.835	18.04***
National Unemployment	0.002	2.38**
State Fiscal Variables		
State Debt	-0.85	-2.60***
Federal Aid [1]	-0.011	-1.52
Structural/Institutional Variables		
Tax Structure [1]	0.007	0.40
Gubernatorial Power	-0.005	-2.00***
Legislative Professionalism	-0.226	-2.75***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	0.718	2.11***
College Degree [1]	-0.862	-1.80*
Manufacturing Employment	0.084	1.79***
Political Culture (Moralistic)	0.004	1.57
Farms	-0.484	-3.60***
South	0.009	1.76*
Urbanization [2]	-0.002	-0.30
Black	0.046	0.25
N	384	
Pseudo R^2	0.2867	
Wald chi-square	458.74	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

total state personal income. The results of this estimation provide support for those who contend that strict environmental policies stimulate state economic growth

A similar finding is evident in Table 6.14. Once again the coefficient for the environmental spending variable (b = 0.120, t = 2.55) is positive and highly significant. Thus, it appears that states that spend more on environmental and natural resource programs experience higher growth in state per capita income. This result is consistent with the results of Table 6.8, which present the estimation of the effect of environmental spending on change in per capita income, excluding the Levinson Index. The coefficient for the Levinson Index in Table 6.14 has similar results to the earlier model estimating the effect of the Levinson Index on state per capita income growth, excluding the state spending variable (Table 6.5). Neither model produces a statistically significant relationship between the Levinson Index and change in state per capita income. Thus, the Levinson Index does not have an affect upon change in state per capita income. These results also lend support to the proponents of stricter state environmental regulations who argue that environmental stringency will enhance economic performance.

The estimation for the effects of the Levinson Index and state environmental spending on state unemployment rates is presented in Table 6.15. Immediately evident is the strong, positive relationship between the Levinson Index (b = 0.443, t = 3.02) and state unemployment rates. States that have higher scores on the Levinson Index—states that impose higher pollution abatement costs on industries—have higher unemployment rates. This finding, including the magnitude of the effect, is similar to that of the original Levinson Index-state unemployment estimation in Table 6.6 that did not include the

Table 6.14. FGLS estimate for Levinson Index & State Environmental Spending and Change in State Per Capita Income, Years 1986 - 1994

	b	t
Intercept	0.018	1.14
Environmental Policy Variable		
Levinson Index [1]	0.624	0.26
Environmental Spending [1]	0.120	2.55***
Business Policy Variables		
Financial Assistance [1]	0.568	3.09***
Tax Incentives [1]	-0.734	-2.00***
National Economic Variables		
Change in Per Capita GDP	0.788	21.68***
National Unemployment [1]	0.422	0.60
State Fiscal Variables		
State Debt	-0.022	-1.02
Federal Aid [1]	-0.006	-1.11
Structural/Institutional Variables		
Tax Structure [1]	0.019	1.84*
Gubernatorial Power [1]	0.377	0.22
Legislative Professionalism	-0.018	-3.61***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.280	-1.26
College Degree [1]	-0.507	-1.69
Manufacturing Employment	0.133	4.84***
Political Culture (Moralistic)	0.003	1.77**
Farms [1]	0.592	0.01
South	0.001	0.36
Urbanization [1]	0.0001	0.03
Black [1]	0.150	1.33
N	384	
Pseudo R^2	0.3281	
Wald chi-square	721.06	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

variable for state environmental spending. On the other hand the environmental spending variable produces somewhat mixed results in the different models. The coefficient for the environmental spending variable (b = -0.060, t = -1.75) in Table 6.15 has a negative relationship to state unemployment rates. Since I expected a positive relationship between these variables, a two-tailed test is applied and the significance of the relationship is at the more relaxed .10 level. Thus, limited support for an effect of state environmental spending on state unemployment rates is found. Once again, a model produces somewhat mixed results. The strong positive relationship between the Levinson Index and state unemployment rates supports the contention that more stringent environmental policies are a detriment to state economic performance. However, the negative relationship between state environmental spending and state unemployment lends support to those who hold the position that more stringent state environmental policies stimulate state economic performance. Though, since the state spending variable is significant at the more relaxed .10 level, the evidence supporting this relationship is weaker than that of the Levinson Index.

