

## ABSTRACT

Title of Document: EXAMINING HOW STATE FUNDING FOR HIGHER EDUCATION IS INFLUENCED BY LEGISLATOR POLICY PREFERENCES: A DYNAMIC PANEL ANALYSIS.

Joseph Andrew Williams, Doctor of Philosophy, 2014

Directed By: Dr. Marvin A. Titus, Department of Counseling, Higher Education, and Special Education

Guided by the spatial theory of voting, this study examines the influence of state legislator policy preferences, higher education interest groups, and other variables on state funding to higher education. Using data from all 50 U.S. states over a period of twelve years, this study utilizes a dynamic panel model with Generalized Methods of Moments (GMM) techniques to examine how a number of independent variables influence state funding for higher education. Dynamic panel modeling with GMM techniques addresses methodological limitations of prior research by accurately examining a lag of the dependent variable included as an independent variable while accounting for unobserved state-specific fixed-effects, time-related fixed-effects, and possible endogeneity of one or more of the independent variables.

The results of this study indicate that more conservative state legislatures are associated with lower levels of funding to higher education while more liberal

legislatures are associated with higher levels of funding. Other variables, including prior year higher education appropriations, K-12 appropriations, gubernatorial strength, and the share of enrollment in private higher education are related to current year state appropriations to higher education.

The results from this study have a number of implications. First, this study utilizes the spatial theory of voting, a theory which has never been previously utilized in higher education research, to guide the selection of political variables, including state legislator policy preferences. Future research within political science and other academic disciplines can employ the spatial theory of voting to examine the influence of state legislator policy preferences on different policy outcomes. Second, future researchers may consider employing dynamic fixed-effects panel modeling with GMM techniques when including a lag of the dependent as an independent variable. Third, future studies can utilize the newly developed measures of policy preferences to understand the influence of state legislator policy preferences on a variety of state level policy outcomes. Fourth, an understanding of the influences of higher education funding will allow policymakers and administrators to better predict funding levels and plan future budgets.

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INFLUENCED BY LEGISLATOR POLICY PREFERENCES: A DYNAMIC  
PANEL ANALYSIS

By

Joseph Andrew Williams

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Advisory Committee:  
Associate Professor Marvin A. Titus, Chair  
Professor Steven Klees  
Associate Professor Noah Drezner  
Associate Professor David Karol  
Associate Professor Alexander Chen

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## **Chapter 1: Introduction**

All public institutions of higher education in the U.S. depend upon state funding for construction, faculty and staff salaries, operating expenses, and other critical needs. However, state financial support has rapidly declined over the past three to four decades. Mortenson (2005) estimates that state support for higher education has declined 40% since 1978 and Jenny and Arbak (2004) found that state appropriations have decreased by \$650 per student in the first few years of the 20th century. Furthermore, state higher education appropriations per full time student (inflation-adjusted) fell to a 25 year low in 2012 (SHEEO State Higher Education Finance FY 2012). In contrast to the decline in state support, there has been a 24% increase in tuition and fees at public colleges and universities from 2005 to 2010 (Trends in College Pricing, 2010).

The aforementioned decreases in financial support to higher education have forced higher education institutions to make various budgetary decisions. The Center on Budget and Policy Priorities (CBPP) cites recent examples of increased faculty workloads, faculty and staff layoffs, scholarship eliminations, and other budget cuts to public colleges and universities across the nation (Johnson, 2011). Additionally, increased tuition and decreased state financial support impose difficult decisions for state policymakers as they consider how to improve college attendance and completion. For example, California public universities recently experienced a 20% decline in state funding and have been forced to reduce their enrollments and raise tuition (McMillan, 2011). These reductions in state financial support for higher education have prompted researchers to study what influences state higher education funding throughout the states.

Recent studies investigating state appropriations to higher education show that prior state appropriations to higher education and certain state characteristics are statistically significant predictors of state funding appropriations (e.g. McLendon, 2003; McLendon, Hearn, & Mokher, 2009). Similarly, the presence of competing budget items, such as corrections, K-12 funding, and health care crowd out funding for higher education within states (Kane, Orszag, & Apostolov, 2005; Okunade, 2004). Additionally, higher education governance structures, the political party of the governor, and gubernatorial power have been shown to influence higher education funding (e.g., Knott & Payne, 2003; McLendon et al., 2009). Another variable, higher education interest groups, has also shown to be statistically significant in previous research assessing state funding for higher education (e.g., Tandberg, 2008). Specifically, previous research has depicted that an increase in higher education interest groups positively influences state appropriations to higher education (e.g., Tandberg & Ness, 2011). Another variable, divided legislature, depicting whether a state had a unified or divided state legislature, also influences state appropriations to higher education (Tandberg, 2008). Overall, prior appropriation levels, state characteristics, competing budget items, higher education governance structures, political party of the governor, gubernatorial strength, divided legislature, and higher education interest groups are shown to influence higher education funding. Additionally, scholars have begun to assess how political parties influence state funding for higher education (e.g., Tandberg, 2007, 2009; Dar, 2012).

Previous studies determined that Democratic governors and legislators within US states have funded postsecondary education at proportionally higher levels compared to

their Republican counterparts (Dar & Spence, 2011). This finding may seem intuitive because Democrats are typically associated with higher spending on social services, including higher education (Archibald & Feldman 2006; McLendon, Hearn, & Deaton 2006). However, not all members of the same political party, whether it is the Democratic or Republican Party, have the same policy preferences regarding state budget items, including higher education funding. For example, a Democratic legislature in the Northeast US may have a different policy preference than a Democratic legislature in a southern state, causing a vastly different stance on higher education funding. A recent study by Shor and McCarty (2011) determined that certain Democratic parties in the southern part of the US are, in fact, more conservative than Republican parties in the Northern US. These results reported by Shor and McCarty (2011) indicate that there are different policy preferences within the Democratic or Republican parties across states. The different policy preferences within parties may help explain why Democrats in some states fund higher education at higher levels than Democrats in other states. Studying how different policy preferences, within the US political parties, are associated with higher education funding can provide a more nuanced and detailed examination of how political variables influence state higher education funding.

In order to study how different legislator policy preferences influence higher education funding, a variety of theoretical frameworks can be considered. The majority of studies investigating the influences of state appropriations to higher education have utilized theories such as the policy innovation and diffusion framework (e.g., McLendon, 2003; McLendon, Deaton, & Hearn, 2007; McLendon, Heller, & Young, 2005), the fiscal policy framework (e.g., Tandberg, 2006, 2007, 2010), or rational choice theories (e.g.,

Weerts & Ronca, 2008; Doyle, 2007). The theoretical frameworks found within these aforementioned studies come from a variety of disciplines. However, only a few studies (e.g., Dar, 2012; Toutkoushian & Hollis, 1998) have employed a framework grounded within political science and employed robust statistical techniques to study how political parties, and policy preferences within political parties, influence state appropriations to higher education. Frameworks grounded within political science can more appropriately guide studies seeking to assess how political factors influence policy outcomes. Therefore, this study utilizes a framework grounded within political science to examine how political factors influence higher education funding.

Though a few recent higher education studies have begun to examine how political variables influence higher education funding, numerous scholars (e.g., McLendon et al., 2009) have pointed to the need for further research in this area. McLendon et al., (2009) presented a paper that outlined the need for further research and Tandberg (2008) recently called for additional research on how state politics affect state support for higher education. Tandberg (2008) found preliminary evidence that decisions made by elected officials during the political process influence higher education funding. Another study by Doyle (2007) points out that the research on the effects of politics on state policies for higher education is only at a starting point. He writes that a variety of theoretical models have been utilized to study the politics of higher education, but further investigation is needed on other potential models. Hossler, Lund, Ramin, Westfall, and Irish (1997) conducted a study in which the authors had difficulty determining the exact variables affecting state appropriations to higher education. They concluded that, similar to other literature on this topic, the size of the public postsecondary system and previous

levels of funding were the only significant variables shown to influence levels of state appropriations to higher education and that further studies are necessary. In a different article, McLendon (2003) detailed the need for studies investigating the effect of politics on state appropriations to higher education. He noted that few studies have tried to explain the relationship between politics and higher education spending and claims that there are vast limitations in the conceptual frameworks of previous studies. Overall, the studies cited here show that there has been a preliminary analysis of how political variables influence funding for higher education. However, many scholars have called for further research in this area. Specifically, there is a need to examine how policy preferences, within political parties, influence higher education funding. Additionally, because the presence of higher education interest groups have been shown to influence state appropriations to higher education (e.g., Tandberg, 2008; Tandberg & Ness, 2011) there is a need to examine how policy preferences, interacting with higher education interest groups, influence state appropriations to higher education.

### Purpose

Using the spatial theory of voting and advanced statistical techniques, this study examines the influence of state legislator policy preferences, higher education interest groups, and other variables on state funding to higher education. The limitations of previous research will be outlined to portray the need for a theoretical framework grounded within political science for this study. Although the theoretical framework within this study concentrates on how policy preferences influence state funding of higher education, other variables are taken into account.

First, this study examines how a set of variables found to be statistically significant in previous research influence higher education funding. Second, study builds upon prior research by examining how state legislator policy preferences and state legislator policy preferences interacting with higher education interest groups influence state appropriations for higher education.

### Research Questions

This study intends to examine how state legislator policy preferences and higher education interest groups influence state appropriations to higher education, controlling for other variables. The following research questions will be addressed:

1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?
2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?



3. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

### Theoretical Framework

A theoretical framework embedded within political science is most appropriate when studying the effects of policy preferences on policy outcomes. One such theory, the spatial theory of voting, will be the theoretical framework guiding this research study. The spatial theory of voting posits that legislators evaluate policy alternatives and make policy decisions based on their own preferences (Enelow & Hinich, 1984). Additionally, rather than simply classifying legislator policy preferences as dichotomous (Democratic or Republican), this framework describes policy preferences on a continuous scale. Thus, the spatial theory of voting depicts how policy preferences differ for legislators within the same political party. A continuous scale measuring policy preferences allows for a more extensive understanding of the political philosophies within and across U.S. states. In summary, the spatial theory of voting assumes that legislators evaluate policy alternatives and make policy decisions based on their own preferences.

A number of previous studies have utilized the spatial theory of voting to analyze legislative decision making (e.g., Bailey & Chang, 2001; Jenkins & Sala, 1998; McCarty

& Poole, 1995). Previous studies have utilized the spatial theory of voting to analyze the influence of the policy preferences of US Presidents and Supreme Court Justices on legislative decision making (Bailey & Chang, 2001). Other authors have employed this theory to assess the influence of policy preferences of the US Congress on legislative decision making (Poole & Rosenthal, 1987, 1991, 2001, 2007). However, this framework has yet to be used in the field of higher education to guide studies examining the influence of policy preferences on state appropriations to higher education.

There are multiple reasons for choosing the spatial theory of voting for this study. First, researchers in political science often try to understand the reasons why policies are enacted, given the different political actors involved. These actors can include governors, legislators, and interest groups. As previously mentioned, many of these studies researching the effects of political actors on policy decisions employ the spatial theory of voting (e.g., Jenkins & Sala, 1998; McCarty & Poole, 1995). Within these studies, the authors determined the influence of political actors' preferences on policy outcomes. Therefore, because the spatial theory of voting has been helpful in understanding political influences on policy decisions in other research, the spatial theory of voting will be used for this study. Second, the spatial theory of voting has been chosen for this study given its effective use in past quantitative research. Qualitative studies that assess how political factors influence policy use different theoretical frameworks, such as organizational theory (Kingdon, 1984), political systems perspective (Fischer, 1990; Wirt & Kirst, 1972), and the power influence perspective (Campbell & Mazzoni, 1976). However, this study will utilize a large data set which contains variables from multiple states over multiple years, requiring the use of a quantitative method. Other scholars have

effectively utilized the spatial theory of voting in previous quantitative research with similar datasets (e.g., McCarty and Poole, 1995). In summary, this study will employ the spatial theory of voting given its effective use in prior quantitative studies examining the effects of political actors on policy decisions.

## Research Design

### *Variables*

The dependent variable in this study is state appropriations to higher education per capita. This data is collected on an annual basis by Grapevine, a joint project of the Center for the Study of Education Policy at Illinois State University and the State Higher Education Executive Officers (Palmer, 2009), through the use of surveys that measure state tax support for higher education within each U.S. state. The Grapevine survey measures tax appropriations to all sectors of higher education (public and private). Measuring state appropriations per capita allows for a comparative measurement across states of the relative proportion of state appropriations to higher education relative to the total state population.

The independent variables within the study include: 1) prior year state appropriations to higher education, 2) state characteristics, which include: unemployment rate, tax and expenditure limitation laws, per capita total enrollment in higher education, and share of higher education enrollment in private institutions, 3) competing budget items, which include: K-12 expenditures per capita, Medicaid expenditures per capita, and prison expenditures per capita, 4) higher education governance systems, and 5) political variables, which include: state legislator policy preferences, political party of the

governors, gubernatorial strength, divided legislature, higher education interest groups, a variable comprising the interaction of state legislator policy preferences and higher education interest groups, political party of the governors, and gubernatorial strength.

The independent variable, prior state appropriations to higher education will be represented as a lagged value of the dependent variable, current state appropriations to higher education. The independent variables representing state characteristics, including unemployment rate, tax expenditure and limitation laws, per capital total enrollment in higher education, and share of higher education enrollment in private institutions are collected from a variety of sources, including; The United States Department of Labor's Bureau of Labor Statistics to capture unemployment rates (Bureau of Labor Statistics, 2013), a dataset compiled by Archibald and Feldman (2006) to compile tax and expenditure laws, and the National Center on Education Statistics Digest of Education Statistics to acquire data on enrollments in higher education, share of higher education enrollment in private institutions, and K-12 expenditures (U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics, 2014). The Centers for Medicare and Medicaid Services provides Medicaid expenditures data (Centers for Medicare and Medicaid Services, 2013) and The Bureau of Justice Statistics contains prison expenditures information (Bureau of Justice Statistics, 2013). Higher education governance systems information is drawn from The Education Commission of the States and will represent whether a state has a coordinating agency, governing board, both a coordinating agency and governing board, or neither a coordinating agency nor governing board (Fulton, McGuinness, L'Orange, 2014). Data on the political party of the governors is collected from the *Governor's Dataset* from Klarner (2013).

