10 YEARS OF VOODOO ECONOMICS:

THE EFFECT OF TAXES ON ECONOMIC GROWTH

A Thesis

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Abstract

of

10 YEARS OF VOODOO ECONOMICS:

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This thesis examines the relationship between taxes and economic growth. Since the rise of supply side economics in the 1980's as a doctrine for understanding macroeconomics, many claims have been made regarding a connection between the rates and amount of taxes collected and subsequent economic growth or decline. This thesis analyzes those claims through a regression analysis of tax, economic, and social factors that are widely believed to be associated with changes in economic growth, using statistics gathered from publicly available sources, such as the U.S. Census Bureau. The regression analysis includes economic data from all 50 U.S states from 10 years of a 12 year period.

The resulting findings indicate that a tenuous connection does exist between taxes and economic growth, but that the relationship is not consistent or consistently significant across many different possible kinds of economic growth. Thus eschewing any notions of a one size fits all tax policy. Furthermore, a determination is made that other, non-tax,

economic and social factors are actually more important to our understanding of economic growth and of what constitutes good policy in this field of economic data

_____, Committee Chair
Robert Wassmer, Ph.D

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Date

ACKNOWLEDGEMENTS

Since my first year in Sac State's Public Policy program I knew that this was the thesis I wanted to do. I knew from the beginning that it would be more work than I have ever done in for a single project, and that I would need a lot of guidance to complete it. I cannot begin to express my gratitude to Robert Wassmer and Suzanne O'Keefe for helping me through each step in the process to completion and for teaching me so much about economics in the process. They represent the finest that higher education has to offer in the way of professors and mentors.

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Chapter 1

INTRODUCTION

Fittingly, for a country that was founded in the midst of a tax revolt, the issue of taxation is still perhaps the most argued and most controversial issue in American politics. In the 2012 election, opinions on taxation were one of the most notable differences in ideology between presidential candidates Barack Obama and Mitt Romney. President Obama advocated raising taxes on the upper class to pay for continued spending which, theoretically, would improve economic growth. Presidential Candidate Mitt Romney advocated lowering taxes so as to promote private investment that could also, theoretically, boost economic growth. Two wildly different approaches to policy, based on two different worldviews, and premised on different historical interpretations of past public policy.

With this thesis, I intend to discern for myself the answer to the question, "Do taxes have a meaningful impact on economic growth?" To do so, I will use publicly available data, such as that provided by the U.S Census, to perform a regression based study of historical economic trends during years from 1999 to 2010. A ten-year period that included economic expansions, recessions, and recoveries, taking place under both liberal and conservative governance. The subjects of the study will be all 50 U.S. states during this period of time and the study will control for widely recognized factors in economic performance and various forms of taxes, spending, and regulation. With as many pieces of the economic puzzle assembled as possible, I am curious which way Adam Smith's invisible hand will guide us.

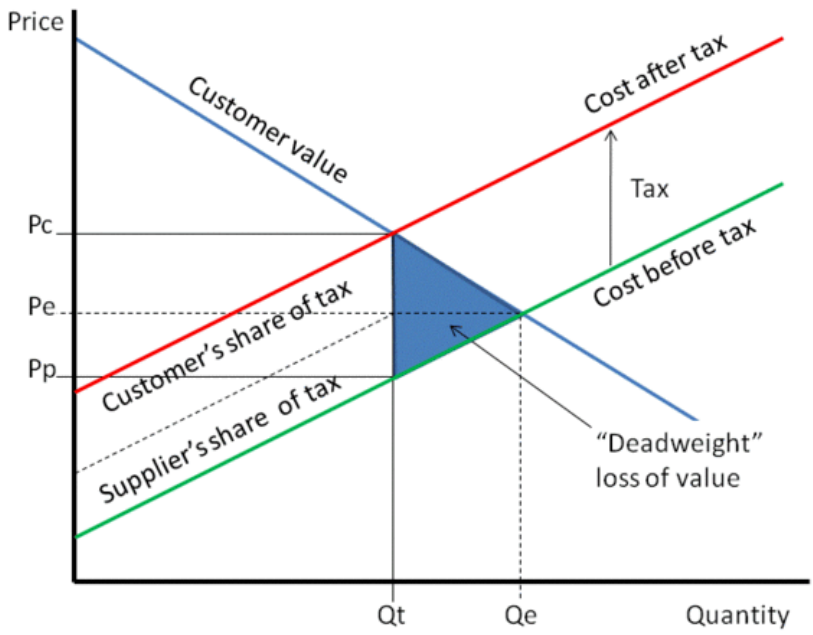
Hypothesis

Do taxes affect economic growth? I think they do, but I do not think they do so significantly. I think the innumerable social, political, and economic factors that theoretically impact and interweave into the tapestry that is the economy, make it impossible to discern what if any effect taxes are having. I think there are too many variables we cannot control for, or even imagine, and that such imperfect information will skew the results. Consequently, I expect my regression to return data showing that many, if not most, of the tax variables I have chosen to include will either prove to be statistically significant, and therefore not predictive of economic growth. Evidence suggests that even when controlling for some of the most widely talked about factors in economic growth, like welfare spending and educational level, there is too much we do not know and cannot reduce into the form of a quantitative study.

Microeconomic Underpinnings

On a theoretical level, economists already understand the effect taxes have on the economy. As taxes rise, they negatively impact supply and demand in product and labor markets. Taxes raise prices for goods and labor above the natural equilibrium. This prices out some consumers, reduces overall benefit, and creates deadweight loss in the market. The higher the tax, the more serious these effects become. The figure below demonstrates this graphically for price versus quantity with *Pe* representing the natural equilibrium price and *Pc* representing the new equilibrium price after taxes.

Supply and Demand Graph



Note: Adapted from Yoong, Wei. (2012). Hybrid Revolution.

Looking at the current economic position of the states, one can begin to see these principles have effects in the real world. Since each state is unique in terms of tax policy, we have begun to see important economic entities like corporations move between them in order to avoid taxes and maximize their profits. For example, the U.S. based arm of Toyota has relocated its head office from California to Texas, where many of its factories

already exist, in order to take advantage of the lower tax and more lenient regulation in that state. (Buss, 2014). Of course, when corporations move, so does employment, which is an important factor for economic growth. So when a large company like Toyota relocates to a new state, or simply chooses to do business there from the start, it does not just deprive the State of California of tax revenue, it deprives the state's residence of potentially gainful, profitable employment. Worse yet, if a vital product, like cars, is being manufactured outside of a state, money will actually leave California.

This side effect of high taxes is not limited to corporations, though; it also can greatly influence the decisions of wealthy individuals. The States of Oregon, New Hampshire, Delaware, and Montana have no personal income tax, making them ideal places for the wealthy to shelter their money in the United States, let alone abroad where even more beneficial tax havens exist (Young, 2014). The cumulative effects of all this are a loss of potential investment, jobs, and income in states with higher taxes.

Macroeconomic Background

Although the effects of taxes seem simple enough on a supply and demand graph, the reality is far more complex. Taxes may be an important factor in economic growth and decline, but it is by no means the only one. Economies grow and shrink for a variety of reasons. It is, therefore, necessary to broaden the discussion to include the dominant macroeconomic theories that the United States has embraced in the 20th century.

The Great Depression

The genesis of our modern theories of macroeconomics can be traced back to the effects of the Great Depression. The Depression itself was the result of several factors including the 1929 Stock Market Crash, a series of bank failures, a reduction in purchasing by American citizens, and high tariffs on European goods (Kelly, n.d.). Its effects were nothing short of disastrous for the American economy. In 1933, unemployment in the United States peaked at 25%. Hundreds of thousands of people lost their homes and had to relocate to shantytowns all over the country (Great Depression, n.d.). Millions left their home states in search of employment. Meanwhile, the United States' gross domestic product dropped by around 25% (Great Depression in the United States, n.d.). In the wake of the economic collapse, it became necessary for the country's leaders to pursue a more government centric approach to handling recessions.

The New Deal, World War II, and the Rise of Keynesian Economics

In response to the Great Depression, the U.S. elected democrat Franklin Delano Roosevelt president. Roosevelt's response was the New Deal, a series of relief and public works projects that allowed the government to employ citizens and spend money to grow local economies and improve public infrastructure. The Civilian Conservation Corp. was developed to employ and educate young adult urban males and the Public Works Administration worked with states and localities on over 34,000 construction projects. Roosevelt also oversaw the implementation of subsidization models such as the Agricultural Adjustment Act, which paid famers *not* to grow crops to better balance

supply with demand, while still providing American farmers with enough income to live. This spending resulted in a marked increase in economic growth and by 1936 the Stock Market and GDP had recovered their pre-crash momentum (Berkin et al., 2011). Employment however, did not recover completely, still hovering at around 11%, when the economy was dealt another blow by a brief recession in 1937.

Ultimately, it would take World War II to solve the United States' unemployment problem. The war necessitated a massive industrial push, the foundation of which was made of sky high taxes and government spending on a level that had never before existed. The glut of labor that had developed during the Depression was erased when millions of men were sent to war and millions of women entered the job market to fill their shoes. Unemployment fell to 1.2% during World War II and the U.S.'s manufacturing industry exploded to meet the military's demands for weapons. There was concern that after the war ended, that the economy and unemployment rate would return to pre-war levels, but they did not. In fact, The Great Depression had actually created pent up demand for goods and services. Goods and services could now be consumed thanks to the government having engaged in deficit spending, which redistributed capital to the middle class (Berkin, 2011).