Overall, the models that include the Levinson Index and state environmental spending in the calculus appear to indicate that the two variables have differing effects on different aspects of state economic performance. The state environmental spending variable consistently exerts a positive effect on the state income growth variables. In all the estimations I consider in this analysis, greater state spending on state environmental and natural resource programs is associated with greater growth in total state personal income and state per capita income. The Levinson Index has a similar consistently

Table 6.15. FGLS estimate for Levinson Index & State Environmental Spending and Unemployment, Years 1986 - 1994

	b	t
Intercept	8.266	5.56***
Environmental Policy Variable		
Levinson Index	0.443	3.02***
Environmental Spending	-0.006	-1.75*
Business Policy Variables		
Financial Assistance	0.010	0.63
Tax Incentives	-0.057	-1.52
National Economic Variables		
Change in Per Capita GDP	-3.523	-1.55
National Unemployment	0.744	15.95***
State Fiscal Variables		
State Debt	8.981	3.87***
Federal Aid [1]	0.280	0.58
Structural/Institutional Variables		
Tax Structure	0.003	2.11***
Gubernatorial Power	-0.109	-0.52
Legislative Professionalism	2.456	3.53***
State Demographic Variables		
Educational Attainment		
High School Degree	-0.079	-3.64***
College Degree	-0.024	-0.72
Manufacturing Employment	-18.22	-6.19***
Political Culture (Moralistic)	-0.027	-0.18
Farms	-17.861	-2.24***
South	-0.337	-0.91
Urbanization	-0.002	-1.98***
Black	8.266	5.56***
N	384	
Pseudo R^2	0.4042	
Wald chi-square	581.86	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

significant effect upon state unemployment rates. In all of the models estimated, the Levinson Index exerts a strong positive effect on state unemployment. States that score higher on the Levinson Index have higher unemployment rates. Thus, higher pollution abatement costs for business and industry is associated with higher levels of state unemployment. While state environmental spending sometimes exerts an effect on state unemployment and while the Levinson Index sometimes exerts an effect on the state income growth variables, these results are not consistent in all the models estimated.

Thus, the evidence seems to support both sides of the environment vs. economy debate, depending upon which economic indicator is used. When examining the effects of environmental policy on change in state income measures, I find that greater state spending on environmental and natural resource programs is associated with greater growth in total state personal income and greater growth in state per capita income. However, when I focus on the effect that environmental policy has on state unemployment rates, I find that states that impose greater pollution abatement costs on business and industry have higher levels of unemployment. Though, I am cautious in making such generalizations since the time period that allows me to study the effects of both variables at the same points in time is somewhat limited. Data are only available for these estimations for eight years.

Conclusion

The results of the models examining the relationship between state environmental policy and state economic growth provide mixed results. My inferences about the effects of state environmental policy depend upon the measurement tool used to represent this independent variable. First, many previous studies have used the Green Index as a

measure of state environmental conditions and Green Policies as a measure of state environmental policy, so I begin by estimating my models of state economic performance with these two variables as independent variables. When the Green Index and Green Policies are used to measure environmental policy, the evidence supports the contention that more stringent state environmental regulations *enhance* state economic growth. This would seem to fit with the contention of many observers that state economies benefit from policies that result in a pristine environment. Unfortunately, the Green Index and Green Policies scale are cross-sectional variables that do not show change in policy over the time period examined. Hence the appropriate interpretation of the coefficients for these variables is the effect of the Green Index and Green Policies on the *average* level of economic performance over the time frame being studied, controlling for the effects of other independent variables. Ultimately, one must view the findings from the models using the Green Index and Green Policies with great caution.

In order to account for this variability in state environmental policy over time, a longitudinal measure of this concept is used. When the Levinson Index is used to measure environmental policy, the exact opposite relationship occurs than when the Green Index is utilized. The Levinson Index models support the contention that more stringent state environmental regulations have a *negative* impact upon state economic growth. This is especially evident when the dependent variable under consideration is state unemployment rates. However, when state environmental spending and state environmental conditions are used as measures of environmental policy, there is somewhat weak evidence that stringent environmental policy has a positive effect upon state economic growth.