Gubernatorial strength will be collected from *The Institutional Power Ratings for the 50 Governors of the United States*, a dataset managed by Thad Beyle (2013). Divided and unified government data is collected from the U.S. Census, *Statistical Abstract of the United States* (2012).

State legislator policy preference data are *not* be derived from citizen ideology or interest group ratings, which has been the measurement in previous studies. Rather, state legislator policy preferences are derived from data collected in a survey of state legislators. Shor and McCarty (2011) have developed a continuous scale depicting state legislators' policy preferences based off of responses to a survey and past state legislature voting which can be compared across states. The survey, conducted by Project Votesmart National Political Awareness Test (NPAT), asks the same questions to incoming legislators in all states, allowing for a direct comparison of issue stances for legislators across states. The responses of this survey are utilized to estimate the political viewpoints of states and state legislators. Data for this statistic are drawn from the *State Legislative Aggregate Ideology Data*, a data set compiled by Shor and McCarty, most recently updated in 2012. This dataset contains state legislator policy preference data for each US state, excluding Nebraska, for years 1998 through 2009.

### *Methodology*

A dynamic fixed-effect panel (DFEP) model estimated via a system GMM estimator will be the quantitative method for this study. This method was selected for a variety of reasons. First, this econometric technique will allow for an examination of

how prior year state appropriations to higher education influence current appropriation levels. Second, DFEP models account for unobserved state-specific fixed-effects and time-related fixed-effects. Third, this technique will account for possible endogeneity of one or more of the independent variables. Overall, a DFEP model will allow for an interpretation of how current higher education appropriations are influenced by prior levels of appropriations and other past predictors of higher education appropriations. Because biased estimates may be found when utilizing DFEP models, the DFEP model combined with Generalized Method of Moments (GMM) techniques will be employed in this study to more accurately examine how lagged independent variables influence the dependent variable.

#### Limitations

This study may be limited in a few ways. First, in dynamic fixed-effects panel data analyses, causality cannot be determined; rather, it can only be inferred. Second, though this study intends to include all the independent variables influencing state appropriations to higher education, there may be other possible variables, not included in the analysis, which may influence the dependent variable. Third, this study is limited in the number of years included for analysis. Because one of the key independent variables, state legislator policy preferences, has only been consistently collected for each state from 1998 to 2009, only 12 years of data are used in this investigation.

## Implications

This study has possible implications for theory. The spatial theory of voting has yet to be employed in the higher education finance literature. Utilizing the spatial theory of voting in studies analyzing how policy preferences influence higher education policies adds to the growing body of higher education finance literature by offering an alternative theoretical framework to consider for future studies. Additionally, previous literature has examined the influence of higher education interest groups on state appropriations to higher education (e.g., Tandberg, 2008). However, this study utilizes the spatial theory of voting to examine whether the interaction of policy preferences and higher education interest groups influences state appropriations to higher education.

This study has potential implications for research. The statistical method utilized in this study, dynamic fixed effects panel modeling with Generalized Methods of Moments (GMM) techniques, has only been employed once before in higher education research (Titus, 2009). However, this method has never been utilized in studies examining state funding for higher education. This method is most appropriate to utilize to quantitatively analyze panel data which includes a lag of the dependent variable as an independent variable. In addition, this study shows the effectiveness of utilizing newly developed measures of policy preference data to understand that influence of state legislator preferences on higher education funding.

This study also has possible implications for policy. A better understanding of how a number of variables, including political variables, influence state appropriations to higher education can help policymakers and administrators predict future appropriation levels. Moreover, examining how differing policy preferences, and the influence of

policy preferences interacting with higher education interest groups, affect higher education funding can help institutional leaders and policymakers forecast future funding trends.



## Chapter 2: Review of the Literature

### Introduction

This study intends to examine the influence of state legislator policy preferences, higher education interest groups, and other variables on state funding to higher education. The theoretical framework guiding this study is the spatial theory of voting. This chapter reviews and critiques the literature discussing state funding to higher education and the spatial theory of voting.

A number of prior studies (e.g., Archibald & Feldman, 2006; Dar, 2012; Hossler, Lund, Ramin, Westfall, & Irish, 1997; McLendon, Hearn, & Mokher, 2009) have attempted to examine the influences of state higher education appropriations. One set of studies (e.g., Clotfelter, 1976; Peterson, 1976) examined the influence of student enrollments on state appropriations to higher education. A second set of studies, (e.g., Adams, 1977; Delaney & Doyle, 2007, 2011) assessing the influences of state appropriations to higher education, examined how state economic conditions affected higher education appropriations. A third set of studies (e.g., Archibald and Feldman, 2006; Dar, 2012) focused on higher education funding as part of a political process. These studies have utilized a variety of theoretical frameworks and conceptual models. Further, a few studies (e.g., Kane, Orszag, & Apostolov, 2005) have not utilized a theoretical framework when analyzing state appropriations to higher education. The first part of this chapter will review the previous literature focusing on state funding to higher education and examine the theoretical frameworks in these studies.

The second part of this chapter will review the spatial theory of voting and evaluate how this theory has been utilized in previous literature. The second part of this

chapter will also discuss how the spatial theory of voting can guide studies examining the influence of legislator policy preferences on state funding of higher education.

Given the purpose of this study, a discussion of the gaps in the literature will be presented in this chapter in order to portray the need for further research to address the following research questions:

1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?

2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

3. Taking into account prior state appropriations to higher education, state characteristics, higher education

governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

## Previous Studies Examining State Financing of Higher Education

### *Student Enrollment and State Appropriations*

A number of studies have been completed over the last forty years analyzing the influencers of state appropriations to higher education (e.g., Peterson, 1976; McLendon et al., 2009; Okunade, 2004). One set of studies analyzing state appropriations to higher education focused on the association between higher education student enrollments and higher education appropriations. One of the first studies on student enrollments and higher education funding was published in 1976 (Peterson, 1976). In the study by Peterson (1976), the author analyzed how socioeconomic, environmental, and political variables influenced higher education appropriations. The author hypothesized that certain environmental and political traits influenced state funding to higher education. Further, the author considered how environmental and political traits affected appropriation levels at two points in time: 1960 and 1969. Within his analysis, Peterson (1976) was guided by the comparative policies theory. The comparative policies theory assumes that certain variables influencing one policy may also influence another policy. In particular, Peterson (1976) hypothesized that certain socioeconomic and political

variables, shown to be influential in previous policy studies on K-12 education and welfare, would also be influential variables in the study of higher education appropriations.

Within his study, Peterson (1976) included socioeconomic and environmental variables such as personal income per capita, corporate income per capita, percent of population college age, institutional enrollment, and the number of institutions within a state. Political variables included gubernatorial power, legislative professionalism, civil rights support, and interparty competition. The author employed correlation analysis and linear regression to examine how these socioeconomic, environmental, and political variables influenced higher education appropriations. Peterson (1976) found that the socioeconomic, environmental, and political variables were statistically significant predictors of higher education appropriations. Specifically, the author determined that states with higher levels of higher education funding were associated with a highly educated population. Additionally, enrollment levels in public institutions were correlated with higher education appropriations; as enrollment levels increased, higher education appropriations increased. In regards to the political variables, Peterson (1976) found that legislative professionalism was correlated with higher education appropriation levels in 1969, but not 1960. Further, powerful governors were positively associated with larger appropriation levels to higher education in 1969 and increased interparty competition was positively associated with increased appropriations toward higher education in both 1960 and 1969.

Overall, the comparative policies theory was useful in the selection of variables in the study by Peterson (1976) as many of the statistically significant variables found in

previous research showed similar statistical significance in his study. However, the political variables in the study by Peterson (1976) (e.g., legislative professionalism, interparty competition, and powers of the governor) did not fully capture all the potential political influencers affecting appropriations to higher education. For example, the makeup of the political parties in the state legislature and the policy preferences of the legislators were not examined in this study. Including additional political variables would have strengthened the study by Peterson (1976).

A different study conducted by Clotfelter (1976) also sought to examine the predictors of higher education appropriations. Similarly to Peterson (1976), the study by Clotfelter (1976) was one of the first research studies attempting to examine the influencers of higher education appropriations. The author utilized an economic demand model developed from earlier studies seeking to determine expenditures for state budget items. In particular, Clotfelter (1976) theorized that appropriations to higher education were determined by two factors: per-capita enrollment and state tax structures. However, he measured per-capita enrollment differently than Peterson (1976). Clotfelter (1976) defined per-capita enrollment as the number of college graduates in the state. He hypothesized that as more college graduates migrated out of state and the enrollment of college graduates decreased, appropriations to higher education would decrease. Additionally, Clotfelter (1976) theorized that states with simpler tax structures were associated with lower levels of spending on budget items, including higher education. Given this model, the author examined state appropriations to higher education in 1970 for all 50 US states.

Clotfelter (1976) utilized ordinary least squares regression to study the influence of enrollment and tax structures on higher education appropriations and had a number of conclusions. First, he found that out-migration of college graduates in a state had a positive statistically significant relationship with higher education appropriations. Although enrollment was defined slightly differently than in the study by Peterson (1976), Clotfelter (1976) found that increased enrollment was associated with increased funding levels to higher education. Second, the author determined that simpler tax structures were associated with lower appropriations to higher education. Overall, the study by Clotfelter (1976), comparable to the study by Peterson (1976), was one of the first empirical studies assessing the predictors of higher education appropriations. However, Clotfelter (1976) only assessed one year of appropriation levels in his study and was therefore unable to determine higher education funding trends over time. Additionally, Clotfelter (1976) did not consider the effect of political influences on higher education appropriations. In particular, political variables such as the political parties of the legislators and the governor might shape appropriation levels for all areas of the state budget, including higher education appropriations. Thus, including political variables would have strengthened this study.

Following the research of Clotfelter (1976) and Peterson (1976), researchers did not conduct analyses on the effect of student enrollment on higher education appropriations until many years later. Strathman (1994) built upon the work developed by Clotfelter (1976) and Peterson (1976) and hypothesized that the amount of college graduates migrating out of a state would be associated with higher education funding levels. The author utilized the benefit spillover hypothesis as the theoretical framework

within his study. The benefit spillover hypothesis asserts that public expenditures to higher education are negatively affected by the outmigration of college graduates from the state. The author employed a three-stage least squares model and determined that an increase in outmigration was associated with decreased spending levels on higher education. Therefore, the results found by Strathman (1994) were comparable to the results of the study by Clotfelter (1976).

Although Strathman (1994) had similar results to Clotfelter (1976), few variables were analyzed to determine the predictors of higher education funding. Beyond assessing the influence of outmigration of college graduates on higher education appropriations, Strathman (1994) neglected to consider how other variables may affect appropriations. For example, political variables, demographic variables, state higher education governance structures, or state economic variables were excluded from the study.

A different study (Leslie & Ramey, 1986) also analyzed the association between higher education student enrollments and state appropriations. Leslie and Ramey (1986) utilized a framework that was based on a theory by Wildavsky (1964) regarding the politics of the budgetary process. Wildavsky (1964) theorized that the largest factor determining the level of appropriations to different state agencies was the previous year's appropriation. Further, Wildavsky (1964) hypothesized that along with previous year's appropriations, small increases in state budget categories could be expected each year. Leslie and Ramey (1986) utilized Wildavsky's (1964) theory to study higher education appropriations; however, they posited that along with previous year's appropriations, increases in enrollment levels would also be influential in influencing appropriations. Employing regression analysis, the authors found that increases in enrollment were

positively tied to appropriations levels; although, this was only the case in some US states. They also found that in certain states, increases in appropriations were positively tied more heavily to economic conditions of the states rather than enrollment changes. Overall, Leslie and Ramey (1986) did find that enrollment changes positively influenced appropriation levels, but their findings were mixed depending on the region of the US. However, the authors neglected to include any variables taking into account possible political influences on higher education funding. Considering the influence of political factors would have improved this study and may have helped explain the changes in appropriations to higher education across different regions of the US.

In summary, the studies by Peterson (1976), Clotfelter (1976), Strathman (1994), and Leslie and Ramey (1986) all utilized regression techniques to test the relationship between enrollments and higher education appropriations. The authors found mixed results and concluded that although enrollments, at times, positively influenced state appropriations to higher education, a host of other economic, demographic, and political variables were also influencing appropriation levels. The theoretical and conceptual frameworks guiding these studies included the comparative policies theory, the benefit-spillover hypothesis, and a conceptual framework based on the assumption that previous year's appropriations predicted the following year's appropriation levels. As previously stated, many of these studies neglected to include political variables which may have influenced the higher education appropriations. Because state legislators are the political actors determining appropriations to state budget items, such as higher education, including political variables such as the strength and policy preferences of the legislators would enhance these studies. Moreover, a framework more appropriately guiding the



selection of political variables may have led these authors to select political variables depicting the political influences of higher education appropriations.