This phenomenon, the economic relationship between taxes and spending, and economic growth as a whole, forms the basis for Keynesian economics or Keynesianism, the dominant macroeconomic theory until about 1970. As it relates to tax policy, Keynesianism stresses tax rates be adjusted depending on whether the economy is in a boom or bust part of the economic cycle. During a boom cycle, governments are

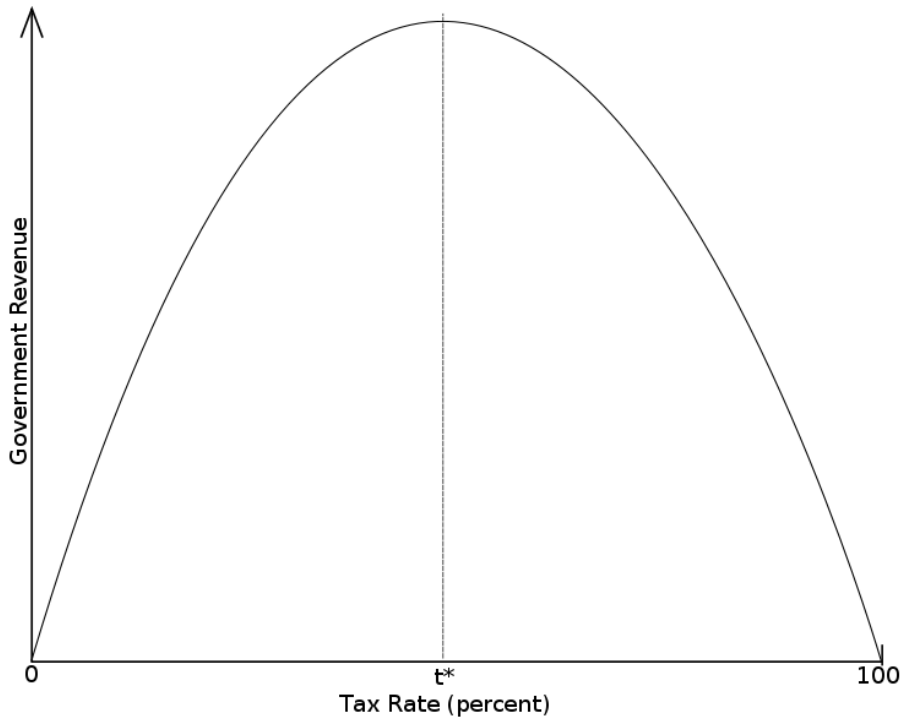
encouraged to tax more to fund longer-term expenditures and pay off debt. During a bust cycle, governments should cut taxes and engage in deficit spending to counter against recessionary saving and spending habits that otherwise make recovery difficult (Keynesian economics, n.d.). By spending heavily during recessions, the government temporarily creates jobs and injects capital into the market. By taxing heavily during expansion, the government can pay for the deficit spending it engages in during recessions. By using this process, the hope is that this form of counter-scheduling will smooth over the boom and bust cycle and result in gradual economic growth.

Reaganomics and into the 21st Century

For 30 years following the Great Depression, the United States followed the Keynesian economic model of taxes and spending. However, during the 1970's the onset of stagflation, a stagnant economy combined with money being devalued through inflation, worked to stall the U.S. economy. Keynesianism began to draw serious criticism, and a new school of thought developed as a response, called Supply Side Economics. Supply Side Economics, as it relates to tax policy, holds that tax rates should generally be kept low and that by lowering taxes, it is possible for the government to stimulate the economy in a way that actually creates more jobs than normal government spending. By leaving more money in the free market, the expectation is that money will be spent more efficiently and result in more prosperity. What is more, supply side economics also holds that a revenue maximizing point, exists where taxes can raise the most revenue for the government. Taxing any point past this equilibrium negatively

impacts business growth and actually results in less revenue. This was illustrated by supply side economist Art Laffer, whose Laffer Curve illustrates a revenue maximizing tax rate at t* on the figure below. The curve goes from the extreme of a 0% tax rate, where business operates without government constraint, to a 100% tax rate, where business is completely constrained (Supply Side Economics, n.d.).

The Laffer Curve



Note: Adapted from Laffer Curve. (n.d.) Retrieved January 15, 2014, from the STS Wiki

Colloquially this is known as Reaganomics, after republican President Ronald Reagan, whose supply side economic policies resulted in tax cuts of nearly 40%. Tax

cuts that have remained in place with only incremental change since the early 1980s. And unlike Keynesianism, wealth is not redistributed through government programs. Instead, Supply Side Economics works through what is called the trickle down effect, where it is presumed that low taxes on high and middle-income earners will foster greater spending, which in turn drives economic growth.

Dichotomies in Policy and Politics

This paper is, inherently, a study of Keynesianism versus Supply Side Economics. I compare a government centric approach to growth and a free market centric approach to growth. Assumptions about the nature of economic growth are premised in these two models' predictive qualities. Is government spending or low taxation better stimuli for economic development? This question is important right now, given the broader political discussion the United States is having about how much government we want for ourselves. Do we want to pay more taxes and receive more services and wealth redistribution, like what the New Deal brought about? Or do we want to continue limiting government growth and emphasize a smaller government, lower taxes, and a freer market approach to services? It is the dilemma of our time and is marked by the controversies surrounding President Obama and the TEA Party opposition that has risen to oppose him. This study seeks to enter into a significant part of that debate and provide context and information for ongoing discussions about the role of government in the marketplace.

Chapter 2

LITERATURE REVIEW

While reviewing the literature for this topic, one overriding theme became apparent, that there is no established standard or set of principles that all economists agree upon for this type of study. There is only a general admission that, theoretically, taxes should negatively impact an economy. However, there are no common measures in the literature that all would researchers would agree is the proper place to begin conceptualizing about this issue. Even studies that ultimately reach the same conclusion can do so using wildly different assumptions and variables. Therefore, in the interest of contextualizing my research with the findings of other studies, this literature review will re-examine some of the underlying theories, studies, and findings that have come before, and make up the foundation for this area of study.

The Variability of Tax and Economic Growth Models

On a basic level, everyone understands what taxes and economic growth are, but defining them in such a way as to be useful for a regression analysis is complex. For example, ask yourself, what kind of taxes would we expect to have an impact on economic growth if they were significantly lowered or raised? There are many different answers one could give just out of hand. Income taxes, sales taxes, property taxes, a strong argument could be made for all of those given the right thesis. Then the issue is complicated further by trying to decide on the correct way to measure taxes. Average tax rates? Marginal? Perhaps some combination of the two? Should we use tax rates at all?

Should it be a hard number that represents taxes like state revenue? And what exactly constitutes economic growth is potentially up for debate as well. We could use state GDP, GDP per capita for residents, their income, the number of new businesses created, changes in the number and amount of state tax receipts.

Independent Variables

Hypothetically speaking, any of the aforementioned taxes could work well as an independent variable and any of the economic growth measures could work as a revealing, interesting dependent variable. A model consisting of any permutation of these variables would probably tell us something useful about the effects of taxes on economic growth. Unfortunately, this also leads to consistency problems as researchers can choose very different variables to represent the same broad ideas.

The independent variable most often used in these kinds of studies is, either some form of marginal income tax, or an amount based on total revenue collected through taxes. Poulson & Kaplan (2008) describe marginal tax rates as the best measure for determining the impact of taxes on economic growth because increases or decreases in a marginal income tax rate create incentives economic units, like workers or businesses, to increase or decrease their output depending on what is best for them individually (Poulson & Kaplan, 2008). Other researchers like Plaut & Pluta (1983), and Mofidi & Stone (1990) chose to use total state revenue per capita, because it more holistically addresses the question of how taxes affect economic growth.

Benson and Johnson (1986) took this methodology a step further, and divided state revenues by the average of all the state revenues of the 48 contiguous states in order to arrive at an average tax rate. The advantage to this method being that, because tax rates are subject to constant pressure from internal and external forces, they change frequently, and, it is therefore necessary to ensure measurements are always relative to other states, who are facing the same forces. Papke & Papke (1986), reasoning along a similar line of logic, that taxes and expenditures are roughly equivalent economically, substituted marginal capital expenditures for tax rates entirely to explore how the use of this specific tax revenue affected economic growth.

Dependent Variables

Dependent variables are similarly varied among experiments. Three, Canto & Webb (1987), Helms (1985), and Poulson & Kaplan (2008), use some measure of personal income as their representation of economic growth. This measure is useful, because it gives a clear picture of how people and businesses are affected monetarily by tax policies. However, this approach lacks some important context. Income can mean different things in different places (e.g. $100k per year income means less in California than in Montana). Because of this, other researchers like Plaut and Pluta (1986) chose to use states' rates of unemployment as the dependent variable for economic growth. This way, tax policy could be related to unemployment. This is easy to relate to, but it carries with it several implicit assumptions that may or may not be true. It requires us to accept

that low unemployment is a sign of healthy economic growth and it requires us to accept that high unemployment is a sign of slow or negative economic growth.

Economically speaking, it may be difficult to picture how a highly employed society could be doing badly economically, but that is exactly what happened in 2013, when the U.K. added 1.6 million jobs, a 6.8% increase in employment, despite a total GDP growth of just 2.5%, well below the 5% commonly associated with healthy job creation (Matthews, 2013). Conversely, it is not hard to picture a situation where economic growth can occur in areas of the economy that are not labor focused, and employment growth would understate true economic growth on a measure using employment as the dependent. The recovery from this most recent Great Recession for example, has been slow in the area of U.S. employment, but has greatly benefitted large corporations and wealthy individuals (Lowrey, 2013). This measure would over look that.