The results of the models using environmental spending and environmental conditions variables are often at odds with the findings of the Levinson Index models. These estimations provide support for the assertion that more stringent state environmental regulations enhance state economic growth. Though, such support is more strongly evident in the models which utilize environmental spending, rather than environmental conditions, as a measure of environmental policy. Further, such support is more strongly evident when examining the state income dependent variables. Evidence points to a consistent positive relationship between state environmental spending and state income growth. However, no such consistent link is found to exist with state environmental spending and state unemployment levels.

Clearly, the model estimations provide inconsistent results, and this begs the question of why. On the one hand, it is possible that these various indicators represent different components of environmental stringency and quality. If so, it would not be surprising that models estimated separately for each indicator would yield different results. For instance, the Levinson Index represents regulatory costs imposed on the state economy. Of course regulation requires some spending to administer and monitor, but not all environmental spending goes for administering, monitoring, and enforcing compliance with environmental regulations. I have assumed that regulatory costs and environmental spending both represent the stringency of environmental policy in a given state, but it is possible that these two variables represent different components of environmental stringency.

On the other hand, it is possible that other factors than just the measurement tools themselves are causing these conflicting results. Because of the limitations in data

availability, the models using the Levinson Index and the environmental spending and conditions variables represent different time periods. The Levinson Index estimates are for the years 1977 to 1994, while the state environmental spending models provide an analysis of time period from 1986 to 2003. The state conditions models are estimated using data from 1988 to 2003. It is possible that the effects of environmental regulations upon economic growth changed over the course of these years.

The initial impact of environmental regulations may have had heavy costs associated with them. These costs could have had a very real impact upon businesses, and thus, overall economic growth when first enacted. As business and industry adjusted to these regulations and these regulations became a part of the routine costs to business, the effect of the regulations may have dwindled. This could explain why the Levinson Index models produce a strong negative effect of environmental policy on state economic performance. The Levinson Index covers the period that produced the first "shocks" of the environmental regulations upon businesses. The environmental spending and environment conditions models start in 1986. By this point business and industry may have adjusted to the costs of these regulations. It may be that environmental regulations are now a routine operating cost and as such no longer have as strong of an economic impact upon businesses.

Thus, the mixed results produced in these different model estimations may not be in conflict. The Levinson Index models may accurately reflect a negative impact of environmental regulation upon economic growth during the years estimated in those models. The weaker positive impact of environmental regulation upon economic growth in the environmental spending and environmental conditions estimations may reflect the

changing role of regulation upon the economy. When states begin putting more financial resources into environmental programs, the states themselves may stimulate positive economic change. Though, I am cautious about reading too much into these findings. The mixed findings produced in these models may be as a result of the changing dynamic of environmental regulations. However, it is also possible that, as mentioned earlier, the different measurement tools are responsible for the differences in results. They may not all be "equal" in their measurement of environmental policy.

Another finding of note in this analysis includes the consistently strong effect that national economic conditions have upon state economic growth. In all of the models estimated, at least one – and generally both – of the national economic conditions variables exhibited a statistically strong effect upon state economic growth. The national economy does matter to the states. When national economic trends are positive state economic growth is evident. Increases in national per capita GDP correspond to increases in state growth in total personal income and state growth in per capita income. Increases in state unemployment will follow increases in national unemployment. My estimations indicate that national economic conditions exert great influence upon economic growth in the states. Though, this finding is debated in the literature. Different researchers note the effect of national economic conditions on state economies is variable over time (Brace, 1991; Hendrick and Garand, 1991, Brace, 1993; Crain, 2003).

However, in my analysis, the evidence regarding the influence of environmental policy upon state economic growth is not as consistent. No clear pattern is discernable. When a cross-sectional measure is used for environmental policy, evidence supports the positive impact that state environmental regulation has upon state economic growth.

When longitudinal measures are used, this finding is not consistent. Longitudinal measures produce mixed results in the time periods examined. The Levinson Index provides support for the argument that environmental regulation has a negative impact upon state economic growth. During the time period covered by the Levinson Index, the initial shock of increased regulation may have had a detrimental effect to state economies. Models estimated for the more recent years of 1986 to 2003, indicate that state environmental spending and state environmental conditions have a weak positive impact upon state economic growth. Thus, the effects of environmental policy upon state economic growth appear to change over time.