### *The Impact of Economic Conditions*

Unlike studies assessing the influence of student enrollments on higher education appropriations, other studies have analyzed how states' fiscal conditions, such as taxes and government spending, influence higher education appropriations (e.g., Adams, 1977; Delaney & Doyle, 2007, 2011). One of the first studies exploring how a state's fiscal condition affects higher education appropriations was conducted by Adams (1977). The author hypothesized that because states are mandated to balance their budgets each year, weaker economic conditions force cuts in expenditures. He hypothesized that during better economic conditions, states are able to increase expenditures. Adams (1977) went on to explain that economic conditions can have a disproportionately negative impact on higher education during poor fiscal conditions. The author explained that during weak economic times, the needs of social services, such as welfare, are prioritized in the state budget. He claimed that higher education is disproportionately cut during these weaker economic times (Adams, 1977). However, Adams (1977) did not empirically test this claim that higher education appropriations suffered disproportionately during weak economic times. Although Adams (1977) neglected to test this hypothesis, later studies tested how weak economic conditions influenced higher education appropriations (e.g., Hovey, 1999; Delaney & Doyle, 2011).

The research by Adams (1977) was not advanced until an article written more than 20 years later. In the article, Hovey (1999) also hypothesized that higher education appropriations were affected by states' economic conditions. Hovey (1999) agreed with

Adams (1977) that during poor economic times, higher education appropriations are disproportionately cut relative to other budget items. However, Hovey (1999) postulated that during good economic times, higher education appropriations are actually funded at proportionally higher levels than other budget items. Hovey (1999) labeled higher education appropriations as the ‘balance wheel’ in state budgets. The term ‘balance wheel’ reflected the nature of higher education funding: during poor economic times, state appropriations to higher education are cut disproportionately to other budget items, and during good economic times, state appropriations to higher education are increased at higher levels relative to other budget items. Within the study, Hovey (1999) did not empirically test his claim of higher education being the balance wheel in state budgets; although, future work did empirically test this hypothesis (e.g., Delaney & Doyle, 2007, 2011). Overall, Hovey (1999) explained that state officials viewed higher education as more discretionary than other budget items, and as a result higher education funding has been, and will continue to be, heavily influenced by states’ fiscal conditions. However, the author did not empirically test his claim, which was a major limitation of the study.

A few studies have utilized the balance wheel framework developed by Hovey (1999) to guide their studies (e.g. Delaney & Doyle, 2007, 2011). In their first study utilizing the balance wheel framework, Delaney and Doyle (2007) utilized fixed-effects regression to examine how states’ economic conditions influenced higher education appropriations. The authors studied eight years of data across all 50 US states and found that funding to higher education did in fact act as a balance wheel in state budgets. Specifically, Delaney and Doyle (2007) determined that during good economic conditions, higher education received greater appropriations relative to other budget

items. Further, higher education received smaller appropriations relative to other budget items during poor economic conditions. Overall, this study empirically portrayed how states' economic conditions influenced higher education appropriations; however, the authors neglected to include the influence of political variables on higher education appropriations which were included in previous research (e.g., Peterson, 1976).

Including variables such as political parties represented in the state legislature and state legislator policy preferences would have expanded this study. In addition, although Delaney and Doyle (2007) utilized the balance-wheel framework developed by Hovey (1999), a different framework may have improved this study. In particular, a framework from the field of political science, such as the median voter theorem or the spatial theory of voting, has been used to guide studies seeking to explain how political actors decide on policy outcomes, such as appropriation levels. Therefore, employing a framework from the field of political science would have helped the authors select certain political variables that may influence higher education funding.

Delaney and Doyle (2011) conducted an updated study which utilized the balance wheel model to test how states' economic conditions influenced higher education appropriations. In their 2011 study, the authors utilized more years of data (1985-2004) and expanded the variables compared to their initial 2007 study. Specifically, Delaney and Doyle (2011) included political variables such as the percentage of Republicans in the state legislature, voter participation in presidential elections, and the political party of the governor. The authors compiled a panel dataset and used a first-differencing regression technique in their study. They concluded that higher education appropriations followed the balance wheel model, similar to the result found in their 2007 study.

However, utilizing a first-differencing method, the authors examined how other variables influenced higher education appropriations. Delaney and Doyle (2011) concluded that the political variables were not statistically significant predictors of higher education appropriations. Other variables had mixed results; larger enrollments of students at private institutions resulted in lower appropriation levels while the percentage of the state population aged 18-24 was not statistically significant. Further, the authors found that different types of higher education governing boards had no statistical significance on higher education appropriations.

Overall, the two studies by Delaney and Doyle (2007, 2011) empirically tested the influence of states' economic conditions on higher education appropriations. Both studies employed the balance wheel model as their framework. Though this framework was appropriately used to examine the influence of states' economic conditions on higher education appropriations, it is not the best framework to test how political variables influence higher education appropriations; a framework taking into account political influences on appropriations would be more appropriate in these studies. Therefore, although Delaney and Doyle (2011) included a few political variables in their study, a framework guiding studies analyzing the influence of political variables would more aptly guide the selection of political variables in an assessment of higher education appropriations.

Similarly to Delaney and Doyle (2007, 2011), Humphreys (2000), sought to assess the influence of states' economic conditions on higher education appropriations. Humphreys (2000) hypothesized that cuts to higher education appropriations were a direct result of economic recessions. Different than other authors (e.g., Delaney &

Doyle, 2007, 2011), Humphreys (2000) defined states' economic conditions as state per capita income, a measure which captures changes across states and over time. Utilizing 25 years of data, the author used an econometric model in his analysis and showed that state per capita income levels had positive significant effects on higher education appropriations. Further, Humphreys (2000) explained the discretionary nature of higher education appropriations, showing that during recessionary periods, higher education was more likely to be slashed from state budgets compared to other budget items. For example, the author found that a 1.39% decrease in state higher education appropriations per student was associated with a 1% decrease in per capita income within a state (Humphreys, 2000). Therefore, the author concluded that states' economic conditions had direct influences on higher education appropriations.

The study conducted by Humphreys (2000) depicted the influence of states' economic conditions on higher education appropriations. However, the author did not consider how other variables may impact higher education appropriations. For example, the author neglected to include how other state demographic variables or political variables, which showed significance in previous higher education studies (e.g., Peterson, 1976; Strathman, 1994), influenced higher education appropriations.

In summary, a number of previous studies depicted the influence of states' economic conditions on higher education appropriations. Numerous authors (e.g. Adams, 1977; Delaney & Doyle, 2007, 2011; Humphreys, 2000) analyzed the influence of a states' economic condition on higher education and have found statistically significant results. However, incorporating demographic and political variables within these studies would help broaden the scope of variables. Additionally, as previously outlined, a more

appropriate theoretical framework guiding studies assessing the influence of political variables on appropriations would have strengthened these studies.

### *Competing Budget Items*

A number of scholars have sought to understand how competing budget items have influenced state spending on higher education (e.g., Kane et al., 2005; Okunade, 2004; Toutkoushian & Hollis, 1998). These studies have utilized different frameworks to guide the selection of variables and have found varying results, indicating that some competing state budget items do influence higher education appropriations while other budget items may not. This next section will review the previous literature assessing the influence of competing budget items on higher education appropriations and discuss the theoretical frameworks guiding these studies.

One of the first studies examining whether competing budget items influenced higher education appropriations was conducted by Toutkoushian and Hollis (1998). In this study, the authors examined the influence of economic and demographic variables on higher education appropriations. Additionally, the authors considered whether K-12 funding influenced higher education funding. To guide their selection of variables, the authors utilized a theory from the field of political science: the median voter theory. This theory asserts that the policy preferences of the median voter will drive legislator decision making. Utilizing this theory, the authors employed fixed-effects regression analysis. They concluded that K-12 funding, at times, competed with higher education funding and drove funding from higher education toward K-12 appropriations. Further, the authors determined that a host of economic variables were significant predictors of higher education funding. Specifically, economic variables such as a healthier state

economy, as measured by unemployment rates and per capita income, were positively associated with higher education appropriations.

As previously stated, Toutkoushian and Hollis (1998) utilized a theoretical framework from the field of political science to guide their study. However, the authors neglected to examine how certain political variables influence higher education appropriations. Including political variables such as the strength of the political parties in the state legislature or policy preferences would have strengthened the study. Therefore, though a framework from political science was used in the study by Toutkoushian & Hollis (1998), the authors excluded certain political variables which may have influenced their results.

A different study conducted by Okunade (2004) sought to examine whether higher education appropriations have competed with other state budget items such as Medicaid and prison expenditures in recent years. The author hypothesized that states have been moving funding previously allocated for higher education and K-12 education to state Medicaid funds in recent years. Moreover, Okunade (2004) portrayed how increases in the eligible population for Medicaid services, recent court mandates, and federal policy decisions have contributed to massive increases in Medicaid appropriations. He also hypothesized that increased public demand for criminal sentencing and crime prevention augmented appropriations to prisons, which have crowded out higher education appropriations. Given these assumptions, the framework guiding this study was based on the notion that higher education funding was competing with other state budget items, including Medicaid and prisons. Testing these claims, Okunade (2004) utilized ordinary least squares regression and generalized least squares

regression and found that Medicaid spending had indeed crowded out higher education funding, which was comparable to prior findings (Breneman & Finney, 1997; Zumeta, 2004). However, Okunade (2004) showed a complementary relationship between prison appropriations and higher education appropriations. Recent increases in prison spending correlated with increased appropriations to higher education; however, the relative amount of appropriations relegated to prisons and higher education was dwarfed by the recent surge in Medicaid spending. Therefore, Okunade (2004) showed how Medicaid, a competing budget item, crowded out higher education appropriations while prison funding showed a complementary relationship with higher education funding.

The analysis and accompanying results found by Okunade (2004) supported other research portraying how competing budget items crowded out spending on higher education (e.g., Toutkoushian & Hollis, 1998). However, the study by Okunade (2004) advanced previous research by incorporating political variables in the analysis. Specifically, the author examined whether the number of years to the next gubernatorial election influenced higher education appropriations. Second, the author tested how higher education appropriations altered when the political party of the governor was the same as the party in control of the state legislature. In regards to the first political variable, Okunade (2004) determined that the amount of time to the next gubernatorial election was not associated with higher education appropriations. However, other political variables such as the party of the governor and the party in control of the state legislature did have statistically significant results. In particular, Okunade (2004) found that Democratic governors that were in office during a Democratic party-controlled state legislature positively influenced spending on higher education.



In summary, the study by Okunade (2004) confirmed other research portraying the influence of competing budget items. The author also examined how certain political variables influenced higher education appropriations, finding that a Democratic governor alongside a Democratic party-controlled legislature was positively associated with higher levels of appropriations to higher education. Because the study by Okunade (2004) focused on the influence of political variables on state higher education appropriations, a theoretical framework from the field of political science would have been more appropriate for this study. For example, the median voter theory, utilized by Toutkoushian and Hollis (1998), appropriately guides studies concentrating on the influence of political variables on policy outcomes. Thus, the median voter theory, or another theory from political science which adequately guides the selection of political variables, would have strengthened this study.

In a different study, Kane et al. (2005) examined how one large state budget appropriation, Medicaid, competed with higher education funding. The authors did not utilize a theoretical framework, but hypothesized that Medicaid, which has demanded increased appropriations from state governments, crowded out spending to higher education. Kane et al. (2005) found conclusive evidence that increases in Medicaid appropriations negatively impacted higher education appropriations. For example, through the use of a fixed-effects regression model, the authors showed that for every new dollar spent on Medicaid, there was a reduction of six to seven cents in higher education funding. Analyzing a ten year period in the late 1980's to the late 1990's, Kane et al. (2005) concluded that the expansion of Medicaid contributed to approximately 80% of the decline in state support for higher education. Therefore, the

authors determined that increased Medicaid appropriations acted as a competing budget item, which crowded out spending on higher education.

Although the study by Kane et al. (2005) found evidence pointing to Medicaid funding crowding out higher education appropriations, the authors neglected to include a host of other variables that were found to be statistically significant in previous studies. For example, the authors did not include certain state characteristics, such as state enrollment in higher education, which were significant in previous research (e.g., Okunade, 2004). Additionally, Kane et al. (2005) did not consider the influence of political variables on higher education appropriations. State legislators are the actors deciding upon the specific appropriation levels for higher education; therefore, including variables reflecting the state legislators' policy preferences on higher education funding would have improved this study. In summary, the study by Kane et al. (2005) provided a robust analysis of how one competing state budget item, Medicaid, influenced higher education funding; however, the authors neglected to include other demographic, economic, and political variables.

In summary, authors (e.g., Toutkoushian & Hollis, 1998; Kane et al., 2005; Okunade, 2004) exploring the influence of competing budget items on higher education funding found mixed results. Specifically, Medicaid funding, prison expenditures and K-12 funding were found to have a negative or complementary influence on higher education appropriations. Though these variables were statistically significant, future studies should also examine how political variables influence higher education appropriations. In particular, because state legislators decide upon appropriation levels for higher education, variables reflecting the policy preferences and philosophy of state

legislators would help predict higher education funding levels. Therefore, including variables reflecting legislator viewpoints would improve future studies.

### *Mix of Demographic, Economic, and Political Influences*

Many recent studies analyzing higher education funding have assessed the influence of either demographic variables, economic variables, or political variables on state appropriations to higher education. The next section of this chapter will review studies analyzing all three of these variables on higher education appropriations.

Hossler, Lund, Ramin, Westfall, and Irish (1997) conducted a study assessing the impact of economic, demographic, and political influences on state funding for higher education. The authors utilized a framework drawn from three bodies of literature: studies exploring the impact of student financial assistance on higher education funding; studies examining the privatization of higher education; and studies assessing the influence of economic, demographic, governance, and political factors on higher education funding. Hossler et al. (1997) used all 50 US states over three years (1990-1992) and employed regression analysis, exploratory factor analysis, and interviews to examine how states' economic, demographic, and political characteristics influenced higher education spending. The authors found that enrollment levels and previous year's appropriations to higher education positively influenced higher education appropriations. Additionally, the authors did not find that competing budget items such as Medicare and K-12 education influenced state support for higher education, which contrasts the results found in other research (e.g., Kane et al., 2005; Okunade, 2004).