Other researchers, like Mofidi & Stone (1990) and Papke & Papke (1986) and Benson & Johnson (1986), decided that business location and capital spending reflect the state of an economy, and are therefore suitable measures for economic growth. The reasoning being that an increase, or decrease in the number of businesses, or an increase in the amount of money a state spends to build infrastructure is representative of the growing needs of a population, which by extension, tells us that economic growth is positive. All of which is probably true to an extent, but probably varies quite a bit by circumstance. A fast growing state like California will, by necessity of size as well as population growth, need to spend more on capital projects than say Rhode Island. There

is more at work here than just relative differences, there are also real geographic and demographic trends here that cannot be accounted for by these variables.

In this kind of experiment, the researcher's choices for independent and dependent variables are the most crucial element, because however the findings ultimately turn out, their ability to be extrapolated into real and useful information is going to hinge on how well they represent the factors being tested. In the case of the independent variable, the choice is probably going to boil down to some function of tax rates, or revenue, or spending or some combination thereof. However, the choice of dependent variable is more flexible, because there are many internally consistent variables that would be a logical choice as a stand in for a broad concept like economic growth. I refer you to the table below for an illustration of the regression studies cited in this paper that demonstrates the variety of variables used to stand in for taxes and economic growth.

Sources of Information

Study by	Independent Variable	Dependent Variable	Findings
Benson, B. & Johnson, R. (1986)	Average Tax Rate	Per Capita Capita Capital Expenditure/ The Average Per Capita Capital Expenditures of 48 States	Higher tax rates among states correspond negatively with investment in capital expenditures. Taxes retard economic activity.
Canto, V. & Webb, R. (1987)	% Changes in Tax Burden by the 50 States	Per capita personal income	Negative relationship between tax burden and income. Taxes also

			found to distort individual opportunity costs for labor and leisure.
Deskins, John. & Hill, Brian. (2010)	Total State Revenue Per Capita	Private Sector Gross State Product	Taxes minimally affect growth in the private sector.
Georgellis, Yannis & Wall, Howard. (2006)	Marginal Tax Rates	Rate of Entrepreneurship	Increases in marginal tax rates negatively impact entrepreneurship.
Helms, J. (1985)	Property Tax & Miscellaneous Taxes	Personal Income Per Capita	Taxes have negative effect on personal income, but expenditures have a positive effect that cannot be ignored either.
Mofidi, A. & Stone, J. (1990)	Total State Revenue Per Capita	Net Investment & Employment in Manufacturing	Taxes negatively impact economic growth when state revenues are spent on transfer payments.
Papke, James. & Papke, Leslie. (1986)	Marginal Capital Expenditures	Business location	The effect of expenditures is uncertain. Taxes fall unevenly on different industries. The relationship is not significant.
Plaut, T. & Pluta, J. (1983)	Total State Revenue Per Capita	% Change in Unemployment & % Change in Manufacturing Capital Stock	Total revenue has negative impacts on unemployment and overall industrial growth, but no effect on the value

		& % Overall Industrial Growth	of stock.
Poulson, B. & Kaplan, J. (2008)	Marginal Tax Rates	Rate of Income growth	Higher marginal tax rates negatively affect state income growth.

Control and Other Variables

While the choice of independent and dependent variables determine what kind of tax policy and what kind of economic growth is being studied, and how useful the study is as a whole, the most important factor for determining the accuracy of an experiment is in the choice of control variables. Conceivably, there are probably millions of social, political, economic, demographic, geographic, and temporal factors at play within an economy that cause it to either grow or shrink. It is simply not possible to account for them all. Here though, there seems to be more agreement on which variables ought to be used as constant factors.

States are diverse entities, and it is necessary to control for differences between them so as not to compare unlike entities and come to a faulty conclusion about what is really happening. The most common of these, are expenditures on state services. Money spent by the state, in the state, can have a stimulative effect at least some of the time. Some states may tax more than others, but it is possible that if that money is spent correctly that economic growth might not be affected or that it even might increase (Papke &Papke, 1986). For that reason, previous studies, like those conducted by Helms

(1985), Papke & Papke (1986), and Mofidi & Stone (1990) included state expenditures in their analyses of economic growth. In addition to this, Benson & Johnson (1986) then added a relative component to state expenditures to account for real differences that existed between states beforehand.

After expenditures, geographical location, and the unique qualities that those locations possess, is the next most important factor to control for. The cost and availability of material and workers will vary by state (Plaut & Pluta, 1983). States nearer the ocean have better property values, which can make starting a business more expensive or result in higher property taxes than would be experienced in other states. This could potentially slow economic growth by bringing less money into the state and crushing opportunities for employment. Climate and certain specific geographical features are also important to consider (Plaut & Pluta, 1983). While corporate offices may be able to move from state to state, some important sectors of a state's economy, like agriculture, mining, or tourism, cannot be moved or do not exist in many other states. A depressed tourism industry on the Gulf of Mexico cannot pick up and move to Kansas when there is an oil spill. An ideal study of the economic differences of different states would include granular details about local influences.

The Problem of Endogeneity

As one reviews the diverse methodologies used to measure the effect taxes have on economic growth, it becomes clear that many of the variables being used as dependent, independent, and control variables are susceptible to endogeneity. Broad measures, like total state revenue, which is used as an independent variable by Deskins & Hill (2010), Mofidi & Stone (1990), and Plaut & Pluta (1983), could potentially serve as a dependent variable as well, if we followed a reasoning that supposed that state revenue is a factor of economic growth. And since revenue itself is generated by taxes, if treated as an independent variable, it could be endogenous with other tax and spending control variables. Consequently, when designing a regression experiment on this subject, it is important to be aware of how the variables chosen relate to each other, and account for various tax and economic factors in ways that avoid endogeneity.

Previous Findings

Predictably, given the wide variety of independent, dependent, control, and other variables that are used to ascertain the effect of taxes on economic growth, the findings of earlier studies are diverse as well. Nearly all conclude that, generally speaking, taxes negatively impact growth, but most seem to qualify their results in meaningful ways. Most stop just short of quantifying a connection between taxes and economic growth, let alone create predictive models showing how much the rate economic growth or decline is affected by tax policy (Poot, 2000). Previous studies also tend to state their answers in broad terms rather than delve into specifics on how much spending or how much taxation

will affect an economy by a given amounts. It is less of an exact science and more an example of economic forecasting.

Thus far, the majority of the literature suggests that expenditures matter just as much, if not more, than taxes. Although taxes do impede economic growth by removing capital from the economy, just as supply side economists have argued for years, wise expenditures can potentially put it back, a la the Keynesian model. For instance, Papke & Papke (1986) found that economic growth would occur when states lowered taxes, but kept the same level of services. Of course, this kind of spend-and-spend mentality can also result in state deficits if that economic growth does not also increase tax revenue to make up the difference. What appears to actually be the case is that more spending is better for the economy. Though, that said, not all spending is equal.

The kinds of expenditures that do promote economic growth seem to be related to the expansion human capital and infrastructure. Spending on programs like healthcare, schools, higher education, and highways generate benefits and long-term growth for states (Helms, 1985). Healthcare helps ensure a steady, consistent workforce, education facilities encourage people to take more advanced, and higher paying jobs, which can bring in new business, and well-maintained, high-quality highways promote trade and efficiency. Tax money invested properly through expenditures will not adversely affect a states economic growth (Helms, 1985).

Though there are probably many expenditures that do not result in an economic benefit for the state, one type in particular is often noted in the literature, transfer payments. Transfer payments are what occur when money moves from one place to

another in exchange for nothing. Examples of transfer payments include welfare, financial aid, corporate subsidies, and when funds are transferred from the state to other local governments. Transfer payments, like welfare are consumed by citizens, but produce very little. Though people may find payouts like these socially beneficial, economically speaking, building a road is better than supporting an out of work family. Transfer payments drain money away from health and infrastructure projects and, as a consequence, states with high taxes that choose to spend money on these projects are likely to see their economic growth slow (Mofidi & Stone, 1990).

However, while several studies reach conclusions that emphasize the importance of taxes, as well as expenditures, as ever with this subject, there is not unanimity in those findings. Poulson & Kaplan (2008) offer no such expenditure related qualifications in their own study. After controlling for regional differences and initial per capita income, they concluded that higher marginal tax rates do negatively affect economic growth, while also finding that states with lower, more regressive, tax rates achieved higher rates of economic growth (Poulson & Kaplan, 2008). Plaut & Pluta (1983), meanwhile, observed that their dependent variable, the unemployment rate, was not significantly affected at all by state taxes. And Canto & Webb (1987), after studying the effects of different tax burdens on different states real per capita income, found that high taxes did indeed reduce economic growth, but that lowering them would not significantly increase personal income. Moreover, they also found that the transfer payments, derided in other studies as a major cause of slow growth, were not a statistically significant variable. So,

even when these studies agree on the causes of economic growth or economic reduction, they do agree on the magnitude of the changes.

Going Forward

After reviewing the literature, I can only come to the conclusion that there is no single, correct way to approach the subject of tax policy's effect on economic growth. There is no definitive set of variables that can be used to come to a definitive conclusion, only factors like taxes and spending, that then need to be boiled down into specific variables like tax rates or total spending. Assumptions about what constitutes growth and which taxes are relevant will color any analysis with a bias. Thus, any study I design is hostage to whatever assumptions I make about what measures economic growth the best.

Chapter 3

METHODOLOGY

This section explains the methodology that will be used for this regression analysis. It describes the overall structure of the analysis and the assumptions I am making. It lists the variables being used to represent the issues of taxes and economic growth. And it catalogues the control variables that account for the influence of a range of important economic factors.