Endnotes

1. The xtgls command in Stata does not produce an R^2 for the FGLS regression. Thus I estimate a pseudo R^2 as the square of the correlation coefficient for the predicted and observed values.
2. The Levinson Index models are estimated with the pollution control incentives excluded. As the results are quite similar to the models in which they are included, the models with the variables excluded are not reported here. The results for these models are presented in Appendix B.
3. Separate models are also estimated with the inclusion of the pollution control index variable. These models are presented in Appendix C.

CHAPTER 7:
CONCLUSION

In this dissertation I examine the relationship between state environmental policy and state economic growth. I determine that measurement tools are critical to understanding this relationship and that there is deficit in the available data that makes it difficult to arrive at firm conclusions. When using the Levinson Index—a measure of the costs to businesses of complying with pollution abatement measures in the states—as the measure of environmental policy, there appears to be a negative relationship between environmental regulatory stringency and state economic performance. States with more stringent environmental policies experience lower total state personal income growth and higher unemployment rates. However when using state per capita environmental spending as the measure of environmental policy, there appears to be a positive relationship between environmental policy and state economic performance. States that spend more on environmental programs exhibit higher rates of total state personal income and per capita income growth and lower unemployment rates. The tool used to measure environmental policy stringency is crucial to the results attained.

The Levinson Index is the variable that most directly approximates the concept I seek to measure. The focus of my research is on the effect that state environmental policies have on state economies. More specifically I have tried to ascertain whether environmental regulatory stringency causes states to lose (or never attain) businesses that contribute to overall state economic health. The Levinson Index measures the costs to businesses of complying with pollution abatement efforts in each state over time. Thus, the Levinson Index captures the costs of regulations to businesses. If more stringent environmental regulations place a higher compliance cost on businesses and if these

higher costs of compliance do play a part in site location or expansion decisions of businesses, the Levinson Index should account for this effect.

Models that I estimate using the Levinson Index as the measure of environmental policy indicate that states that impose greater pollution abatement costs upon business and industry experience lower rates of total personal income growth and higher unemployment rates. Models based on the Levinson Index provide strong support for the contention that states that adopt strict environmental policies will suffer a detrimental economic consequence. More stringent environmental policies that impose greater costs on business and industry are associated with lower economic growth and higher unemployment in the states that impose these regulatory burdens. This result comes from estimations that use the policy measurement tool that is the more direct measure of how environmental policies effect business costs—the Levinson Index. Thus, I find evidence of a negative economic effect of environmental stringency.

My analysis does not stop with the Levinson Index, though, and this is where the results become a bit muddled. The Levinson Index is only available for the years 1977 to 1994. In order to study the effects of state environmental policy on state economic performance over a longer period of time, it is necessary for me to use another measure for environmental policy. I use two different alternate measures of environmental policy: state per capita spending on environmental and natural resource programs and state environmental conditions. I do not find much evidence that state environmental conditions have an effect on state economic growth. However, the state spending measurement tool produces results contradictory to those of the models using the Levinson Index.

In the model estimations in which I use state per capita environmental spending as a measure of environmental policy, I find that state environmental spending has a positive relationship to state economic growth. States that allocate more of their resources toward environmental programs are associated with higher levels of total state personal income growth and higher per capita income growth. Further, I find that states that have higher levels of environmental spending experience lower unemployment rates. However, I am cautious about reading too much into these results. While I am confident that the Levinson Index captures the costs associated with environmental regulatory stringency, I am not as confident that state environmental spending is a good proxy for the same concept.

States that spend more on environmental and natural resource programs may be states that have more money to spend, i.e. states that have strong economies. The estimations using state spending as the measure of environmental policy may have a problem of endogeneity. It is possible that the results I find in these models may not truly reflect that greater state environmental spending leads to better state economic performance. Instead, the accurate relationship may be that states with stronger economies spend more on environmental programs. Thus, the direction of the relationship is in question.