The study by Hossler et al. (1997) was one of the first studies which attempted to examine how economic, demographic, and political variables influenced of higher education funding. Although their framework included literature drawn from a variety of previous higher education studies, the authors did not adequately include all the relevant demographic and political variables. Inclusion of variables such as the political party of the governor, the strength of the political party of the legislature, and enrollment in higher education institutions would have improved this study. In addition, state legislators are directly involved in shaping the amount of appropriations to higher education each year. Therefore, inclusion state legislator viewpoints on education expenditures may help explain the influences of higher education appropriations across states.

In another study, Weerts (2002) sought to understand which variables influenced state appropriations to public research universities. The author included a mix of demographic, economic, and political variables in the study, including higher education governance structure, state tax rates, institutional enrollments, and political climate. Weerts (2002) employed a complex theoretical framework to guide his study. Specifically, Weerts (2002) utilized three organizational theories; rational perspectives, political perspectives, and cultural perspectives to guide his study. These theories were chosen because Weerts (2002) claimed that organizational theories best guide studies seeking to explain how government bodies, such as state legislatures, appropriate funding to higher education. The author employed multiple regression analysis to investigate how demographic, economic, political, and institutional characteristics predicted state appropriations to public research universities over six years in the 1990's. He found that a state's higher education governance structure, political climate, institutional enrollment

and expenditures, and a state's tax rate all helped predict state support for public research universities. Specifically, the author found that consolidated governing boards were associated with higher funding levels. In regards to the political climate predicting state appropriations, Weerts (2002) determined that in states in which Democrats controlled both chambers in the state legislature, appropriations to higher education were significantly higher compared to states in which Republicans controlled both chambers. Additionally, Weerts (2002) found that states with higher per capita taxes were associated with increased appropriation levels. In summary, Weerts (2002) concluded that a number of economic, demographic, political, and institutional characteristics helped to predict state funding to public research universities in the 1990's.

In a different study conducted by Weerts and Ronca (2006), the authors attempted to analyze the differences in state support for higher education in the 1990's across US states. Their conceptual model was compiled from a few areas of previous literature: First, Weerts and Ronca (2006) included previous literature analyzing the significance of economic and demographic variables on higher education appropriations. Second, the authors hypothesized that certain political factors, such as the political party of the governor, might impact higher education appropriations. In particular, they theorized that Democratic governors would positively influence higher education appropriations. Third, the authors portrayed how higher education governance structures impacted state funding for higher education. Specifically, they hypothesized that states with higher education coordinating boards may positively influence higher education appropriations more than states with higher education governing boards. Fourth, Weerts and Ronca (2006) argued that state culture, such as state history and tradition may impact higher

education funding. The authors hypothesized that states that historically funded higher education at high levels would continue to do so. Fifth, the authors hypothesized that institutional factors such as increased enrollment, increased grants and contracts, and increased private gifts and grants would positively influence state support for higher education.

Weerts and Ronca (2006) utilized a mixed methods approach in their study. Their qualitative section included document reviews and a series of interviews with campus and state higher education professionals. The authors utilized multivariate regression for the quantitative section of their study. Overall, Weerts and Ronca (2006) determined that a number of variables influenced higher education funding. Dissimilar to other research (e.g., Kane et al., 2005), the authors found that increases in K-12 and healthcare funding was positively correlated to higher education funding. Additionally, the authors found that state legislatures controlled by Republicans were associated with lower funding levels for higher education compared to state legislatures controlled by Democrats. In addition, Weerts and Ronca (2006) found that higher levels of private gifts and increased enrollments at institutions were associated with higher levels of state support for research universities. Overall, the authors found mixed results, compared to earlier studies (e.g., Kane et al., 2005; Okunade, 2004). In addition, although the authors reviewed some relevant literature related to the influence of political variables on higher education appropriations, a framework grounded within political science would have more appropriately guided their study. In particular, given the authors' focus on political influences on higher education appropriations, a framework guiding the selection of political variables would have strengthened the study.

Weerts and Ronca (2008) conducted a similar study a few years after their 2006 study to examine state appropriations to higher education. In the 2008 study, they employed a different theoretical framework. Specifically, the authors utilized organizational theory to guide their study. Weerts and Ronca (2008) hypothesized that organizational theory was the most appropriate framework to guide their study because organizational theory best guides studies analyzing how state and institutional factors influence decisions made by state governmental bodies. The authors employed a random-effects regression model to examine how state appropriations to higher education changed over 20 years (1985 to 2004). First, they found that state appropriations to higher education were lower in states with higher per capita income levels. Second, they concluded that in states with higher percentage of citizens aged 18-24, higher education appropriations were lower. Third, Weerts and Ronca (2008) found that Republican governors were associated with higher levels of funding for higher education. Fourth, the authors determined that increases in health care, corrections, and K-12 expenditures resulted in decreased funding for higher education. Fifth, the authors concluded that previous levels of appropriations helped predict future levels of funding for higher education. Overall, Weerts and Ronca (2008) found that a variety of economic, demographic, and political variables influenced higher education appropriations. However, similar to their 2006 study, Weerts and Ronca (2008) utilized organizational theory to guide their study. Because the authors considered how political variables, such as political parties, influenced higher education appropriations, a different theoretical framework would have improved their study. Particularly, a framework guiding the

selection of political variables would have been more appropriate in the study by Weerts and Ronca (2008).

A more recent study by McLendon, Hearn, and Mokher (2009) analyzed how a mix of economic, demographic, and political variables influenced state support for higher education. The authors developed a conceptual framework drawn from three strands of literature: First, the authors looked at past studies analyzing postsecondary finance. Second, the authors looked at previous literature studying higher education governance. Third, McLendon et al. (2009) analyzed previous studies concentrating on comparative state politics. From these groups of studies, the authors examined how state support for higher education was influenced by political parties of the governor and legislature, legislative professionalism, citizen ideology, interest group climates, and the economic and demographic conditions of the states. Specific political variables included the percentage of Republican legislators in the state legislature, the political party of the governor, legislator term limits, tax and expenditure limitation policies, gubernatorial power, and the number of higher education interest groups in a state. Another political variable, citizen ideology, was included in the study. Citizen ideology, a measure created by Berry, Ringquist, Fording, and Hanson (1998) is an index measuring the policy preferences of the state's electorate based off of roll call voting scores of members of the US Congress.

Compiling a pooled cross-sectional time-series dataset and using fixed-effects regression, McLendon et al. (2009) found that a host of economic, demographic, and enrollment variables influenced higher education appropriations. For example, lower state unemployment rates were associated with increased funding levels for higher



education. In addition, higher funding levels were positively associated with greater enrollments. In regards to the political variables, McLendon et al. (2009) found varying results. First, higher levels of legislative professionalism, defined as a legislator's pay, days in session, and the number staff members per legislator, was found to be statistically significant. Specifically, higher levels of legislative professionalism were associated with higher postsecondary funding levels. Second, a Republican governor was associated with lower levels of higher education funding. Third, a strong Republican state legislature, as measured by the percent of Republicans in the legislature, was associated with lower levels of higher education spending. Fourth, states with legislator term limits were associated with higher levels of funding for higher education. Fifth, as the amount of higher education interest groups increased, so did state funding for higher education. Sixth, strong governors were associated with lower levels of funding toward higher education.

The study by McLendon et al. (2009) advanced previous literature analyzing state funding for higher education by including variables found to be significant in previous work and employing a robust statistical technique. However, one of the key political variables in the study, citizen ideology, had limitations. This variable, which was developed by Berry et al. (1998), measured the policy preferences of members of the U.S. Congress. In the study by Berry et al. (1998), it was assumed that the policy preferences of the state's Congressional delegation were the same as the state's legislative body. However, state legislators, not state representatives in Congress, make decisions on higher education appropriations. In the study by McLendon et al. (2009), the authors utilized this variable as a proxy for state legislator policy preferences. A more accurate

measure of the policy preferences of state legislators would have improved this study by McLendon et al. (2009).

In a different study conducted by Rizzo (2006), the author examined how a number of different variables, including demographic, economic, political, and institutional specific variables influenced state support for higher education. The author did not utilize a conceptual model or a theoretical framework in his study. Regardless, he assembled data from 1977 through 2001 in order to compare how variables influenced higher education funding at two different points in time. Demographic and economic variables included the percent of the states' population in certain age ranges, state income levels, the state unemployment rate, K-12 enrollment, higher education enrollments in private vs. public institutions, migration of students in and out of state, and state tax revenues. Political variables included the political party of the governor, voter participation rates, divided or unified state legislature, and the amount of state assembly seats. Institutional specific variables included enrollments, private giving, and degree production. Rizzo (2006) used ordinary least squares regression, the Arellano-Bond dynamic panel estimation technique, and augmented regressions to examine how these aforementioned variables influenced state higher education funding.

Rizzo (2006) determined that a variety of variables influenced higher education funding. In particular, Rizzo (2006) found that vast decreases in state support for higher education from 1977 to 2001 were influenced by increases in income inequality. Additionally, the author determined that court mandates had increased appropriations to K-12 education which diminished higher education appropriations. In regards to political and institutional variables, Rizzo (2006) had a number of findings: First, as state

legislatures increased in size, higher education funding decreased. Second, higher education funding increased when larger shares of doctoral degrees were awarded in science and technology fields. Third, states with larger shares of students in two-year colleges saw higher appropriations toward higher education. Fourth, as private donations to institutions increased, state support dwindled. Fifth, states with a unified legislature (both chambers of the state legislator with the same political party in control), were associated with lower funding to higher education. In summary, Rizzo (2006) concluded that a variety of demographic, economic, political and institutional specific variables influenced higher education appropriations. However, the lack of a theoretical framework or conceptual model in the study was a major limitation.

In summary, studies analyzing how economic, demographic, and political characteristics influence higher education have advanced the literature on state higher education finance (e.g., McLendon et al., 2009; Rizzo, 2006). However, a number of limitations exist within these studies. First, some of the aforementioned studies (e.g., McLendon et. al, 2009; Weerts & Ronca, 2006, 2008) neglected to examine how competing budget items, found to be statistically significant in previous research (e.g., Kane et. al, 2005), influenced higher education funding. Second, there were limitations in how the authors defined political variables. For example, state legislator policy preference variables could be improved to more accurately depict state legislator policy preferences. Third, because these studies were attempting to explain the influence of political variables on higher education funding, a theoretical framework guiding the selection of political variables would have been more appropriate. Frameworks from the field of political science, such as the median voter theory, or the special theory of voting,

appropriately guide studies seeking to explain how political variables influence government spending.

### *Studies Focusing on Political Variables*

A few recent studies have concentrated on the influence of political variables on higher education appropriations. Though some of these studies also consider other variables, such as economic and demographic characteristics, the focus is on political variables. This next section will review and critique these studies.

Archibald and Feldman (2006) examined how political variables, including state citizen policy preferences and political party affiliation of the governor and state legislature, influenced higher education appropriations; however, the authors did not employ a theoretical framework or conceptual model within their study. State citizen policy preferences was based on measures developed by Berry et al. (1998) and was defined as the philosophical preferences and political orientations of the state citizenry. Archibald and Feldman (2006) utilized this measure in their study and found that state citizen policy preferences were statistically significant. Specifically, more liberal states were associated with higher levels of spending on higher education. Further, in examining how the political party influenced higher education funding, the authors had a variety of results. First, they determined that states with a Democratic governor prior to 1980 were associated with lower levels of appropriations to higher education. After 1980, states with Democratic governors were associated with higher spending levels for higher education. The same conclusion was found for the state legislature: a Democratic controlled legislature prior to 1980 was associated with lower funding levels to higher

education while a Democratic controlled legislature after 1980 was associated with higher levels of funding to higher education (Archibald & Feldman, 2006).

The study by Archibald and Feldman (2006) was one of the first higher education studies concentrating on the influence of policy preferences on higher education appropriations. As explained earlier, the authors utilized state citizen ideology as a proxy for the state elected officials' policy preferences and political orientations. This variable measured the policy preferences of members of the U.S. Congress, assuming that the policy preferences of the state's congressional delegation were the same as the state citizenry. Assuming a state's congressional delegation has the same policy preferences as the state citizenry is one limitation of this study. Policy preferences are built from individual beliefs, opinions, and preferences; therefore, one cannot assume that the state citizenry policy preferences directly align with the Congressional delegation in that state. Therefore, although Archibald and Feldman (2006) utilized a measure for policy preferences, a more accurate measure of policy preferences based on the policy preference of the state citizens or state legislators would have strengthened their study.

Archibald and Feldman (2006) also examined whether state tax and expenditure limitation laws (TELS) influenced state funding to higher education. TELS were defined as state policy which restricts the growth of state expenditures, relative to the growth of state personal income. The authors found that states with broad based TELS were associated with lower levels of spending on higher education. Therefore, TELS, introduced by many states in the 1980's, did negatively influence state appropriations to higher education.

The study by Archibald and Feldman (2006) helped advance the higher education finance literature, especially the literature pertaining to the political factors influencing higher education appropriations. However, the authors did not utilize a theoretical framework or conceptual model in their study. Further, a more accurate measure of policy preferences could have been used to examine the effect of state legislators' policy preference on higher education appropriations.