Experimental Design

My model is a regression based study design that analyzes the effects of various taxes, state spending, labor, and other economic influences on three separate commonly used measures of economic growth. Other studies are often limited by the fact that they only choose one variable to represent economic growth, like GDP per capita or income per capita. Because of this, they can only speak to how one segment of the economy is impacted. Using three dependent variables to represent economic growth allows us to broaden its meaning and look at how different aspects of the economy are affected by the same economic circumstances. By using a regression, it is possible to control for the effects of related variables so as to isolate the effect of my key explanatory variable. In addition to telling me the economic impacts of each variable, regression will also tell me which variables are significant enough to have an effect, and which ones simply exist without influencing economic growth. What follows is a breakdown of the broad factors

I believe are important to understanding how tax rates affect economic growth, and the variables I have chosen to represent those factors in the regression.

Economic Growth and Dependent Variables

The first measure I have chosen to represent economic growth as a dependent variable is personal income per capita. I chose it because per capita income is simple to understand and because it says something meaningful about a state's economic health. Higher growth in income per capita means a state is growing more affluent on average, lower growth or decline means a state's residents are getting poorer.

The second measure I have chosen is median household income. Although change in GSP per capita income is a good measure of a state's overall economic growth, it does not speak to who is benefitting, or languishing, economically. If GSP per capita rises, but only because the rich have become richer, it means the economy as a whole is growing, but that it is not growing for everyone. If Bill Gates were to move into a neighborhood in Compton, California, average income in that neighborhood would jump considerably, but median income would only shift slightly. By including median household income as a measure along with GSP per capita, we can get a better idea of how individual families are doing, and whether they are experiencing changes in income growth along with the state they inhabit.

The third measure I use is unemployment rate. This too, is a widely available and well-understood statistic. Like median income, it helps clarify exactly who is feeling the effects of growth and recession. Increased employment is synonymous in people's minds

with a growing economy. However, the unemployment rate does not speak much to the quality of employment, which is why it is being measured in concert with GDP per capita and median income per capita. This method paints a clearer picture of who is not employed, who is, and how well are they doing.

Taxes and the Independent Variables

Following on from the work done by Plaut & Pluta (1983), and Mofidi & Stone (1990), the primary independent variable for this study will be taxes paid per capita by a state's citizens in dollars. The way each state chooses to balance the tax burden placed on its inhabitants can vary widely. California, for example, as a result of Proposition 13, which harshly limits property taxes, relies strongly on income taxes from wealthy individuals, and thus has high marginal tax rates. New Hampshire has no income tax whatsoever. We need to be able to account for how people are affected by tax burden, regardless of how that burden is placed though, which makes taxes paid per capita a good fit since it is a function of every kind tax.

The most essential component of this study is measuring the effects of different tax policies among the 50 states. Taxes, which take money out of the free market, are regarded by businesses as a deterrent to economic growth. When businesses and individuals pay taxes, it lowers their total income. The expectation then, is that, once you account for how taxes are spent, all taxes should have a negative effect on personal income; with higher taxes resulting in lower personal income, and lower taxes allowing for higher personal income. Tax rates and tax policy differ widely by state, but there are

a few constants. For the purpose of this study, I will be controlling for four of the most important and most common taxes, specifically, personal income tax, property tax, and corporate tax as percentages of total state and local revenue. In addition, will will be controlling for one other type of state revenue, charges and fees, to control for their effects on the economy apart from revenues generated by taxes. This is represented by the following equation:

Taxes=f(% Revenue from State and Local sales tax, % Revenue from State and Local personal income tax, % Revenue from State and Local property tax, % Revenue from State and Local corporate tax, % Revenue from Charges and fees)

Economically, it is important to control for all of these taxes. Sales taxes represent the average amount of money citizens pay in taxes when they purchase goods and services. Depending on the elasticity of demand for the product or service, this can lead to high costs for consumers and businesses that reduce income. Personal income taxes represent the average amount of money taken directly from citizens' yearly income and transferred to the state. This is especially important to measure for comparison purposes, as some states do not collect income taxes, while others collect up to thousands of dollars a year from their residents. Because of this, it is also necessary to control for corporate taxes, which can substitute for or exist alongside personal income taxes. Corporate taxes are taxes collected directly from businesses. It is also necessary to control for property taxes, as many states rely on them for revenue, and because property

taxes are an important factor in whether individuals and businesses choose to relocate to a state. These four taxes revenues make up the most important pieces of the taxes factor.

Spending

The next most important broad causal factor for economic growth in general, and personal income in particular, is state spending. State spending creates services that are consumed by residents and benefit them either directly or indirectly. Government spending on infrastructure projects can boost the quality of a state's living and working conditions. That can encourage businesses and individuals to come to a state and grow its economy. Generally speaking the benefits of state spending are indirect, but positive. Transfer payments however, like welfare programs, are seen by many economists as possessing no or negative economic impact on the economy. The following equation represents the spending factors included within my regression:

Spending=f(State and Local Expenditures per capita, % State and Local expenditures on capital , % State and Local expenditures on welfare)

My three proxy variables for state spending are total state and local spending per capita, percentage of spending on capital outlays, and percentage of spending on welfare. Spending per capita is a broad measure that represents the overall impact of a state's spending on its economy. Capital spending represents how much of a state's revenues are used to improve state infrastructure and human capital. It is a holistic measure that

includes state spending on programs ranging from construction projects to education. Research by Mofidi & Stone (1990) and Papke & Papke (1986) and Benson & Johnson (1986) found that capital outlays like this are good for the economy because they inject cash into the market that facilitates the growth of industry. Therefore, I would expect a positive sign from this variable and a positive effect on personal income. Conversely, I expect welfare spending to have a negative effect on the economy, because money is not being reinvested, just redistributed. I would expect that higher welfare spending as a percentage of total expenditures results in lower overall personal income within a state (Mofidi and Stone, 1990).

Labor Factors

In addition to states' tax and spending policies, statewide differences in labor market factors also need to be controlled for. The demographics, level of education, and labor laws of different states generate inequality that affects personal income per capita. I expect that right-to-work states, which allow employees to opt out of unions, will possess lower personal income than states that compel union membership, and thus enable collective bargaining. However, since the cost to employers can theoretically be lower under this system, it is possible too that right-to-work states might have higher employment rates. Those higher employment rates could then positively affect growth in a way that might normally be stifled by unions. To account for these effects, I have included right-to-work as a dummy variable. With regards to education, I predict that states with a higher percentage of graduated citizens will have higher economic growth.

For this, I have included an education variable that represents the percentage of citizens in each state who have not graduated from high school. The two age variables I am including, percent of populations under 18 and over 65, will likely demonstrate a negative effect on personal income. Residents under 18 are unlikely to be employed full time, and residents over 65 are likely retired and living on a pension or other fixed income. It is logical then, to control for these two variables to account for circumstances where states have disproportionate numbers of either demographic.

There is some disagreement as to whether minimum wage reduces employment or enhances it. It is somewhat circumstantial. Nevertheless it is worth accounting for, for whatever influence it has on employment, and for any lingering effects it might have on how it affects people's income. I will therefore include all state minimum wages adjusted for inflation, substituting the federal minimum wage for states that choose not to have or raise their minimum wages to the federal level. These labor factors form an equation thusly.

Labor Factors=f(right-to-work, % state residents with less than a high school degree, percent under 18 years of age, percent over 65 years of age, minimum wage)

Dummy Variables and Fixed-Effects

Because this is a panel data set examining economic data over the course of many years, it is logical to presume there will be a high degree of heterogeneity in potential regression results for each state. To ameliorate this, I am including 60 state and time dummy variables, one for

each state and each year, to control for variables that change over time, even when the variable's effects themselves are likely to remain constant, and account for the individual heterogeneous factors within each state. The regression itself then, will be based on a Fixed-Effects Model, represented as:

$$Y_{it} = \alpha_i + \beta_1 * Spending\ Per\ Capita + \beta_2 * Property\ Tax\ \%\ Revenue + \beta_3 * Sales\ Tax\ \%\ Revenue + \beta_4 * Income\ Tax\ \%\ Revenue + \beta_5 * Corporate\ Tax\ \%\ Revenue + \beta_6 * X_{it} + Year_t + \varepsilon_{it}$$

where α_i is the state fixed effect, $Year_t$ is year dummy variables, and X_{it} represents state control variables that vary over time.

Chapter 4

RESULTS

This chapter will review the results of my regression analysis. It includes an overview of my statistical findings as well as my observations as to the significance of my variables and the relationships they have with one another. It is from these findings that I draw my ultimate conclusions.

Preliminary Statistics

Before running my regression there were a couple of statistical readouts I felt it necessary to include for comparison purposes and general information. Table 4.1 includes basic descriptive statistics for my regression variables. All values are adjusted for inflation into 2014 dollars using the CPI based U.S. Inflation Calculator. Revenues and expenditures represent combined state and local values.

Table 4.1 Descriptive Statistics for Regression Variables

Variable	Obs.	Mean	Std. Dev.	Min.	Max
Average Taxes Paid	500	3,056.39	1,326.34	748.61	14,768.22
Income Per Capita	500	41,033.00	6091.72	29,349.23	62,853.78
Median Income	500	64,113.21	11,903.59	36,781.79	98,491.57
Unemployment Rate	500	5.08	1.66	2.50	13.60
Spending Per	500	10,153.59	2,856.84	6,230.23	29,420.38

Capita					
% Revenue from Property	500	20.23	7.08	6.59	46.32
% Revenue from Sales Taxes	500	23.88	8.08	3.48	44.01
% Revenue from Income Taxes	479	14.56	7.27	0	30.87
% Revenue from Business Taxes	488	2.47	1.54	0	9.54
% Revenue from Charges	500	33.10	6.32	16.96	71.73
% Capital Spending	500	12.10	2.75	6.16	20.70
% Welfare Spending	500	14.63	3.19	5.55	23.97
% Without High School Degree	500	15.22	4.27	7.70	28.00
% Population Under 18	500	26.53	2.20	20.65	34.44
% Population Over 65	500	12.23	2.13	3.22	18.11
Right-to-Work state	500	0.4300	0.4956	0	1.00
Minimum Wage	500	7.06	1.06	2.18	9.32

I also felt it was necessary to determine of any of the variables in use here were potentially collinear. To determine if any serious multicollinearity existed within my variable set, I ran a pairwise correlation, the results of which are in Table 4.2. A correlation is said to be highly collinear when pairwise values are greater than .80 (UCLA, n.d.). As you can see below, none of my regression variables result in a score that high, and thus are not significantly multicollinear.