In order to better understand the mixed results from the Levinson Index and state spending models, I estimate models with both of these variables included as measures of state environmental policy. These models do not necessarily lend clarity to my analysis. The models indicate that state environmental spending has a very strong positive effect upon the income dependent variables. Greater state environmental spending is associated

with greater growth in total state personal income and greater growth in per capita income. However, as mentioned in the preceding paragraph, I am cautious of these results since the spending and income growth variables may be endogenous. These final sets of models do not indicate that state environmental spending has a strong impact on state unemployment rates. While a negative relationship is found, it is at the weaker .10 level of significance. The Levinson Index, though, exhibits a very strong effect on state unemployment rates in these models. The higher a state scores on the Levinson Index—the greater the pollution abatement costs to industry in a state—the higher the state unemployment rates. However, the Levinson Index does not exhibit a relationship with the state income growth variables. This final set of models seems to indicate that state environmental spending and the Levinson Index effect different aspects of state economic performance.

There are two possible explanations for the conflicting results achieved in the models estimated. First, the three measures I use for environmental policy may simply be measuring different things. The Levinson Index, state environmental spending, and state environmental conditions may not be interchangeable policy variables. By definition these variables are not the same – they measure different aspects of states' environmental efforts. Thus, the differing results achieved in the models may simply be a reflection of this variety in the measurement tools. The models produce differing results because the policy variables measure different concepts.

Secondly, the results may be in conflict because the variables cover different time periods. The Levinson Index is only available from 1977 to 1994. The state environmental spending data is available from 1986 to 2003. The state environmental

conditions data has been collected annually since 1988. The conflicting results in the models may be as a result of changes in the regulatory environment in the time period from 1977 to 2003. The time period covered by the Levinson Index is the period in which the first serious efforts of the federal government to regulate the environment occurred. The initial cost to business of compliance with "new" federal and state laws was probably very severe. Since data for the Levinson Index begins in 1977, the height of this regulatory period, this variable may include start-up costs that had a major impact on the costs of business operations. The Levinson Index data is not available after 1994. By this point in time, businesses may have started to adjust to these costs and environmental compliance costs were just another operating expense. Thus, the negative economic impact that the Levinson Index exhibits may be a result of the "growing pains" of a new regulatory push.

By the same token, data availability for the environmental spending and conditions variables begin in the late 1980s. These variables are from a time period when the regulatory "growing pains" may have subsided. The somewhat positive economic effect that is evident in these models may be due to the acceptance by business and industry of these environmental regulations after having time to adjust. Thus, the models may present somewhat conflicting results because the business reaction to environmental regulations has changed over time.

While the models do display some contradictory findings, I am more confident in the results of the Levinson Index models. This variable is the best measure for understanding the cost of environmental regulatory compliance to business and industry. My study is focused on how state environmental stringency affects state economic

growth. The typical argument revolves around the notion that environmental regulations increase operating costs to business and these businesses will leave an area (choose to operate elsewhere) if operating expenses are too high. When businesses leave, states will suffer a negative economic impact. The Levinson Index provides a measure that captures the cost of compliance to businesses. Thus, this variable measures the concept closest to the theory driving my research.

There is a key drawback associated with the Levinson Index, though. As mentioned, the Levinson Index is only available from 1977 to 1994. This limitation of the data calls into question the generalizability of the results. The estimations indicate that from 1977 to 1994 states that have higher pollution abatement costs imposed on business and industry experience a negative impact on state economic performance. However, since the Levinson Index is not available after 1994, it cannot be said with certainty that this effect holds true today. Simply because such a negative effect was evident from 1977 to 1994, it cannot be assumed that this effect reaches past 1994. Even with this limitation, though, the Levinson Index models do provide a better understanding of the relationship between state environmental policy stringency and economic growth during the time period examined.

As noted at the beginning of this chapter, limitations of data availability have created difficulties in my ability to reach firm conclusions regarding the impact of state environmental regulations on state economic performance. While researchers have developed specific environmental policy measures, these are all cross-sectional in nature. In order to study state environmental policy in each state over time, accounting for variability in the states, it is necessary to find another measure of environmental policy.

Available longitudinal measures capture some aspect of state environmental policy without actually specifically measuring state environmental policy.