A different study by Dar (2011) analyzed how states' political landscapes, as defined by the influence of state political parties, affected higher education appropriations. The author utilized a theoretical framework from political science to study how political variables influenced higher education funding in California. Specifically, Dar (2011) employed the median voter theory in her study. The median voter theory, which was also used in the study by Toutkoushian and Hollis (1998), states that the views and opinions of the median voter will be reflected by the legislators. However, different from the research by Toutkoushian and Hollis (1998), the study by Dar (2011) included variables such as political polarization and party strength. Dar (2011) hypothesized that politically liberal legislatures would be associated with higher levels of spending toward higher education while politically conservative legislatures would be associated with lower levels of spending for higher education. To examine liberalism and conservatism within the legislatures, Dar (2011) used a variable termed "Democratic Strength". Democratic strength was defined as the percentage of seats held by Democrats in the two state legislative chambers. Dar (2011) also sought to examine how political polarization affected higher education funding. To measure polarization, the author calculated the average distance between DW-NOMINATE scores of

Democrats and Republicans of the state's congressional delegation. DW-NOMINATE scores, developed by Poole and Rosenthal (1983), are measures of policy preference for members of the US Congress. In her study, Dar (2011) utilized DW-NOMINATE scores as a proxy of state legislator policy preferences. In summary, levels of liberalism/conservatism and political polarization were the two main components of Dar's (2011) theoretical framework.

Dar (2011) utilized data from 1976 to 2006 and employed regression analysis to examine trends in state funding to higher education in California. The author determined that as the percentage of Democrats in the legislature increased, funding for higher education decreased. This finding was in contrast to her hypothesis that more liberal legislatures, as defined by a Democratic controlled legislature, would be associated with higher levels of funding for higher education. Dar (2011) also found that as legislatures became more polarized, higher education funding decreased. However, one limitation of this approach is that it is not comparable across states. A Democratic controlled legislature in another part of the country may or may not behave similarly to the Democratic controlled legislature in California. Neglecting to note this restriction is a limitation within this study.

Overall, the study by Dar (2011) was similar to previous literature which examined the effects of the makeup and control of political parties in state legislatures on higher education appropriations (e.g., Hossler et al, 1997; Weerts, 2002; Weerts & Ronca, 2006, 2008; McLendon et al., 2009). In addition, Dar (2011) examined how policy preferences influenced higher education appropriations. Few studies in higher education (e.g., Archibald & Feldman, 2006; McLendon et al., 2009) have utilized policy

preferences as a variable when examining state appropriations to higher education. Moreover, similar to previous studies, the study by Dar (2011) utilized variables for policy preferences that were based on U.S. Congressional viewpoints and were not direct measures of state legislator policy preferences. Therefore, a more direct measure of state legislator policy preferences would have strengthened this study. Further, Dar (2011) did not include certain variables in her study that were found to be significant in previous research, including state economic and demographic variables.

In a different study by Dar and Spence (2011), the authors hypothesized that higher education funding was influenced by the levels of political polarization in the state legislatures and states' economic conditions. The authors did not utilize a specific theoretical framework or conceptual model. They collected data from 49 states from 1976 to 2004 and employed a fixed-effects regression model to test their hypothesis. Dar and Spence (2011) found preliminary evidence to support the notion that during lower levels of polarization, Democrats were associated with slightly higher levels of appropriations. During high levels of polarization, Democrats were still associated with higher levels of appropriations, though it was not as significant as compared with lower levels of polarization (Dar & Spence, 2011). This study, along with the study by Dar (2011) was one of the first attempts to examine the influences of political polarization on higher education funding. However, as mentioned earlier, no clear theoretical framework or conceptual model was used in this study.

A few other recent studies sought to understand the influence of politics on higher education funding within the states. In one such study, David Tandberg (2008) examined the influence of interest groups on higher education appropriations. The author



developed a conceptual framework which took into account socioeconomic factors, demographic factors, and states' political systems. Some of the political variables analyzed in his study included the party of the governor, party of the legislature, legislative professionalism, political culture, electoral competition, public policy preferences, unification of the legislature, and voter turnout. Tandberg (2008) also sought to examine whether interest groups, such as higher education interest groups, influenced higher education funding. Tandberg (2008) pointed out that previous research proved that the number and type of interest groups influenced policy outcomes (e.g., Jacoby & Schneider, 2001) and sought to test this in the higher education literature. Therefore, Tandberg (2008) explored how the number of higher education interest groups, within a state, influenced state appropriations to higher education.

Utilizing cross-section time-series data, Tandberg (2008) employed a regression model to examine influence of politics on higher education funding. Tandberg (2008) found that many of the political variables in his study influenced state higher education funding appropriations. Notably, a Democrat governor or Democratic controlled legislature resulted in higher levels of appropriations for higher education. In addition, unified legislatures (legislatures with the same political party controlling both the House and Senate) were associated with lower funding levels for higher education, which was similar to a finding by Rizzo (2006). Higher education interest groups also showed significant results in the study: more powerful higher education interest groups within a state were associated with higher levels of funding for higher education. Specifically, Tandberg (2008) discovered that the greater number of higher education interests groups, relative to the number of other interest groups within the state, positively influenced state

appropriations to higher education. Therefore, Tandberg (2008) proved that the number of interest groups lobbying on behalf of higher education influenced funding outcomes. Overall, this study by Tandberg (2008) included a new aspect of political influences on higher education appropriations, higher education interest groups, which had not been included in previous literature.

In a more recent study by Tandberg (2010), the author attempted to improve his 2008 study by developing an original theoretical and conceptual framework to study the influence of politics on higher education appropriations. Tandberg (2010) labeled his new framework the fiscal policy framework. The fiscal policy framework was developed from the institutional rational choice framework and the policy framework. Specifically, the fiscal policy framework “assumes that the actions of political decision makers are a function of the attributes of the individuals (e.g., values and resources) and the attributes of the decision situation, and that within those constraints actors are weighing expected benefits and costs of their possible actions prior to making a decision” (Tandberg, 2010, p. 740). Utilizing this framework, Tandberg (2010) considered the influence of the number of state higher education interest groups, political attributes, governmental institutions, state higher education factors, previous year’s appropriations, economic variables, demographic variables, and political culture variables on appropriation levels. Similar to his previous study, Tandberg (2010) included a multitude of variables to analyze higher education appropriations over a 30 year period. He employed stepwise regression and had a number of significant findings. First, he found that the previous year’s higher education appropriation level was a strong predictor of the following year’s appropriation levels. Second, Tandberg (2010) found that some of his political variables

were statistically significant. In particular, he concluded that states with a larger number of higher education interest groups, relative to the number of other interest groups in the state, were associated with larger higher education appropriations. This finding was consistent to the finding in his 2008 study that higher education interest groups influenced funding outcomes. In addition, increases in legislator salaries were associated with higher levels of funding for higher education. Tandberg (2010) found that uniparty state legislatures were associated with lower levels of funding for higher education. One of the key political variables, citizen ideology, was measured based on the policy preferences of members of Congress each year. Similarly to previous studies (e.g., Archibald & Feldman, 2006; Dar, 2012; McLendon et al., 2009), the political variable, citizen ideology, did not accurately depict the policy preferences of state legislators. A variable depicting the policy preferences of state legislators would be more appropriate because state legislators have direct influence over state higher education appropriations. Regardless, Tandberg (2010) found that citizen ideology was positively associated with higher education funding: more liberal policy preferences were associated with an increase in higher education appropriations. Overall, Tandberg (2010) had a number of significant findings in his 2010 study; however, improving the policy preference variable to more accurately depict the preferences of the state's legislators would have enhanced this study.

In a different study, Tandberg and Ness (2011) sought to understand the political influences on state capital expenditures to higher education. Previous studies examined how different variables influenced general funding for higher education. However, this study sought to understand if these variables also influenced capital expenditures. The

authors considered a set of hypotheses considering how demographic, economic, and political factors predicted levels of capital funding for higher education. Tandberg and Ness (2011) utilized a variable, citizen ideology, to measure the influence of policy preferences on higher education funding decisions. Similar to previous research (e.g., Archibald & Feldman, 2006; Dar, 2012; Tandberg, 2010), citizen ideology did not appropriately capture the policy preferences of the state legislators. Rather, it depicted the policy preferences of the US Congress, which is comprised of legislators who do not decide on state higher education appropriations. Therefore, a more accurate measure of state legislator policy preferences would have improved the study.

Utilizing fixed-effects regression, Tandberg and Ness (2011) found that many political variables found in previous studies were also statistically significant in their study. First, the authors found that an increase in higher education interest groups, relative to other state interest groups, resulted in increased funding for capital expenditures. In particular, the authors found that the higher education interest group variable showed greater statistical significance in predicting higher education funding compared to the other political variables in the study. Second, political culture, as defined by the racial and ethnic diversity of states, proved to be statistically significant in that more diverse states were associated with higher education funding levels. Third, as elections became more competitive, capital support for higher education also increased. Fourth, governors with budgetary power were associated with lower levels of higher education funding. Overall, Tandberg and Ness (2011) portrayed that a variety of political variables influenced state capital support for higher education funding; though

the higher education interest group variable showed the greatest statistical significance in the study.

In summary, the studies by Archibald and Feldman (2006), Dar (2011), Dar and Spence (2011), Tandberg (2008, 2010), and Tandberg and Ness (2011) focused on how certain political factors influenced appropriations to higher education. Within many of these studies (e.g., Archibald & Feldman, 2006; Dar, 2012; McLendon et al., 2009; Tandberg, 2010) the authors examined whether policy preferences influenced higher education funding. The measure of policy preferences was based on either the preferences of the state citizenry or members of the US Congress and not based off of the policy preferences of state legislators. State legislators are the political actors with direct influence over higher education funding. Therefore, a variable which directly measures the policy preferences of state legislators would have strengthened these studies.

A few of the aforementioned studies (e.g., Tandberg, 2010; Tandberg & Ness, 2011) examining the influence of policy preferences on higher education funding also examined the influence of interest groups on higher education funding. In particular, Tandberg (2010) and Tandberg and Ness (2011) examined how the influence of higher education interest groups, relative to all other interest groups in a state, influenced higher education appropriations. The authors determined that an increase in the ratio of higher education interest groups compared to all interest groups within a state, positively influenced higher education funding. Therefore, higher education interest groups, shown to be statistically significant in previous studies, should be included in future studies assessing the influence of political variables on higher education funding.

## The Influence of Policy Preferences on Higher Education Funding

Recent studies have shown that a host of political variables influence state funding to higher education, including; political party of the governor and legislators, legislative professionalism, higher education interest groups, gubernatorial power, divided vs. unified government, and percentage of seats in the legislature held by Republicans/Democrats (e.g., Dar, 2012; McLendon et al., 2009; Rizzo, 2006; Tandberg, 2008, 2010). An additional political variable, policy preferences, has also been analyzed in recent literature to assess its influence on higher education appropriations (e.g., Archibald & Feldman, 2006; Dar, 2012; McLendon et al., 2009; Tandberg & Ness, 2011). Scholars attempting to analyze the influence of policy preferences on higher education appropriations have encountered two main limitations. First, the measure of policy preferences was based on the policy preferences of members of the US Congress, developed by Berry et al. (1998) or the policy preferences of the state's citizens. State legislator policy preferences, which have recently been measured by Shor and McCarty (2011), would be a more appropriate measure in studies assessing state funding to higher education because state legislators are the political actors deciding on higher education funding. Second, previous studies have utilized a variety of theoretical frameworks and conceptual models to study the influence of political variables on higher education funding. However, no studies have employed an appropriate theoretical framework from the field of political science to guide the selection of political variables. This study intends to employ a newly developed measure of policy preferences, which is based on the policy preferences of state legislators, in order to assess the influence of policy preferences on higher education funding. Additionally, this study intends to employ an

appropriate theoretical framework from the field of political science to guide the selection of political variables.

#### A Framework to Guide this Study

In previous studies assessing the influence of policy preferences on higher education appropriations, a few different frameworks were employed. Dar (2011) used the median voter theory as her theoretical framework and McLendon et al. (2009) developed an original conceptual framework based on postsecondary finance literature, higher education governance literature, and comparative state politics literature. Archibald and Feldman (2006) did not have a clear conceptual model or theoretical framework and Tandberg (2010) developed a new framework called the fiscal policy framework to guide his study. Additionally, Dar and Spence (2011) did not have a clear theoretical framework and Tandberg and Ness (2011) considered a set of hypotheses to test the influence demographic, economic, and political variables on higher education appropriations. The aforementioned theories were used to guide studies seeking to assess the influence of policy preferences on policy outcomes. However, when studying the influence of political variables on policy outcomes, a theory from the field of political science is most appropriate. Only Dar (2011) and Toutkoushian and Hollis (1998) utilized a framework from the field of political science, the median voter theory, to guide their studies. This study proposes a different theory from the field of political science which is more appropriate in guiding studies analyzing the influence of policy preferences on higher education appropriations.

The spatial theory of voting has been employed within the field of political science to guide studies analyzing legislative voting behavior. Downs (1957) and Black

(1958) were two of the first scholars to write about the spatial theory of voting. Since then, multiple scholars have utilized this theory in studies seeking to explain why legislators vote the way they do on specific policies (Enelow & Hinich, 1984). Broadly speaking, the spatial theory of voting posits that legislators evaluate policy alternatives and make policy decisions based on their own preferences. The theory does not explain the source of a legislator's preference; rather, the spatial theory of voting assumes that legislators vote for policies that are most favorable to them. In sum, this theory assumes that legislators act rationally by evaluating alternative policies and choose to vote based on their own interests (Enelow & Hinich, 1984).