Pairwise Correlation of Regression Variables

	Avg. Taxes	Income/ Capita	Median Income	Unemployment Rate	Spending/ Capita	% from Property	% from Sales	% from Income
Avg. Taxes	1							
Income/Capita	0.405	1						
Med. Income	-0.0262	0.4906	1					
Unemp. Rate	0.2529	-0.1089	-0.4027	1				
Spend/Capita	-0.0408	0.0784	0.1241	-0.0561	1			
Property	0.0444	0.453	0.2782	0.0024	0.2282	1		
Sales	-0.2268	-0.2675	-0.2304	-0.0215	-0.073	-0.2504	1	
Income	0.1635	0.1775	0.1876	0.0001	0.0444	-0.0721	-0.4206	1
Business	0.2061	0.1836	0.172	-0.0242	-0.0035	0.1217	-0.4832	0.0891
Charges	-0.1003	-0.4256	-0.2641	0.1701	-0.1588	-0.5146	-0.1869	-0.3692
Cap. Exp.	-0.0639	-0.061	0.0094	-0.2016	-0.0736	-0.2515	0.2433	-0.3831
Welfare	0.0337	-0.1422	-0.296	0.1117	0.0305	0.1073	-0.0757	0.2022
No HS	-0.3372	-0.4019	-0.1317	0.0581	-0.0414	-0.3341	0.3981	-0.043
Under 18	-0.0557	-0.1711	0.044	-0.2159	-0.1838	-0.2494	-0.0061	-0.2125
Over 65	-0.1061	-0.0763	-0.2729	-0.0179	0.1031	0.183	0.1503	0.0803
Right/Work	-0.2772	-0.3671	-0.3487	-0.1028	-0.0442	-0.2525	0.4385	-0.3839
Min. Wage	0.3682	0.2955	0.1516	0.2586	-0.049	0.1626	-0.1848	0.1853

Pairwise Correlation (cont.)

	% from Businesses	% from Charges	% Cap. Spending	%Welfare Spending	% HS Unfinished	% Pop. Under18	% Pop. Over65	Right-to-Work	Minimum Wage
Business	1								
Charges	0.0335	1							
Cap. Exp.	-0.2372	0.3455	1						
Welfare	0.211	-0.2446	-0.6363	1					
No HS	-0.0592	-0.0099	-0.0796	0.0501	1				
Under 18	0.0605	0.3834	0.3438	-0.2547	-0.1416	1			
Over 65	-0.1535	-0.3513	-0.2415	0.3486	0.0658	-0.6711	1		
Right/Work	-0.3519	0.2564	0.4459	-0.2633	0.269	0.1715	0.0321	1	
Min. Wage	0.0985	-0.0905	-0.2022	0.0942	-0.1491	-0.2328	-0.0004	-0.4304	1

Regression Data Results

After establishing baseline statistics and testing for variable correlation I began testing the full regression. I tested all the major functional forms, including lin-lin, log-lin, log-semi-log, and quadratic. The dataset was declared to be panel data and regressed using fixed-effects regression with directions to Stata to correct for the higher than normal levels of heteroskedasticity, because of the time-series nature of the study. State and time dummy variables were used to control for within state factors. The quadratic form produced the most significance and was therefore used in my final regressions. Below are my final regression results. The results of the other functional forms have been archived in Appendix A.

Regression Results

VARIABLES	(1) Income Per Capita	(2) Median Household Income	(3) Unemployment Rate
Avg. Taxes Paid	0.3133**	-0.0399	-0.0001
	(0.142)	(0.137)	(0.000)
Spending Per Capita	-0.0563*	0.0330	0.0001
	(0.032)	(0.075)	(0.000)
% Property Taxes	-93.67	-428.02**	0.0969**
	(121.240)	(192.684)	(0.040)
% Sales Taxes	-194.74	-281.82	0.0682
	(131.056)	(226.694)	(0.046)
% Income Taxes	-181.04	-220.16	-0.0479
	(165.955)	(237.338)	(0.070)
% Business Taxes	1,439.04***	393.94	-0.4625**
	(498.913)	(452.417)	(0.189)

Business Squared	-161.10**		0.0367**
	(70.515)		(0.017)
% Charges	-734.02**	-1,921.64***	0.2774**
	(301.258)	(403.052)	(0.113)
Charges Squared	6.14*	20.83***	-0.0028**
	(3.059)	(3.915)	(0.001)
% Capital Spending	326.10***	599.10***	-0.1762***
	(85.947)	(204.511)	(0.041)
% Welfare Spending	196.62**	265.56	-0.0737*
	(76.189)	(187.779)	(0.038)
% Without HS Degree	-305.06	-803.03**	-0.0263
	(184.318)	(373.555)	(0.091)
% Pop. Under18	239.62	-125.84	0.2573***
	(209.100)	(427.574)	(0.090)
% Pop. Over 65	-53.93	-48.63	0.3318**
	(271.466)	(532.565)	(0.145)
Right-to-Work	-1,463.64***	-233.31	0.5003**
	(460.069)	(1,305.211)	(0.212)
Minimum Wage	3,696.37***	547.24	-0.2724***
	(713.286)	(338.490)	(0.076)
Min. Wage Square	-303.63***		
	(65.200)		
Year 2000	83.43	-1,066.35*	-0.3478***
	(194.028)	(564.552)	(0.087)
Year 2002	639.07	-4,570.65***	-0.3962**
	(465.721)	(1,149.631)	(0.176)
Year 2004	447.16	-10,340.52***	0.6248**
	(703.289)	(1,473.999)	(0.295)
Year 2005	-716.14	-13,541.53***	0.3676
	(849.559)	(1,576.115)	(0.327)
Year 2006	911.61	-15,972.24***	0.1925
	(852.026)	(1,766.935)	(0.382)
Year 2007	1,881.04**	-17,434.34***	-0.2026
	(906.330)	(1,899.628)	(0.431)
Year 2008	1,276.79	-19,039.79***	-0.3000
	(1,287.340)	(2,161.756)	(0.491)
Year 2009	1,228.86	-20,764.53***	0.4828
	(1,240.856)	(2,530.704)	(0.532)
Year 2010	1,239.51	-26,591.91***	3.88***
	(1,383.747)	(2,919.457)	(0.606)
Constant	46,263.82***	135,566.47***	-9.17**
	(14,440.599)	(21,847.691)	(4.545)
Observations	478	478	478

R-squared	0.452	0.886	0.821
Number of State	50	50	50

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All real values have been adjusted for inflation

Variance Inflation Factors

After determining that the quadratic functional form produced the best regression results, I ran variance inflation factor tests on all three of my final regressions to check for multicollinearity. Variance Inflation Factor tests indicate multicollinearity where the VIF value is greater than 10 and the tolerance, which is defined as 1/VIF, is less that .10 (UCLA, n.d.). The only cases of collinearty reported by my VIF tests were in the quadratic terms, which are endemic to the form. These tests are archived in Appendix B.

Regression Findings

My regression results are an interesting combination of expected and unexpected outcomes. Most of the results from my three regressions seem plausible. However, there are a few instances that seem to beg for further study, and suggest the existence of omitted variable bias.

Income Per Capita

Of the three regressions, Regression 1, the effect of the average taxes paid on income per capita, is the least predictive, possessing an R-squared of just .452. The

independent variable, average taxes paid, is significant, and positive with a $.31 increase in income for every dollar extra paid in taxes. This indicates that as incomes rise, so do taxes. For example if income per capita rises by $1, wouldn't we expect taxes per capita to rise also? Because people pay tax on their income, taxes paid are a function of income, which makes this variable endogenous. You could say that you leave it in the regression as a control variable, to help isolate the marginal impact of other variables of interest. Spending per capita too, was significant, but with an overall negative sign. The coefficient indicates that for every $1 increase in spending per capita, income per capita falls 5.6 cents. So if spending per capita rises by $1000, income per capita is expected to fall $56.

The effects of different sources of tax revenue are notable for being mostly insignificant. Of the four taxes, only business taxes registered as significant. Business taxes trend along a parabolic curve, raising income by $1,439 on one side of the curve per each 1% rise, and lowering them by $161 on the other. To determine the overall impact of charges on income per capita, it was necessary to calculate the inflection point of the curve, which is 4.47%. Business taxes that make up a greater percentage of revenue than this point reduce income per capita. Since the mean for business taxes is 2.47%, it is probable that many states are failing to maximize income growth in their states. Charges (fees) by state and local entities follow a similar trend. As charges rise by 1%, income drops by $734, but this is offset by an increase in income of $6.14 for every 1% increase in the square term. The inflection point is 59.81%. Spending above this point produces positive benefits for per capita income and spending less lowers income on average.

Since the mean for charges is 33.1%, many states are generating negative growth in this area.