One weakness of using these longitudinal measures is that none of them are available for the entire time period I examine. Thus, I cannot be sure that when I estimate the models with these different measures of policy that I am consistently measuring the same concept in these models. As mentioned with regards to the Levinson Index, this calls into question the generalizability of my results. Further, the state environmental spending variable may not be adequately capturing the concept I hope to measure – the level of commitment to environmental efforts by the states. This variable may need to be reformulated as a proportion of total state personal income in order to truly be able to account for whether some states spend more on environmental programs simply because they have stronger economies, and thus, have more money to spend on such programs. An effort must be made to resolve the possible endogenous relationship between the state environmental spending and state income growth variables.

Future research should also try to resolve some of the curious results of the control variables. In particular, the state institutional variables and the state educational variables often produce confounding results in the modes I estimate. The cross-sectional nature of the institutional variables may be responsible for results that are often at odds with expectations. Since these measures do not vary over time, they may not be able to accurately capture the change in state economic performance that could occur as a result of legislative professionalism and gubernatorial power. In addition, the state educational attainment results are not consistent throughout the models estimated. The results frequently defy the conventional wisdom that a better educated citizenry can aid in a

state's economic performance. As detailed in chapter 5, the educational attainment data suffers from three major flaws. First, the data is not consistently available for the years 1977 to 1988. Second, when reported in these years, the data is sometimes reported regionally, sometimes reported by state. Finally, the question wording changed in 1989 from a question asking about years of school completed to actual degree attained. These inconsistencies in the raw data may account for the incongruous results often found in the models estimated. Thus, future research needs to account for problems with the control variables, as well as the environmental policies variables.

Taking into account all of the measurement issues mentioned above, my research indicates that when businesses spend more on pollution control efforts, state economies do experience a negative impact on economic growth. Total state personal income is lower and unemployment is higher in states that impose greater pollution abatement compliance costs on business and industry. This effect is especially strong on state unemployment rates. While this effect may be waning as business and industries come to consider pollution abatement as a normal operating expense, I am cautious about drawing such a conclusion until a better environmental policy measurement tool is available.

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APPENDIX A:
DESCRIPTION OF INDEPENDENT VARIABLES TAKEN FROM SITE SELECTION HANDBOOK: FINANCIAL ASSISTANCE FOR INDUSTRY, TAX INCENTIVES FOR INDUSTRY, AND POLLUTION CONTROL INCENTIVES FOR INDUSTRY

State Industrial Aid (Financial Assistance for Industry)

1. State Sponsored Industrial Development Authority
2. Privately Sponsored Development Credit Corporation
3. State Authority or Agency Revenue Bond Financing
4. State Authority of Agency General Obligation Bond Financing
5. City and/or County Revenue Bond Financing
6. City and/or County General Obligation Bond Financing
7. State Loans for Building Construction
8. State Loans for Equipment, Machinery
9. City and/or County Loans for Building Construction
10. City and/or County Loans for Equipment, Machinery
11. State Loan Guarantees for Building Construction
12. State Loan Guarantees for Equipment, Machinery
13. City and/or County Loan Guarantees for Building Construction
14. City and/or County Loan Guarantees for Equipment, Machinery
15. State Financing Aid for Existing Plant Expansion
16. State Matching Funds for City and/or County Industrial Financing Programs
17. State Incentive for Establishing Industrial Plants in Areas of High Unemployment
18. City and/or County Incentive for Establishing Industrial Plants in Areas of High Unemployment

Tax Incentives for Industry

1. Corporate Income Tax Exemption
2. Personal Income Tax Exemption
3. Excise Tax Exemption
4. Tax Exemption or Moratorium on Land, Capital Improvements
5. Tax Exemption or Moratorium on Equipment, Machinery
6. Inventory Tax Exemption on Goods in Transit (Freeport)
7. Tax Exemption on Manufacturers Inventory
8. Sales/Use Tax Exemption on New Equipment
9. Tax Exemption on Raw Materials Used in Manufacturing
10. Tax Incentive for Creation of Jobs
11. Tax Incentive for Industrial Investment
12. Tax Credits for Use of Specified State Products
13. Tax Stabilization Agreements for Specified Industries
14. Tax Exemption to Encourage Research and Development
15. Accelerated Depreciation of Industrial Equipment