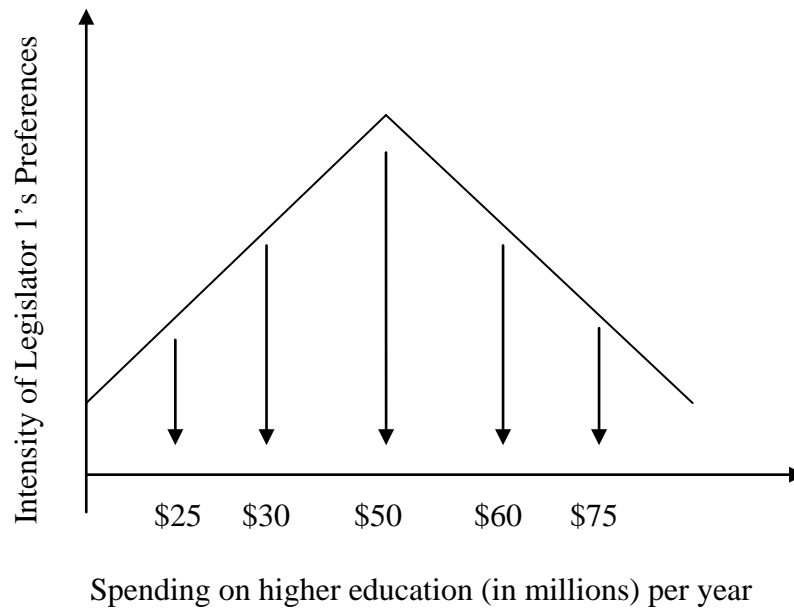
The spatial theory of voting has a number of characteristics: First, as previously stated, legislators' are assumed to vote on policies based on their own preferences. This means that legislators' philosophical principles drive their voting behavior. Moreover, legislators do not vote based on the wishes of their political party, but rather act on their individual preferences when deciding on policy alternatives. Legislator's philosophical principles on any given issue may or may not align with what is specified within their party's platform. Overall, the spatial theory of voting assumes that legislator's will cast votes on each policy based on their own preference (Enelow & Hinich, 1984).

A second characteristic of the spatial theory of voting has to do with legislator policy preferences. It is assumed in the spatial theory of voting that legislators have individual preferences on policy alternatives (Krehbiel, 1988). For example, take a group of five legislators voting on funding for higher education. Legislator 1 prefers that higher education funding should be \$50 million dollars, legislator 2 prefers funding for higher education at \$60 million, legislator 3 at \$75 million, legislator 4 at \$25 million, and



legislator 5 at \$30 million. These policy preferences can be plotted on a preference curve for each legislator. Figure 2.1 depicts Legislator 1's preference curve. As Figure 1 shows, Legislator 1's preference is at \$50 million dollars, which is represented as his ideal point on the graph at \$50 million. Legislator 1's policy alternatives are symmetrical around \$50 million. This means that the farther away an alternative policy is from Legislator 1's preference, the less preferred it is. If two alternatives are the same distance from Legislator 1's ideal point, he is indifferent to the alternatives. Thus, Legislator 1 is indifferent to \$40 million or \$60 million in funding as they are both \$10 million away from his ideal point of \$50 million.

Figure 2.1: Preferences in the Spatial Theory of Voting for Legislator 1



Preference curves can be plotted for any legislator in this example. Each preference curve would show a single peaked policy preference, depicted as an ideal point, for each legislator. Moreover, similar to Legislator 1's preference curve, policy alternatives would be less preferred the farther away the alternative lies from the legislator's ideal point. In summary, the spatial theory of voting assumes legislator policy preferences are single peaked and policy alternatives are less preferred the farther away the alternative is from the each legislator's ideal point (Krehbiel, 1988; Enelow & Hinich, 1984).

A third characteristic of the spatial theory of voting is that legislators have information about other legislators' policy preferences. Although each legislator may not be able to predict how each legislator will vote on a given policy, it is assumed in this

theory that legislators have an idea as to other legislator's policy preferences (Krehbiel, 1988).

These aforementioned characteristics describe the spatial theory of voting. To summarize, the spatial theory of voting assumes that legislators vote on policies based on their own policy preferences, legislators have single peaked policy preferences on policies, and legislators have information on other legislator's policy preferences.

### *Studies Employing the Spatial Theory of Voting*

A number of studies have utilized the spatial theory of voting to assess legislative decision making (e.g., Bailey & Chang, 2001; Jenkins & Sala, 1998). However, as stated earlier, no study has utilized the spatial theory of voting to analyze state legislative decision making as it pertains to higher education funding. This next section will review the literature that has employed the spatial theory of voting and describe how this theory can be used in this study.

Previous studies utilizing the spatial theory of voting to analyze legislative decision making include those by Bailey and Chang (2001), Jenkins and Sala (1998), and McCarty and Poole (1995). In an article by Bailey and Chang (2001), the authors employed the spatial theory of voting to analyze US Presidents, US Senators, and Supreme Court Justices. In particular, the authors attempted to place the policy preferences of these three groups on a common scale. Bailey and Chang (2001) analyzed Solicitor General court briefs to estimate the policy preferences of US Presidents, assessed Supreme Court briefs to study policy preferences of Supreme Court Justices, and studied US Senate roll call votes to estimate Senatorial policy preferences. Employing a random-effects model, the authors collected ideal points of US Presidents,

Supreme Court Justices, and US Senators to create a common preference scale across these three groups. The authors argued that this common preference scale would allow future scholars to study political decision making across these three groups (Bailey & Chang, 2001). Overall, this study effectively utilized the spatial theory of voting to assess the political policy preferences of three different groups of political actors.

Other studies employing the spatial theory of voting have benefited from the research conducted by Poole and Rosenthal (1987, 1991, 2001, and 2007). Poole and Rosenthal (1987, 2001, and 2007) developed measures of ideal points for members of the US Congress from 1789 to the early 2000's. These ideal points have been utilized in a variety of studies to examine the policy decisions made by members of the US Congress for over two hundred years (e.g., Jenkins & Sala, 1998; Platt, Poole, & Rosenthal, 1992; Jenkins & Nokken, 2000).

In a study by McCarty and Poole (1995), the authors utilized the spatial theory of voting to estimate US President's policy preferences at different points in time. Additionally, the authors used data developed by Poole and Rosenthal (2001, 2007) to examine the policy preferences of members of the US Congress. Taken together, the authors sought to understand how influential the US President was over Congressional legislation. The authors created an original method to assess the policy preferences of US Presidents which was based on the President's public position on policy issues and found that the US President was able to influence policies in the US Congress. Overall, the study by McCarty and Poole (1995) effectively employed the spatial theory of voting to analyze the policy preferences of US Presidents and the US Congress.

In a different study employing the spatial theory of voting, Jenkins and Sala (1998) used the ideal points developed by Poole & Rosenthal (1997). Jenkins and Sala (1998) analyzed the 1825 Presidential election and examined whether the ideal points of members of Congress in 1825 were similar to the Presidential winner in the election. The authors conducted a difference of means test and found that the ideal points of the elected President's, John Quincy Adams, were consistent with Congressional ideal points. Therefore, the authors concluded that ideal points of Congress predicted the observed behavior of the Presidential election (Jenkins & Sala, 1997). Similar to previous research (e.g., McCarty & Poole, 1995), the study by Jenkins and Sala (1998) effectively employed the spatial theory of voting to assess the influence of legislators' policy preferences on political outcomes.

In a different study, Platt, Poole, and Rosenthal (1992) sought to examine whether Congressional voting behavior was associated with the ideal points developed by Poole and Rosenthal (1991). They compared measures of policy preferences developed by a different group of researchers (Rabinowitz & Macdonald, 1989) to the measure of policy preferences from the study by Poole and Rosenthal (1991). Assuming the spatial theory of voting drove Congressional behavior, the authors determined that the measures of policy preferences developed by Poole and Rosenthal (1991) were more representative of Congressional voting behavior compared to the measures of policy preferences developed by Rabinowitz and Macdonald (1989). This analysis was similar to a study by Jenkins and Nokken (2000) in which the authors studied the 34<sup>th</sup> House of Representatives in the US Congress. Specifically, the authors sought to understand how the policy preferences of this Congress influenced the speakership election in 1855-56. The authors were

guided by the spatial theory of voting and utilized the measures of policy preferences of the US Congress developed by Poole and Rosenthal (1985, 1997). They concluded that the measures of policy preferences were influential in determining the speakership election. Therefore, the studies by Platt et al. (1992) and Jenkins and Nokken (2000) utilized the spatial theory of voting and found that policy preferences influenced legislative decision making.

In sum, a number of studies have employed the spatial theory of voting to assess decisions made by US Presidents, US Congress, and the Supreme Court (e.g., Jenkins & Nokken, 2000; Platt et al., 1992; Rabinowitz & Macdonald, 1989). Additionally, the measures of ideal points developed by Poole and Rosenthal (1987, 1991, 2001, 2007) have been heavily utilized in recent literature (e.g., Jenkins & Sala, 2000; Platt et al., 1992; McCarty & Poole, 1995) to assess the influence of policy preferences on different policy outcomes. However, as previously mentioned, the spatial theory of voting has not been utilized in studies assessing state legislative behavior, such as appropriations to higher education.

#### *The Spatial Theory of Voting to Guide this Study*

Shor and McCarty (2011) stated that there are two main reasons why the spatial theory of voting has not been utilized in literature on state legislative decision making. The first reason is that state legislator voting data has not been collected for all 50 US states. Therefore, a lack of voting data would not allow for adequate measures of legislator policy preferences. The second reason is that legislator voting data has not been collected over time. Berry, Fording, Ringquist, Hanson, and Klarner (2010) also

recognized that state legislator voting data has not been collected across states and over time. Berry et al. (2010) wrote about this limitation:

Recently, scholars have made significant advancements in the measurement of state public opinion and state legislator ideal points (e.g., Bafumi & Herron 2007; Park, Gelman, & Bafumi 2004; Shor, Berry, & McCarty 2007). However, these alternative measures are currently available only for scattered states and/or years, thereby precluding their use in pooled cross-sectional time-series analysis. If valid direct measures of state citizen and government ideology eventually become available for the 50 states over a sufficient period of years, we would certainly favor using them over BRFH's less direct proxies. (p. 130)

Therefore, both studies by Shor and McCarty (2011) and Berry et al. (2010) recognized two main reasons for the lack of studies on the spatial theory of voting in studies investigating state legislative behavior: legislator policy preferences have not been collected for across all US states and has not been consistently collected over time.

Shor and McCarty (2011) recently developed a new dataset composed of state legislative policy preferences within all US states over a number of years. Specifically, Shor and McCarty (2011) collected roll call votes in state legislatures from 1993 to 2009. In addition, the authors developed a new technique to compare policy preferences across state legislatures. Shor and McCarty (2011) utilized a survey conducted by Project Votesmart National Political Awareness Test (NPAT) to aid in their analysis. This survey asks questions on policy stances of incoming legislators in all states, allowing for a direct comparison of issue stances of legislators across states. Combining the state roll

call voting data with the survey responses, Shor and McCarty (2011) created a robust dataset for researchers to use in studies seeking to understand the influence of state legislative policy preferences on state policy outcomes. In particular, the data set contains measures of policy preferences for each state legislature which can be arranged on a continuum depicting more liberal state legislatures on one end of the continuum and more conservative legislatures on the other end of the continuum.

The dataset compiled by Shor and McCarty (2011) more appropriately measures policy preferences for members of the state legislator compared to earlier research (e.g., Bailey & Chang, 2001; Berry et al., 1998; Berry et al., 2010; Jenkins & Sala, 1998; Poole & Rosenthal, 1987, 1991, 2001, 2007; McCarty & Poole, 1995). In particular, the measures developed by Shor and McCarty (2011) do not utilize measures of policy preferences of the US Congress or state citizenry as a proxy for state legislators. Rather, using roll call voting data of state legislators and survey data of state legislator policy preferences, Shor and McCarty (2011) have created a data set that directly represents state legislative policy preferences.

In summary, prior studies analyzed how the Democratic controlled legislatures or Republican controlled legislatures influenced higher education appropriations (e.g., Archibald & Feldman, 2006; Dar, 2012; Hossler et al., 1997; McLendon et al., 2009; Tandberg, 2008). Within these studies there have been some conflicting results; however, most studies found that Democratic controlled legislatures are typically associated with higher levels of funding for higher education. However, Shor and McCarty (2011) portrayed that Democratic legislators, in certain areas of the U.S., are more conservative than Republican legislators in other parts of the country. “For



example, the Democratic party in Mississippi is more conservative than the relatively liberal Republican parties of Connecticut, Delaware, Hawaii, Illinois, Massachusetts, New Jersey, New York, and Rhode Island” (Shor & McCarty, 2011, p. 537). The new measures of state legislator policy preferences collected by Shor and McCarty (2011) can help clarify the differences in policy preferences with a political party from state to state. Therefore, these new measures of policy preferences can improve upon the limitations of previous higher education research assessing the influence of policy preferences on higher education appropriations. This study intends to capitalize on these new, more accurate, measures of policy preferences to assess how state legislator policy preferences influence state appropriations to higher education.

### Conclusion

This review of the literature discussed previous studies evaluating the influencers of state appropriations to higher education. Studies reviewed include research depicting the influence of student enrollments on higher education appropriations, studies assessing how state economic conditions affect higher education appropriations, and studies focusing on how political variables influence higher education funding. Overall, these studies have shown that prior state appropriations to higher education, state characteristics, competing budget items, higher education interest groups, higher education governance structures, divided legislature, political party of the governors, and gubernatorial strength influence higher education appropriations. Further, recent studies have shown that certain political variables influence higher education appropriations.