Findings about the effects of specific spending on income both proved significant and resulted in a combination of the expected and the unexpected. Although Mofidi & Stone (1990) found transfer payments detrimental to economic growth, here, we see 1% increases in welfare spending actually raising income by $196 a year. Relative to the mean income per capita, which is around $41,000 a year, this amount is not life altering, but it refutes the notion that welfare spending is necessarily a drain on overall income growth. Conventional wisdom about the benefits of capital spending proved to be more accurate. 1% increases in capital spending tracked with per capita income increases of $326 per year. Demonstrating the value of investment in infrastructure and human capital.

The effects of labor factors are very much a mixed bag. As I predicted in Chapter 3, the effect of right-to-work labor laws have a negative influence on per capita income, to the tune of $1,463 a year. Likely due to decreased wages. Minimum wage law was also significant as well, and has a parabolic relationship with income. This seems reasonable, because as minimum wages rise, so should income per capita, but it also makes sense that, after a certain point, raising the minimum wage will discourage employers from hiring, putting people out of work and thus lowering income per capita. As the minimum wage increases by $1, per capita income rises by roughly $3,696. But, being quadratic in nature, it also drops by $303 times the square of the minimum wage. The inflection point of this curve then, is $6.09. A minimum wage higher than this point

will result in a loss of income per capita. The current federal minimum wage is $7.25, although tipped employees can be paid as little as $2.13, which means it is probable that income per capita is being adversely affected by current minimum wage law.

The effects of population age and education were not found to be significant influences on per capita income. In the case of education this is particularly surprising, as investment in human capital is widely considered to be an important factor in economic growth (Helms, 1985). I think there is an omitted variable at play here. It is possible that the total percentage of high school non-graduates, which is around 15% of the population of this study, are simply not enough of a drag on the economy to really register. But, given the result of my median household income regression, I think the former is more likely.

Median Household Income

With an R-squared of .886, Regression 2, the effect of average taxes paid on median household income, is the most predictive of my three regressions. However, average taxes paid, the independent variable, proved to have a statistically insignificant affect on median household income. Spending per capita has a statistically insignificant impact as well. Thus, my two broadest measures of taxation and spending were immediately ruled out by this regression.

Once again, the effect of revenue measures on income seemed to be largely insignificant. Of the four tax measures accounted for in the regression only one, percentage of revenue drawn from property taxes, has a significant impact on median

household income. A 1% increase in property tax tracks with a $428 yearly loss in median household income. Percentage of revenue coming from charges was significant again in this regression and once again followed a parabolic curve this time resulting in negative growth $1,921 for every 1% increase in charges coupled with positive growth $20.82. The inflection point of this curve then, is 46.13%, which is above the mean for percentage revenue from charges, indicating that charges on average are actually having a negative influence on median household income.

Spending variables' effect on median household income yielded little new information. Percentage of welfare spending came back as an insignificant factor affecting median income. Capital spending is significant and, as with income per capita, is positively correlated. A 1% increase in capital spending results in an increase of $599 to median household income.

Labor factors' effect on median income, as with income per capita, is sporadically significant. Once again, population age was insignificant altogether. Right-to-work status and minimum wage, which were both significant factors for income per capita, are not significant when regressed against median household income. Newly significant in this regression is my education variable, which tracks the percentage of the population lacking a high school degree. An 1% increase in the share of the population without a diploma of any kind is associated with a decline in median household income of $803 a year, which meets expectations that individuals with more education are likely to make more money (Helms, 1985).

Unemployment Rate

Though not quite as predictive as median household income, Regression 3, which measures the effect of average taxes paid on the unemployment rate, returns with a respectable R-square of .821. As with Regression 2, the impact of average taxes paid on the dependent variable is insignificant. In fact, not only is the variable itself insignificant, but the coefficient, which had to be rounded to a ten-thousandth of a percent, is exceedingly tiny. A condition repeated by the spending per capita variable. Which means that in the final two regressions, the two broadest variables in play, the independent variable average taxes paid, and spending per capita are either insignificant or possess coefficients that are triflingly small.

Specific revenue variables however, do seem to have a more highly correlated impact on unemployment than they do on my income variable. For example, a 1% increase in property taxes results in a nearly 0.1% increase in the unemployment rate. Two more revenue variables that are significant are percentage revenue coming from business/corporate taxes and percentage revenue coming from charges and fees. Both are quadratic in nature as well. Taxes on businesses follow a parabolic curve and initially yield declines in unemployment of 0.46% per 1% increase, but which is offset by increases of 0.04%. The inflection point of this curve then, is 6.3%. The mean for business taxes as a percentage of revenue is 2.47%, which indicates that, on average, business taxes have a positive overall effect on employment. States whose business taxes exceed 6.3% of their revenue see unemployment rise. Notably, the other regression forms I tried also resulted in significance for this variable; a 1% increase for linear, logarithmic,

and log-semilog regression resulting in increases in employment of 0.01%, 0.03%, and 0.04% respectively. This tracks rather closely with the declines in unemployment we would expect to see past the inflection point, and seems to be evidence in favor of the quadratic finding. Charges are parabolic as well, going 3 for 3 in each of my quadratic regressions, raising unemployment 0.28% on one hand and dropping it by 0.003% on the squared term, resulting in an inflection point of 49.54%, much higher than the mean for charges, which is 33%. Charges therefore have positive influences on income per capita, median household income, and unemployment.

Both of my spending variables were significant in Regression 3, and both had a negative impact on unemployment. Capital spending increases of 1%, decrease unemployment by about 0.18% and welfare spending increases of a percent decrease it by about 0.07^{th} of a percent. In the case of unemployment both of these results make sense. Capital spending, on things like schools and infrastructure, create jobs and create opportunity, which are likely to positively affect employment (Helms, 1985). Meanwhile, welfare spending, which transfers money from the state to individuals, could possibly result in lower unemployment via several means. Welfare may allow some individuals to take lower paying jobs because their income is being augmented by the state, similar to how the Earned Income Tax Credit is designed to incentivize employment. Or, oppositely, it may induce some members of society to give up looking for work and just live off of welfare, which would result in them being removed from unemployment statistics. Either situation is plausible.

In general, Regression 3 returned more significance for labor variables than did

Regression 1 or 2, but its results are by far the most perplexing. My education variable, percentage of the population without a high school degree, is insignificant implying that a low degree of education has no significant effect on unemployment. For the first time, controls for age become significant, but their signs are the opposite of what I would have expected. 1% increases in the number of people under age 18 results in unemployment increases of 0.26% and the same increase in the number of over 65 citizens results in an unemployment increase of 0.33%. Given the fact that the young and the elderly are usually either too young to be working full-time or old enough to be in retirement, these findings are contrary to my expectations. This control was actually intended to exclude the economically inactive and dependent from comparison to people working and contributing to the economy in their prime. Thus, the age variables should have driven unemployment rate downward, not upward. I suppose it is possible that people under the age of 18 and over the age of 65 are just seeking more employment than I had anticipated, but I think a more likely reason for this finding is the existence of an omitted variable that is affecting the relationship between age and my regressions in general.

Similarly odd results were reached for other my other labor variables. Right-to-work laws apparently increase unemployment by about 0.5%, while minimum wage increases of 1 dollar decrease unemployment by 0.27%. In the case of minimum wage law, it is traditionally held that higher wages result in lower employment, but the argument can be made that increasing the minimum wage might incentivize the unemployed to take jobs they otherwise might have overlooked (U.S. Department of Labor, n.d.). No such rationalization exists for my right-to-work variable. Right-to-work

laws eliminate barriers to employment that are otherwise put up by unions. If anything, right-to-work laws should result in an increase in unemployment. So this result is something of a mystery, and possibly a case where a correlation with the unemployment rates of various states is not contributing to causation.

Chapter 5

CONCLUSION

Voodoo Economics is a term coined by then presidential candidate George H.W. Bush during the Republican primary of 1980. It is a synonym for supply side economics, and refers to the "magical" quality of what then candidate Ronald Reagan was proposing, massive tax cuts that were supposedly going to result in economic growth without raising the federal deficit. It is a theory predicated on the assumption that taxes are a powerful driving factor in economic growth, and it has been a driver of public policy ever since the Reagan presidency. So, is that assumption well founded? In the 10 years of voodoo economics covered by this study, what can be said about the relationship between taxes and economic growth?

Confirmations and Explanations

Although the Laffer Curve is technically meant to describe the impact of different tax rates on government revenue, when one considers that the source of tax revenue is people and corporations, it also handily explains much about taxes and economics in general. Collect too few and you have anarchy, and government cannot enforce laws in such a way as to protect property. Collect too many, and you discourage private sector business altogether. Good policy is about finding the right balance of taxes and government intervention to efficiently fund the government while allowing private industry to maximize profit. And, much like with the Laffer Curve, this spectrum of government involvement would run along a parabolic curve. That is the theory anyways,

but I feel my findings here lend some weight to the concept. In every regression I ran, the most significance and the most realistic coefficients were derived from the quadratic form. The effect of taxes, spending, and labor factors on incomes and unemployment were heavily influenced by the fact that some variables were parabolic in nature. Instead of a direct, linear relationship between taxes and economic growth, the connection is more akin to something from *Goldilocks and the Three Bears*, where the best results are achieved when certain variables, like percentage of revenue from charges and percentage of revenues from business taxes, are proportioned just right. I take these findings as evidence confirming Laffer's take on broad impacts government can have on an economy.