Pollution Control Incentives for Industry

1. Corporate Income Tax Exemption
2. Personal Income Tax Exemption
3. Excise Tax Exemption
4. Tax Exemption or Moratorium on Land, Capital Improvements
5. Tax Exemption or Moratorium on Equipment, Machinery
6. Inventory Tax Exemption on Goods in Transit (Freeport)
7. Tax Exemption on Manufacturers Inventory
8. Sales/Use Tax Exemption on New Equipment
9. Tax Exemption on Raw Materials Used in Manufacturing

APPENDIX B:
LEVINSON INDEX
ADDITIONAL MODELS

Table B.1. FGLS estimate for Levinson Index and Change in Total State Personal Income

	b	t
Intercept	0.088	5.28***
Environmental Policy Variable		
The Levinson Index	-0.005	-2.08***
Business Policy Variables		
Financial Assistance [1]	-0.013	-0.05
Tax Incentives [1]	-0.577	-1.32
National Economic Variables		
Change in Per Capita GDP	0.570	21.98***
National Unemployment	-0.002	-3.05***
State Fiscal Variables		
State Debt	-0.052	-1.93**
Federal Aid [1]	0.011	1.52
Structural/Institutional Variables		
Tax Structure [1]	-0.009	-0.71
Gubernatorial Power	-0.008	-3.27***
Legislative Professionalism	-0.030	-3.78***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.222	-0.85
College Degree [1]	-0.611	-1.39
Manufacturing Employment	-0.018	-0.47
Political Culture (Moralistic)	0.003	1.65*
Farms	-0.420	-4.04***
South	0.008	2.02**
Urbanization [1]	0.260	2.47**
Black [1]	-0.246	-1.63
N	816	
Pseudo R^2	0.3255	
Wald chi-square	727.94	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

Table B.2. FGLS estimate for Levinson Index and Change in State Per Capita Income

	b	t
Intercept	0.047	3.90***
Environmental Policy Variable		
The Levinson Index	-0.002	-1.31
Business Policy Variables		
Financial Assistance [1]	0.287	1.65*
Tax Incentives [1]	0.065	0.21
National Economic Variables		
Change in Per Capita GDP	0.594	26.42***
National Unemployment	-0.001	-3.29***
State Fiscal Variables		
State Debt	-0.024	-1.24
Federal Aid [1]	0.002	0.28
Structural/Institutional Variables		
Tax Structure [1]	-0.004	-0.39
Gubernatorial Power	-0.001	-0.65
Legislative Professionalism	-0.011	-2.21**
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.149	-0.78
College Degree [1]	-0.688	-2.19**
Manufacturing Employment	0.032	1.20
Political Culture (Moralistic)	0.001	0.93
Farms	-0.097	-1.27
South	0.005	1.86*
Urbanization [1]	-0.010	-0.15
Black [1]	-0.129	-1.28
N	816	
Pseudo R^2	0.3390	
Wald chi-square	940.77	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

Table B.3. FGLS estimate for Levinson Index and State Unemployment

	b	t
Intercept	2.84	1.88*
Environmental Policy Variable		
The Levinson Index	0.559	4.37***
Business Policy Variables		
Financial Assistance [1]	0.786	0.05
Tax Incentives	0.010	0.05
National Economic Variables		
Change in Per Capita GDP	-0.428	-.039
National Unemployment	0.929	31.87***
State Fiscal Variables		
State Debt	7.892	3.99***
Federal Aid	-0.001	-3.10***
Structural/Institutional Variables		
Tax Structure [1]	-0.233	-0.18
Gubernatorial Power	-0.423	-1.51
Legislative Professionalism	2.213	2.67***
State Demographic Variables		
Educational Attainment		
High School Degree	0.004	0.22
College Degree	0.001	0.03
Manufacturing Employment	-13.144	-3.94***
Political Culture (Moralistic)	-0.127	-0.81
Farms	-27.382	-3.59***
South	-1.014	-2.21***
Urbanization	-0.023	-2.24***
Black	0.050	2.70***
N	816	
Pseudo R^2	0.4409	
Wald chi-square	1489.94	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