This study intends to advance the research on the influence of political variables on higher education funding. In particular, this study will employ the spatial theory of voting which has been shown to effectively guide studies analyzing legislative decision making. However, this theory has not been utilized in previous literature analyzing state legislative decision making as it pertains to higher education funding. Further, this study will utilize new measures of policy preferences developed by Shor and McCarty (2011) to address the following research questions:

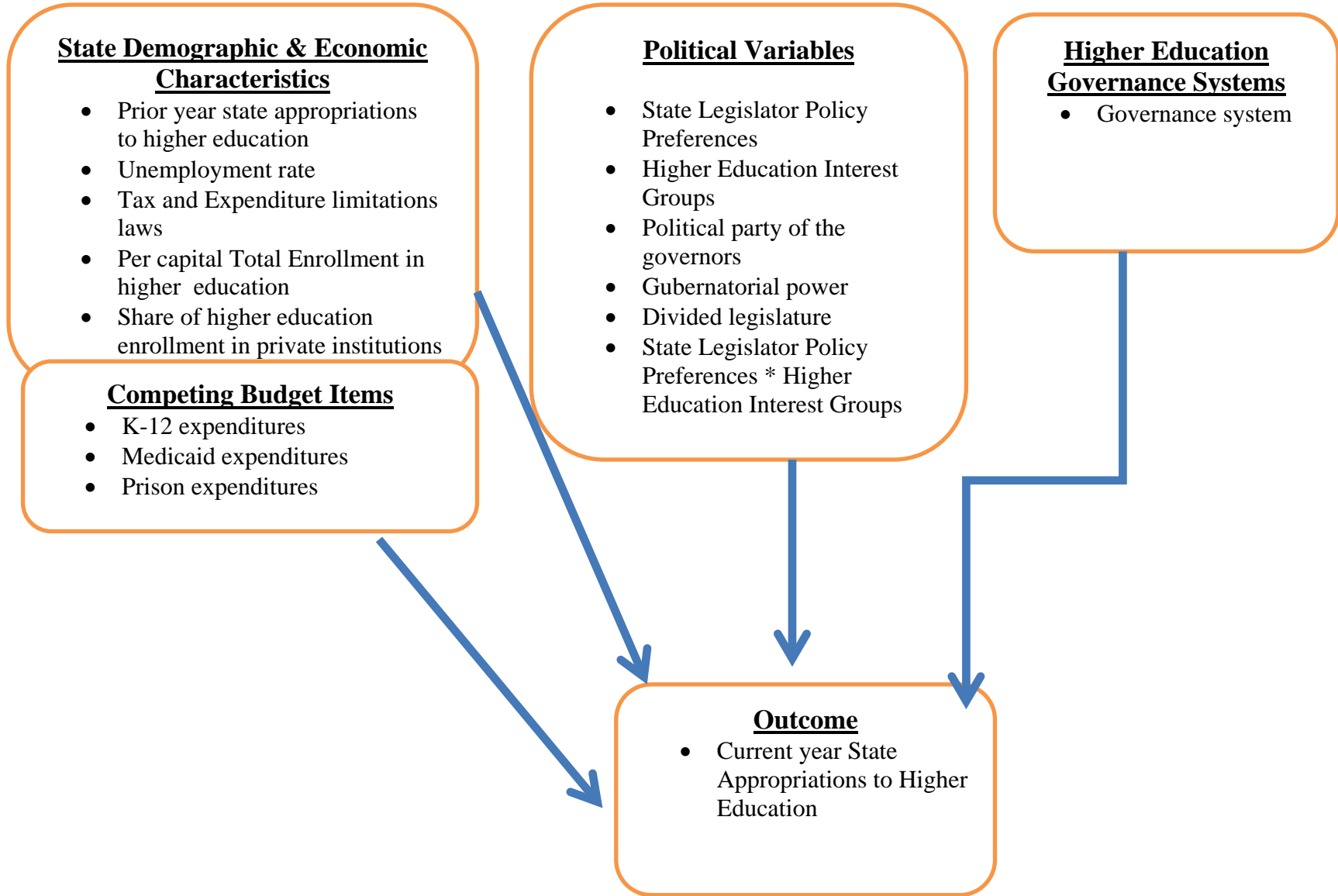
1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?

2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

3. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

A diagram depicting this analysis is displayed in Figure 2.1.

Figure 2.1: Visual Representation of Analysis



## Chapter 3: Research Design

### Introduction

Using the spatial theory of voting and advanced statistical techniques, this study examines the influence of state legislator policy preferences and higher education interest groups on state funding to higher education, controlling for other variables. This chapter re-introduces the research questions and describes the data for this study. Additionally, this chapter presents the variables and description of the appropriate quantitative techniques for this study. A discussion of the limitations is found at the conclusion of the chapter.

### Research Questions

This study examines how policy preferences and higher education interest groups influence annual state appropriations to higher education, controlling for other variables.

The following research questions will be addressed:

1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?

2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

3. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

#### Data

This study utilizes data from a variety of sources. The data source for annual state appropriations to higher education come from an annual compilation of state financial support for higher education provided by Grapevine, a data compilation project at Illinois State University. Grapevine has been collecting data on state support for higher education through an annual survey for over 50 years. On each annual survey, states are asked to report annual expenditures to all institutions of higher education within their

state, including public and private institutions. However, states are only asked to provide expenditures for operational expenditures, but not capital expenditures for higher education. Grapevine has made available all state higher education expenditure data for years 1960 through 2012, via their website.

Data on policy preferences is collected from a recent publication by Boris Shor and Nolan McCarty (2012), titled, *The Ideological Mapping of American Legislatures*. This publication contains a dataset of state legislative policy preference scores. To construct the dataset, Shor and McCarty (2012) utilized two sets of information: First, the authors used the Project Votesmart National Political Awareness Test (NPAT). The NPAT is an annual survey given to state and federal legislative candidates and asks policy specific questions on topics including; social issues, environmentalism, national security, fiscal policy, criminal justice, foreign policy, domestic issues, and education. The results of each survey are compiled to create a NPAT policy preference score for each survey responder. This policy preference score is intended to represent the policy preferences of the survey responder. These scores can be compared across responders, and over time, to understand policy preferences of incoming state legislators.

Though the results of the NPAT survey can give clear depictions of legislator policy preference, only about one-third of legislators complete the survey. Therefore, it does not capture legislator policy preference for all state legislators. In order to capture policy preferences for all state legislators, Shor and McCarty (2011) supplemented the NPAT survey data with a second data source. In particular, the authors collected roll call voting data of state legislators from all 50 U.S. states. To do so, they developed data-mining scripts to capture the roll call votes from each state's journal records. Through

this data collection effort, Shor and McCarty (2011) were able to compile roll call votes for over 14,000 state legislators from the mid-1990's through 2010.

Shor and McCarty (2011) utilized ordinary least squares regression analysis to predict NPAT scores based on the roll call voting data. Through this method, the authors were able to provide NPAT policy preference scores for all legislators, including those that did not complete the NPAT Survey. Therefore, by combining NPAT survey results and roll call voting data, the authors compiled a dataset of policy preference for all state legislators from 1996 through 2010. The dataset compiled by Shor and McCarty (2011) represents the first national collation of state legislator policy preference. Prior to their collection, scholars were using proxies of state legislator policy preferences to conduct analyses (e.g., McLendon, Hearn, & Mokher, 2009; Tandberg, 2008).

A different dataset compiled by The Education Commission of the States, contains information on higher education governance structures. This data, which are developed in partnership with the National Center for Higher Education Management Systems and the State Higher Education Executive Officers, offers a description of whether a state has a state level coordinating agency and/or governing board for higher education. This data was first collected in 1997, and has been updated in 2000 and 2007.

Higher education interest group data is collected from a dataset created by David Tandberg. Tandberg looked at how many higher education interest groups are within each U.S. state each year, relative to the total number of interest groups within each state. Through this analysis, he created a ratio of total higher education interest groups over total interest groups within each state. Tandberg (2013) collected state higher education interest group data through 2011.



Data on state Medicaid expenditures is collected from The Centers for Medicare and Medicaid Services publications on Health expenditure reports by state. These annual reports, electronically available from the Centers for Medicare and Medicaid, provide the total dollar amount spent on Medicaid by each state in the U.S. starting from 1991 through 2010.

State prison expenditures data is compiled from The Bureau of Justice Statistics' State Correction Expenditures tables. These publicly available tables list total prison expenditures, for each U.S. state, from the 1980's through 2010.

Additionally, K-12 education funding data is collected from the National Center for Education Statistics (NCES). NCES has an annual table listing state expenditures to elementary and secondary education, titled Current expenditures for public elementary and secondary education, by state or jurisdiction: Selected years, 1969-70 through 2008-09. This data can be directly accessed from the NCES website (U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics).

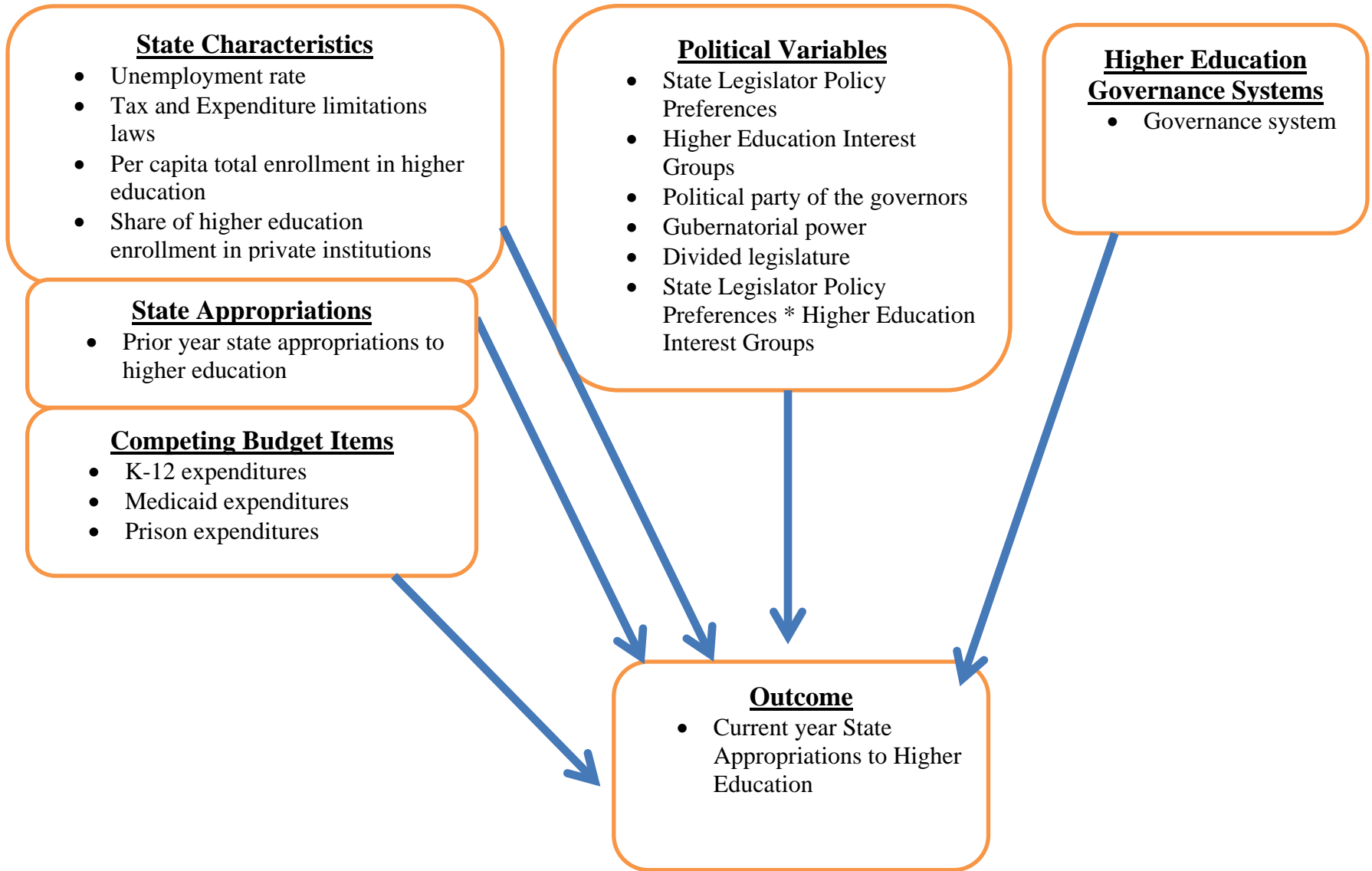
Data on the political party of the US governors is collected from the *Governor's Dataset* from Klarner (2013). This dataset lists the terms and political parties of all US current and historic US governors. Gubernatorial strength is collected from *The Institutional Power Ratings for the 50 Governors of the United States*, a dataset managed by Thad Beyle (2013) which calculates gubernatorial power for each current and previous US governors. Prior higher education studies examining the influence of gubernatorial power have also utilized Beyle's data within their studies (e.g., McLendon et al., 2009). Divided and unified government data is collected from the U.S. Census, *Statistical Abstract of the United States* (2012).

## Variables

The dependent variable in this study, state appropriations to higher education, is hypothesized to be influenced by a number of political variables, including the political preferences of the state legislators and higher education interest groups. Both of these political variables, political preferences of state legislators and higher education interests groups are based on constructs from the spatial theory of voting.

Figure 3.1 shows these two independent variables, political preferences of state legislators and state higher education interest groups, along with the other state-level variables hypothesized to influence state appropriations to higher education. Additionally, the dependent variable, state appropriations to higher education, is depicted in Figure 3.1. Overall, the theoretical framework in this study allows for an examination of the influence of political preferences of state legislators, higher education interest groups, and other state-level characteristics on state appropriations to higher education.

Figure 3.1: Visual Representation of Analysis



### *Dependent Variable*

The dependent variable in this study, state appropriations to higher education, is defined as the annual amount of state funding to higher education per capita. Levels of appropriations to higher education are expressed in terms of per capita in order to represent the level of state financial support relative to the state's total population. This variable is calculated by dividing the total state appropriations by the total state population. Data for total state appropriations to higher education is taken from Grapevine's annual reports on state tax appropriations to higher education. Data on the total state population is collected from the U.S. Census Bureau Population Estimates data. The state tax appropriations data from Grapevine Data is adjusted for inflation by using a Consumer Price Index (CPI) Inflation Multiplier Calculator to express funding in 2009 dollars.