The parabolic nature of taxes' effect on economic growth also cleared up another mystery for me. In Chapter 2, I noted a strange hesitancy in previous literature to provide hard numbers showing the magnitude of the effects of different taxes on economic growth. But with my findings establishing a parabolic relationship in several variables, this makes more sense. I would hazard a guess right now that studies even more comprehensive than my own would find even more variables parabolic in nature, and in that scenario, the best you can do is point out the sweet spot in terms of what government ought to be doing with its economic policy. You cannot determine magnitude in that instance, which is a little like telling someone how to do the right thing, but without being able to describe in too much detail about why. And that is before addressing whether or not your findings really support the existence of causal relationships, or if they are just correlational. It makes sense now, why so many regression studies end with broad

affirmations or refutations about the effect of taxes on economic growth, rather than with specific proscriptions.

Taxes and Economic Growth

My hypothesis, that taxes do not have the powerful economic impact we believe them to possess, is largely bared out by my results. My independent variable, average taxes paid, proved statistically insignificant for both median household income and unemployment. The one dependent variable it did have a relationship with, was per capita income, but the positive nature of the relationship suggests that higher income per capita simply results in paying more in average taxes paid, and that the relationship is more correlational than causal.

In every regression, no more than two tax variables showed significance, and the only two that did were percentage revenue derived from property taxes and percentage revenue derived from business taxes. The insignificance of income taxes in all three regressions is, in my opinion, one of the more interesting findings here. Income taxes are a huge source of debate in the United States, but their actual influence seems negligible. Property taxes, it would appear, have a straight up negative impact on most kinds of economic growth, with increases causing declines in median household income and increases in unemployment. It is recommended then, that these taxes be kept to a minimum. The effect of business taxes, are a more complicated issue. It has a significant effect on both income per capita and unemployment, but it is also parabolic in nature for both. For income per capita, the inflection point is 4.5%, but for unemployment, it is

6.3%. So which of these ideal revenue percentages should a state lean toward when making policy? Economically, increasing percentage of revenue beyond 4.5% reduces income per capita, but keeping it lower than 6.3% does not minimize unemployment to the fullest. The best way to resolve which number to favor would be to use magnitudes to determine which offers more benefit. But we cannot do that, so the best advice I can give is for a state to decide for itself which it thinks it needs more of, wealthier citizens or employed citizens.

Charges and Economic Growth

Originally, I included percentage of revenue from charges and fees as a variable strictly for the purpose of controlling for its effects. I had no notion that it would be one of the most consistently significant variables in the entire study. Like business taxes, it too is parabolic, with inflection points at 59.81%, 46.13%, and 49.54% for income per capita, median household income, and unemployment respectively. It is different, however, in that charges as percentage of revenue now need to equal or exceed these amounts to have a positive impact on economic growth, and the difference between the coefficients is much higher, making favoring one or two of these effects over the other a more difficult decision. What is more, it should be asked whether it is realistic for most states to raise 50-60% of their revenue from charges and fees. The mean for charges and fees as percentage of revenue is about 33%, but even that number is affected by outlier states like Alaska and Wyoming, which are some of the least populous, but use charges and fees to make up 40-70% of their revenues. California and Texas, the two most

populous states, by contrast, hover closer to around 30%. All of which begs the question, even if a state does benefit by raising more revenue through charges and fees, is that practice really sustainable for all states?

Spending and Economic Growth

The intended purpose of spending variables in my regressions was to account for the benefits and drawbacks of different kinds of government spending that are enabled by the revenue measures. To that end, some results were unsurprising. Capital spending proved to be the most significant variable in the entire regression and, as Mofidi & Stone (1990) and Papke & Papke (1986) and Benson & Johnson (1986) found in their studies, it has a generalized positive effect on economic growth. In my study, capital spending correlated strongly with meaningful increases in both per capita and median household income and with declines in unemployment.

Less consistent with my expectations and the prior literature, were my results for welfare spending. In two out of three regressions, it was significant, but with positive impacts on income per capita and on employment. The former finding makes some degree of sense if income is being redistributed from the top of the economic food chain to the bottom, but the latter one is more difficult to rationalize. How does increasing welfare spending as a percentage of the budget affect declines in unemployment? I suppose it is possible that a generous enough welfare program could have an effect whereby people simply stop looking for work. Indeed, this is a fear many on the right have. Perhaps this is evidence in support of that position.

Nevertheless, it is critical to note that my broad spending variable, spending per capita, proved an insignificant factor in both median household income and unemployment, and a significant, but negative factor in income per capita. As I had controlled for both capital and welfare spending specifically in the regression and both turned up positive results, this unexpected finding tells me that there is one or more omitted variables at play here. There are other kinds of transfer payments and spending in general that are either not returning on investment or influencing peoples' actions in some undesirable way.

Labor Factors and Economic Growth

The influence of labor factors on economic growth yielded diverse results. My education variable, though insignificant for per capita income and unemployment, had an expected negative influence on median household income. The inclusion of controls for people aged 18 and under and 65 and over were intended to factor out some of the economic non-actors who are either too young to work or retired and no longer looking for employment. It was a surprise then, to see both of these groups correlating to increases in unemployment. Perhaps our notions of when our search for employment begins and ends are outdated. Or maybe this just reflects the era we live in, with more people from these groups seeking employment because of tough economic times. More study is required to be sure.

My findings on right-to-work laws seem to bear out liberal positions on those policies. Living in a right-to-work state means making about $1,500 dollars less on

average, and those states that do have right-to-work laws have unemployment half a point higher than states that do not. Considering that the purpose of right-to-work laws is to free employees from union restraints, and thus make employment easier, this is a pretty firm refutation of the policy. Logically, it makes more sense that as barriers to employment fall, employment should rise. But since income per capita drops so far in the process, maybe the laws themselves are acting as a disincentive towards working, as though the job positions opened by right-to-work status are not worth taking.

Minimum wage law yielded some remarkable findings. Although we cannot gauge the magnitude of the minimum wage's effect on income per capita, the quadratic nature of the relationship does give us an ideal minimum wage level, $6.09. Although this is lower than the current federal minimum wage, and many would probably argue that it is not a living wage, it actually results in higher income per capita. How? Well maybe that is explained by the minimum wage's relationship with the unemployment rate. Ordinarily, one would think that increases in the minimum wage would act as a disincentive to employment, but in my study higher minimum wage correlates to lower unemployment. Part of this could be workers simply accepting work that, at lower wages, they would refuse do. But it is also possible that a relatively low minimum wage actually does result in enough of a bump in employment so as to raise the average amount, and therefore the per capita amount, of income in the market.

Putting It All Together

So when we put all these variables and all their effects together, what does my study really have to say about the relationship between taxes and economic growth? My answer would be that it is tenuous at best. Certain kinds of taxes affect certain kinds of economic growth, but taxes as a whole do not have a consistently significant effect. And even when they are significant, their magnitude is not consistently noteworthy. It would appear that certain kinds of spending, like capital spending, and certain kinds of labor policies, like right-to-work status, and revenues collected from charges and fees are ultimately more important points to consider when discussing broadly, the influence of government on the economy.

As I noted in Chapter 2, there is a high degree of discord among studies of this kind owing to the different variables used to stand in for the idea of taxes and the idea of economic growth. But what I take away from my work here is that this is the wrong approach. We should not be looking for the general effect of taxes on economic growth; we should be looking at the effects of specific taxes on many different kinds of economic growth. The effect of average taxes paid, my independent variable, on my three dependent variables, was simply not as revealing as observations like those I made about the effect of charges and fees on economic growth across income and unemployment, and the different inflection points thereof. Or even when just limiting discussion to a single measure of economic growth, results are more proscriptive in circumstances like my unemployment variable, where the parabolic nature of the charges and business taxes variables give hard values that policy can then be built around.

It pretty much goes without saying then, that future studies should endeavor to include far more variables than I have here. As many separate economic factors as possible relating to spending, taxation, and labor and regulatory policies, so as to control for effects yes, but also to read between the lines and observe how these different variables are playing off one another. A more comprehensive study should also include more controls for regional factors like demographics and natural resources.

Instead of looking at the big picture of how taxes affect economic growth, and trying to find a pattern that explains everything, we should focus instead on the many smaller pictures that have clearer patterns of their own. Ultimately, public policy is going to come down to raising and lowering specific taxes anyways. It is advisable that we spend more time examining those and putting pieces of the economic puzzle together piece by piece instead of trying to do it all at once.

APPENDIX A.

Regression Results Tables

Linear-Linear Regression Results

VARIABLES	(1) Income Per Capita	(2) Median Household Income	(3) Unemp. Rate
Avg. Taxes Paid	0.2195	-0.2144	0.0000
	(0.136)	(0.194)	(0.000)
Spending Per Capita	-0.0432	0.0230	0.0000
	(0.029)	(0.074)	(0.000)
% Property Taxes	-41.9004	-277.1023	0.0696
	(132.253)	(259.243)	(0.048)
% Sales taxes	-145.8368	-56.4041	0.0329
	(137.037)	(291.971)	(0.048)
% Income Taxes	1.4633	164.7924	-0.1146
	(184.160)	(279.442)	(0.071)
% Business Taxes	144.2278	322.0535	-0.1772*
	(272.742)	(513.426)	(0.104)
% Charges	-196.9780	-68.0859	0.0206
	(131.131)	(217.037)	(0.032)
% Capital Spending	338.9271***	640.8273***	-0.1808***
	(88.057)	(215.440)	(0.044)
%Welfare Spending	181.2280**	226.7276	-0.0714*
	(83.971)	(208.752)	(0.040)
% Without HS Degree	-383.7905*	-988.6380**	0.0088
	(192.501)	(395.673)	(0.091)
% Pop. Under 18	125.0811	-339.0112	0.2980***
	(214.161)	(391.844)	(0.085)
% Pop. Over 65	-85.1360	-35.3867	0.3248**
	(274.384)	(525.666)	(0.145)
Right-to-Work	-1,214.9881***	84.7684	0.4337*
	(412.419)	(1,280.618)	(0.229)
Minimum Wage	14.7346	623.5556	-0.2791***
	(321.831)	(386.669)	(0.085)