APPENDIX C:
LEVINSON INDEX/ENVIRONMENTAL SPENDING
ADDITIONAL MODELS

Table C.1. FGLS estimate for Levinson Index & State Environmental Spending and Change in Total State Personal Income, Years 1986 – 1994, Including Pollution Control

	b	t
Intercept	-0.011	-0.42
Environmental Policy Variable		
Levinson Index [1]	-0.393	-0.12
Environmental Spending [1]	0.194	2.79***
Business Policy Variables		
Financial Assistance [1]	0.315	1.12
Tax Incentives [1]	-0.447	-0.73
Pollution Control [1]	-0.937	-1.78*
National Economic Variables		
Change in Per Capita GDP	0.838	16.84***
National Unemployment	0.002	2.05**
State Fiscal Variables		
State Debt	-0.068	-1.94***
Federal Aid [1]	-0.011	-1.25
Structural/Institutional Variables		
Tax Structure [1]	0.001	0.06
Gubernatorial Power	-0.004	-1.53
Legislative Professionalism	-0.019	-2.21***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	0.707	1.95**
College Degree [1]	-0.913	-1.82*
Manufacturing Employment	0.126	2.32***
Political Culture (Moralistic)	0.001	0.47
Farms	-0.606	-4.20***
South	0.011	2.21***
Urbanization	-0.002	-0.19
Black [1]	-0.132	-0.71
N	336	
R^2	0.2675	
Wald chi-square	431.72	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10 [1] Coefficient has been multiplied by 1,000 to facilitate interpretation

Table C.2. FGLS estimate for Levinson Index & State Environmental Spending and Change in State Per Capita Income, Years 1986 - 1994, Including Pollution Control

	b	t
Intercept	0.015	0.84
Environmental Policy Variable		
Levinson Index	0.001	0.43
Environmental Spending [1]	0.163	3.13***
Business Policy Variables		
Financial Assistance [1]	0.548	2.84***
Tax Incentives [1]	-0.642	-1.69*
Pollution Control [1]	0.247	0.71
National Economic Variables		
Change in Per Capita GDP	0.808	21.34***
National Unemployment [1]	0.047	0.07
State Fiscal Variables		
State Debt	-0.029	-1.26
Federal Aid [1]	-0.005	-0.80
Structural/Institutional Variables		
Tax Structure [1]	0.031	3.05***
Gubernatorial Power [1]	-0.073	0.04
Legislative Professionalism	-0.020	-4.38***
State Demographic Variables		
Educational Attainment		
High School Degree [1]	-0.230	-0.98
College Degree [1]	-0.540	-1.76*
Manufacturing Employment	0.133	4.84***
Political Culture (Moralistic)	0.002	1.15
Farms	-0.34	-0.33
South	0.464	0.16
Urbanization [1]	0.002	0.46
Black	0.169	1.49
N	336	
R^2	0.3368	
Wald chi-square	832.27	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

Table C.3. FGLS estimate for Levinson Index & State Environmental Spending and Unemployment, Years 1986 - 1994 Including Pollution Control

	b	t
Intercept	7.850	4.83***
Environmental Policy Variable		
Levinson Index	0.433	3.02***
Environmental Spending	-0.006	-1.81*
Business Policy Variables		
Financial Assistance	0.009	0.56
Tax Incentives	-0.135	-3.54***
Pollution Control	0.176	3.92***
National Economic Variables		
Change in Per Capita GDP	-3.188	-1.43
National Unemployment	0.747	15.77***
State Fiscal Variables		
State Debt	7.413	3.12***
Federal Aid [1]	-0.056	-0.09
Structural/Institutional Variables		
Tax Structure	0.004	2.43***
Gubernatorial Power	-0.669	-0.28
Legislative Professionalism	2.60	3.14***
State Demographic Variables		
Educational Attainment		
High School Degree	-0.076	-3.23***
College Degree	-0.001	-0.01
Manufacturing Employment	-24.872	-7.10***
Political Culture (Moralistic)	-0.067	-0.40
Farms	-11.473	-1.39
South	-0.444	-1.06
Urbanization	-0.002	-1.89**
Black	0.011	0.61***
N	336	
R^2	0.3786	
Wald chi-square	576.26	
Prob chi-square	0.0000	

***prob < .01
** prob < .05
* prob < .10

[1] Coefficient has been multiplied by 1,000 to facilitate interpretation

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