Year 2000	60.6662	-1,502.9773**	-0.2698***
	(202.586)	(573.319)	(0.082)
Year 2002	280.0708	-5,429.6066***	-0.1853
	(477.399)	(1,160.480)	(0.166)
Year 2004	419.7490	-10,823.1598***	0.7676**
	(709.940)	(1,519.343)	(0.288)
Year 2005	-598.4873	-13,983.3673***	0.4799
	(858.557)	(1,587.782)	(0.321)
Year 2006	1,157.1766	-16,420.8246***	0.2773
	(942.044)	(1,761.633)	(0.377)
Year 2007	1,720.3974*	-18,285.8462***	-0.0485
	(978.712)	(1,925.121)	(0.423)
Year 2008	974.4331	-20,153.1281***	-0.0993
	(1,358.685)	(2,174.322)	(0.482)
Year 2009	664.6519	-21,647.0616***	0.6655
	(1,206.750)	(2,561.883)	(0.523)
Year 2010	77.7525	-28,127.9391***	4.2132***
	(1,425.512)	(3,054.487)	(0.620)
Constant	47,929.6228***	93,107.1795***	-3.5783
	(13,990.418)	(22,692.764)	(4.886)
Observations	478	478	478
R-squared	0.402	0.878	0.813
Number of State	50	50	50

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Log-Linear Regression Results

VARIABLES	(1) Log of Income Per Capita	(2) Log of Median Household Income	(3) Log of Unemp. Rate
Avg. Taxes Paid	0.0000	-0.0000	0.0000
	(0.000)	(0.000)	(0.000)
Spending Per Capita	-0.0000	0.0000	0.0000
	(0.000)	(0.000)	(0.000)
% Property Taxes	-0.0022	-0.0034	0.0096

	(0.003)	(0.004)	(0.010)
% Sales taxes	-0.0036	-0.0016	0.0017
	(0.003)	(0.005)	(0.011)
% Income Taxes	-0.0006	0.0019	-0.0196
	(0.004)	(0.004)	(0.015)
% Business Taxes	0.0038	0.0058	-0.0321**
	(0.007)	(0.008)	(0.016)
% Charges	-0.0049	-0.0020	0.0054
	(0.003)	(0.003)	(0.006)
% Capital Spending	0.0096***	0.0082**	-0.0297***
	(0.002)	(0.003)	(0.009)
%Welfare Spending	0.0049**	0.0035	-0.0073
	(0.002)	(0.003)	(0.009)
% Without HS Degree	-0.0123**	-0.0001	0.0158
	(0.005)	(0.006)	(0.019)
% Pop. Under 18	0.0036	-0.0078	0.0267**
	(0.005)	(0.007)	(0.013)
% Pop. Over 65	-0.0028	-0.0025	0.0369*
	(0.006)	(0.008)	(0.021)
Right-to-Work	-0.0321***	0.0054	0.0987**
	(0.009)	(0.020)	(0.047)
Minimum Wage	-0.0023	0.0067	-0.0587***
	(0.008)	(0.006)	(0.020)
Year 2000	-0.0016	-0.0119	-0.0558***
	(0.005)	(0.008)	(0.018)
Year 2002	0.0012	-0.0505***	0.0093
	(0.011)	(0.016)	(0.036)
Year 2004	0.0023	-0.1138***	0.2270***
	(0.017)	(0.021)	(0.060)
Year 2005	-0.0262	-0.1533***	0.1743**
	(0.021)	(0.023)	(0.067)
Year 2006	0.0142	-0.1839***	0.1388*
	(0.022)	(0.025)	(0.079)
Year 2007	0.0259	-0.2046***	0.0694
	(0.023)	(0.028)	(0.089)
Year 2008	0.0075	-0.2226***	0.0704
	(0.031)	(0.032)	(0.102)
Year 2009	0.0038	-0.2475***	0.2474**
	(0.029)	(0.037)	(0.114)
Year 2010	-0.0054	-0.3657***	0.7264***
	(0.035)	(0.045)	(0.135)
Constant	10.8663***	11.3742***	0.7369
	(0.329)	(0.388)	(0.845)

Observations	478	478	478
R-squared	0.426	0.886	0.767
Number of State	50	50	50

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Log-Semilog Regression Results

VARIABLES (In log form excluding bolded variables)	(1) Income Per Capita	(2) Median Household Income	(3) Unemp. Rate
Avg. Taxes Paid	0.0216	-0.0030	0.0004
	(0.017)	(0.012)	(0.037)
Spending Per Capita	-0.0064	0.0042	0.0383
	(0.010)	(0.013)	(0.043)
% Property Taxes	0.0121	-0.0194	0.0011
	(0.048)	(0.059)	(0.214)
% Sales taxes	0.0025	-0.0426	-0.1800
	(0.056)	(0.073)	(0.239)
% Income Taxes	-0.0001	0.0012	-0.0236*
	(0.004)	(0.004)	(0.014)
% Business Taxes	0.0077	0.0069	-0.0387**
	(0.006)	(0.007)	(0.018)
% Charges	-0.1660**	-0.0852	0.1144
	(0.079)	(0.088)	(0.186)
% Capital Spending	0.1060***	0.0999***	-0.3431***
	(0.026)	(0.037)	(0.102)
%Welfare Spending	0.0424	0.0476	-0.0575
	(0.029)	(0.030)	(0.098)
% Without HS Degree	-0.1515	-0.2140*	0.1806
	(0.099)	(0.121)	(0.489)
% Pop. Under 18	0.0776	-0.1265	0.4968
	(0.143)	(0.139)	(0.307)
% Pop. Over 65	0.0434	0.0690	0.1876
	(0.083)	(0.108)	(0.304)
Right-to-Work	-0.0329***	0.0032	0.0974**
	(0.010)	(0.016)	(0.048)
Minimum Wage	0.0109	0.0373	-0.3350***

	(0.040)	(0.023)	(0.078)
Year 2000	0.0065	-0.0168**	-0.0668***
	(0.004)	(0.007)	(0.021)
Year 2002	0.0176	-0.0717***	-0.0063
	(0.012)	(0.016)	(0.048)
Year 2004	0.0239	-0.1519***	0.2061**
	(0.018)	(0.022)	(0.081)
Year 2005	-0.0016	-0.1987***	0.1481
	(0.020)	(0.025)	(0.092)
Year 2006	0.0395	-0.2386***	0.1103
	(0.024)	(0.029)	(0.108)
Year 2007	0.0521*	-0.2651***	0.0340
	(0.027)	(0.033)	(0.127)
Year 2008	0.0373	-0.2919***	0.0267
	(0.036)	(0.039)	(0.153)
Year 2009	0.0324	-0.3249***	0.2034
	(0.037)	(0.044)	(0.180)
Year 2010	0.0064	-0.4497***	0.6888***
	(0.044)	(0.051)	(0.205)
Constant	10.6556***	12.0580***	0.7044
	(0.928)	(1.055)	(2.904)
Observations	478	478	478
R-squared	0.419	0.888	0.765
Number of State	50	50	50

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

APPENDIX B.

Variance Inflation Factor Test Tables

Regression Variance Inflation Factors

VIF for Regression 1 Income Per Capita

Variable	VIF	1/VIF
Minimum Wage Square	47.37	0.021108
Minimum Wage	44.25	0.022598
% Charges	40.8	0.024511
%Charges Square	30.94	0.032322
%Business Tax Square	14.14	0.070698
% Business Tax	13.67	0.073161
% Sales Tax	6.59	0.151793
% Income Tax	5.82	0.171869
% Property Tax	5.78	0.172915
% Pop. Under 18	3	0.333543
% Pop Over 65	2.66	0.376201
% Capital Spending	2.46	0.406833
% Without HS Degree	2.42	0.413009
Avg. Taxes Paid	2.19	0.455801
% Welfare Spending	2.16	0.463001
Right-to-work	2.1	0.4766
Spending Per Capita	1.23	0.81492
Mean VIF	9.54	

VIF for Regression 2 Median Household Income

Variable	VIF	1/VIF
% Charges	40.31	0.024806
% Charges Square	29.94	0.033398
% Sales Tax	6.47	0.15454
% Property Tax	5.74	0.174098
% Income Tax	5.03	0.198698
% Pop. Under 18	2.88	0.347151
% Capital Spending	2.39	0.418789
% Without HS Degree	2.38	0.420016
% Pop. Over 65	2.26	0.44209
Average Taxes Paid	2.13	0.469613
% Welfare	2.11	0.474215
Right-to-work	2.08	0.479785
Business Tax	1.99	0.502931
Minimum Wage	1.64	0.61124
Spending Per Capita	1.21	0.825249
Mean VIF	5.37	

VIF for Regression 3 Unemployment Rate

Variable	VIF	1/VIF
% Charges	40.5	0.024689
% Charges Square	30.41	0.032885
% Business Tax Square	14.03	0.071282
% Business Tax	13.43	0.074464
% Sales Tax	6.58	0.151892
% Income Tax	5.8	0.172322
% Property Tax	5.74	0.174096
% Pop. Under 18	3	0.333832
% Over 65	2.64	0.378254
% Capital Spending	2.41	0.414191
% Without HS Degree	2.39	0.417872
Avg. Taxes Paid	2.15	0.464822
% Welfare	2.11	0.47345
Right-to-work	2.09	0.478266
Minimum Wage	1.64	0.610556
Spending Per Capita	1.21	0.82374
Mean VIF	6.26	

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