### *Independent Variables*

This study includes a number of state-level independent variables. Findings from previous research on variables influencing state appropriations to higher education, theory, and data availability determine the selection of independent variables in this study. All variable names and descriptions are also specified in Table 3.1.

### *State Appropriations*

*Prior state appropriations to higher education:* Previous research showed that states' previous appropriations to higher education were positively associated with current state appropriations to higher education (e.g., Tandberg, 2008). Moreover, some researchers determined that a state's previous year's appropriation levels were the most significant

predictor of the current year's appropriation level (e.g., Hossler, Lund, Ramin, Westfall, & Irish, 1997; Wildavsky, 1964) Therefore, prior year's appropriation levels is included as an independent variable in this study. This variable is represented as a lagged value of the dependent variable, current state appropriations to higher education per capita.

Table 3.1. *Variables Included in the Analysis*

<b>Variable Name</b>	<b>Description</b>
<b>Dependent</b>	
Current Year State Appropriations to Higher Education	Dollar amount of annual amount of state funding to higher education per capita.
<b>Independent</b>	
<u>State Appropriations</u>	
Prior year state appropriations to higher education	Dollar amount of previous year's annual amount of state appropriations to higher education per capita.
<u>State Characteristics</u>	
Unemployment Rate	Number of unemployed people divided by all individuals in the labor force (percentage).
Tax and Expenditure limitations laws	Tax and expenditure limitation (TEL) policy in a state (1 = yes, 0 = no).
Per capita Total Enrollment in higher education	Per capita total enrollment in higher education institutions within a state.
Share of higher education enrollment in private institutions	Number of total enrollments in private higher education divided by all enrollments in higher education, within a state (percentage).
<u>Competing Budget Items</u>	
K-12 Expenditures	Dollar amount of K-12 expenditures per capita.
Medicaid Expenditures	Dollar amount of Medicaid expenditures per capita.
Prison Expenditures	Dollar amount of prison expenditures per capita.
<u>Political Variables</u>	
State Legislator Political Preferences	Policy preference scores for the state legislature, averaged for the House and Senate.
Higher Education Interest Groups	Ratio of higher education interest groups relative to all interest groups within a state (percentage).
Republican Governor	Party of the Governor (Democrat = 0 or Republican = 1)
Gubernatorial Strength	Compilation of Governor's appointment power, budgetary power, veto power, and tenure potential.
Divided Legislature	Divided or unified state legislature (divided = 1, unified = 0)
<u>Higher Education Governance Systems</u>	
Governance System	State higher education governance system (3 = coordinating agency, 2 = governing board, 1 = both coordinating agency and governing board, 0 = neither coordinating agency nor governing board).

### *State Characteristics*

*Unemployment rate:* Unemployment rate is a variable calculated by the United States Department of Labor's Bureau of Labor Statistics. This variable is calculated as the number of unemployed people divided by all individuals in the labor force (Bureau of Labor Statistics, 2013). The Bureau has tables depicting each state's unemployment rate, on an annual basis, for over one hundred years. Prior studies have often included a state's unemployment rate when examining what influences state appropriations to higher education, finding that states with lower rates of unemployment were associated with increased higher education funding (e.g., Toutkoushian & Hollis, 1998). Therefore, in order to assess the possible variables that influence state appropriations to higher education, this study includes states' unemployment rates as one of the independent variables.

*Tax and Expenditure limitations laws:* Many states adopted tax and expenditure limitation (TEL) policies in the late 1970's. These policies were adopted in order to legally cap the total state appropriations to certain state agencies, including higher education institutions. Archibald and Feldman (2006) found that states with TELs were negatively associated with higher education funding. McLendon et al., (2009) also examined whether TELs were predictors of higher education funding. However, the authors did not find this variable to be statistically significant in their study. Therefore, there have been mixed results as to whether TELs influence state appropriations to higher education. This study attempts to examine how TELs influence higher education appropriations. This variable is measured as a categorical, dummy variable; states are coded as to whether they do (coded as 1) or do not (coded as 0) have a TEL. Data on

TELEs is collected from the publicly accessible information found at the National Conference of State Legislatures website (Waisanen, 2010).

*Enrollments in higher education:* Previous literature has depicted the influence of higher education enrollment within a state on state appropriations to higher education (e.g., Clotfelter, 1976; Delaney & Doyle, 2011; Leslie & Ramey, 1986; Peterson, 1976; Strathman, 1994). In particular, authors have found that, at times, per capita enrollments in higher education positively influenced state appropriations to higher education. Within this study, enrollment is measured as the number of total enrollments in higher education per capita. This data comes from the National Center on Education Statistics Digest of Education Statistics. Annual measures of state higher education enrollments from 1998 to 2009 are collected in the Digest and are included as a variable in this study to examine whether current per capita enrollments in higher education within a state influence state appropriations to higher education.

*Share of higher education enrollment in private institutions:* Previous research has examined the influence of the share of enrollments in private institutions, compared to enrollment in public institutions, on bachelor's degree production within states (Titus, 2009) and on state appropriations to higher education (McLendon et al., 2009). A study by McLendon et al., (2009) found that states with higher shares of enrollment in private higher education institutions were associated with lower levels of state appropriations to higher education. Therefore, the share of higher education enrollment in private institutions within a state is included as an independent variable within this study. The share of higher education enrollment in private institutions is collected from the National Center on Education Statistics Digest of Education Statistics. This variable is calculated



by dividing the number total enrollments in private higher education institutions by total enrollment in all higher education institutions (public and private).

### *Competing Budget Items*

*K-12 expenditures:* A variety of literature has sought to understand if and how state K-12 expenditures influenced expenditures in other state budget categories, such as higher education (e.g., Kane, Orszag, & Apostolov, 2005; Toutkoushian & Hollis, 1998).

Toukoushian and Hollis (1998) and Okuande (2004) found that funding for K-12, at times, competed with funding for higher education. These findings are consistent with the results of a study by Kane et al., (2005). Therefore, state K-12 expenditures is included in this study to examine how competing state budget items influence state appropriations to higher education. Data on state expenditures for K-12 education is collected from the National Center for Education Statistics (NCES). NCES publishes annual reports depicting the total state expenditures for K-12 education across all states. Furthermore, this variable is measured as K-12 expenditures per capita, in order to represent the level of state financial support relative to the state's population. Because the dependent variable (state higher education appropriations) is also measured per capita, variables representing competing state budget items are normalized in the same manner. Data for K-12 expenditures is adjusted for inflation by using a Consumer Price Index (CPI) Inflation Multiplier Calculator to reflect funding in 2010 dollars.

*Medicaid expenditures:* Previous researchers have investigated whether state Medicaid expenditures influenced state appropriations to higher education (e.g., Kane et al., 2005; Okunade, 2004; Zumeta, 2004). These authors found that Medicaid expenditures did

influence higher education appropriations. Specifically, both studies determined that state spending on Medicaid, which has dramatically increased over the last 20-30 years, has negatively affected higher education funding. Overall, previous research depicts that as Medicaid spending increases, state funding to higher education decreases (Kane et al., 2005; Okunade, 2004; Zumeta, 2004). Therefore, this study includes Medicaid expenditures as an independent variable. State Medicaid spending data is drawn from The Centers for Medicare and Medicaid Services publications on Health expenditure reports by state. The figures for annual state expenditures to Medicaid are measured by per capita within a state and adjusted for inflation by using a Consumer Price Index (CPI) Inflation Multiplier Calculator to express funding in 2010 dollars.

*Prison expenditures:* Prison expenditures have also been included in previous research in an attempt to understand whether this state budget item influences state appropriations to higher education (e.g., Okunade, 2004). Okunade (2004) found a complementary relationship between prison expenditures and higher education expenditures in states. Therefore, this study examines whether state prison expenditures influence higher education expenditures. Data on state prison expenditures comes directly from The Bureau of Justice Statistics State Correction Expenditures data tables. Like data on K-12 expenditures and Medicaid expenditures, prison expenditures are measured on a per capita basis. Data on prison expenditures is adjusted for inflation by using a Consumer Price Index (CPI) Inflation Multiplier Calculator to express funding in 2010 dollars.

### *Higher Education Governance Systems*

*Governance system:* Several studies have investigated whether state higher education governance systems influence state appropriations to higher education (e.g., McLendon et al., 2009; Weerts, 2002). The aforementioned studies have produced mixed results in regards to the influence of higher education governance systems on state appropriations to higher education. Weerts (2002) found that consolidated governing agencies were associated with higher levels of state appropriations to higher education while McLendon et al., (2009) found no association between a state's higher education governance structure and state appropriations to higher education. Given these mixed results, this study includes state higher education governance systems as an independent variable and examines whether states with a coordinating agency, states with a governing board, states with both a coordinating agency and governing board, or states with neither a coordinating agency nor governing board influence state appropriations to higher education. Governance system data is compiled from The Education Commission of the States online database of Postsecondary Governance Structures. Within this study, this variable is reflected as a categorical, dummy variable (coordinating agency, governing board, both a coordinating agency and governing board, neither a coordinating agency nor governing board).

### *Political Variables*

*State Legislator Policy Preferences:* Political preferences have been utilized in previous research to understand the influence of policy preferences on state appropriations to higher education (e.g., Dar, 2012; McLendon et al., 2009). These studies have found that

legislator policy preferences have influenced state appropriations to higher education. In particular, authors have determined that states with more liberal legislator policy preferences were associated with higher levels of state appropriations to higher education while states with more conservative legislator policy preferences were associated with lower spending levels on higher education. However, no study has accurately measured the policy preference of state legislators. Rather, these studies (e.g., Dar, 2012; McLendon et al., 2009) utilized a proxy for state legislator policy preferences: the policy preferences of members of U.S. Congress, in lieu of a direct measure of state legislator policy preferences. Because state legislators are the political actors deciding on state appropriations to higher education, this study utilizes a direct measure of state legislator policy preferences to examine how legislators' policy preferences influence state appropriations to higher education.

New data by Shor and McCarty (2011) directly measures state legislator policy preferences. The authors utilized roll call voting scores and data from the National Political Awareness Test to compile a dataset measuring state legislative policy preferences for each state. This data can be utilized to examine whether state legislators' policy preferences influence state appropriations to higher education. However, in contrast to previous literature depicting the influence of policy preferences on state appropriations to higher education, this study utilizes a variable that directly measures the state legislator policy preferences. Specifically, this study utilizes variables found in the Shor and McCarty (2011) dataset which measures the median policy preferences, for each year and within each legislative chamber (House and Senate). Found within the publicly available dataset by Shor and McCarty (2011), the variable `hou_chamber` and

sen\_chamber reflects the median policy preference scores for both the House and Senate within each state. In this study, these variables (hou\_chamber and sen\_chamber) are averaged together, representing state legislator policy preferences.

*Higher Education Interest Groups:* David Tandberg has conducted numerous studies examining the influence of state higher education interest groups on state appropriations to higher education (e.g., Tandberg, 2008; Tandberg & Ness, 2011). He has consistently found that state higher education interest groups, relative to all interest groups within a state, were positively associated with higher education funding. Therefore, the ratio of higher education interest groups in a state is included in this study to understand the influence of higher education interest groups, relative to all interest groups in a state, on state appropriations to higher education. Higher education interest group data is drawn from the database of higher education interests groups that David Tandberg has collected. This data includes information on interest groups from the 1980's and has been updated to include data through 2011 (Tandberg, 2013).

*Republican Governor:* A number of prior studies depicted the influence of the political party of the governors on state appropriations to higher education (e.g., McLendon et al., 2009; Rizzo, 2006). Specifically, the authors determined that Republican governors were typically associated with lower funding levels to higher education compared to Democratic governors. Thus, the political party of the governor is an additional independent variable in this study, coded as a categorical, dummy variable. A historic listing of the US Governors across all US states has been compiled by Klaner (2013). The scholar has a publicly available dataset which lists the years in which a governor was

in power within each state as well as political party affiliation of the governors. Data on the political party of the governors spans from the early 20<sup>th</sup> century through 2012.

*Gubernatorial Strength:* A few previous studies have sought to understand the influence of the strength of the governor on state appropriations to higher education (e.g., McLendon et al., 2009; Peterson, 1976; Tandberg and Ness, 2011). The authors found mixed results: Peterson (1976) determined that more powerful governors were associated with higher funding levels to higher education while McLendon et al., (2009) and Tandberg and Ness (2011) concluded that powerful governors were associated with lower funding levels to higher education. Overall, due to previous findings in the literature, gubernatorial strength is included as an independent variable within this study. Data on gubernatorial strength is collected from Thad Beyle's datasets on gubernatorial power. The data includes information on four gubernatorial powers: appointment power, veto power, budgetary power, and tenure potential. Beyle (2013) has compiled all four of these powers into one variable depicted the overall gubernatorial strength. Furthermore, this variable is available within Beyle's publicly available dataset, depicting the gubernatorial strength for all current and past US governors.

*Divided Legislature:* Certain prior studies analyzing the influence of political variables on higher education funding have included an independent variable capturing whether a state had a unified or divided legislature (e.g, Tandberg, 2008, 2010). Because this variable has been included in prior research studying the political influencers of higher education funding, it is included in this study as a categorical, dummy variable. Data on whether a state has a divided or unified legislature comes from the U.S. Census, Statistical Abstract of the United States (2012).

In summary, the aforementioned variables have been compiled to form a panel dataset. Panel data contains cross-sectional time-series data. Cross-sectional data are collected from several locations or units at one point in time. Time-series data are collected from the same location or unit over successive time intervals. This study compiles the aforementioned variables for 50 states over several years (1998 – 2009).

### Analytic Framework

This study examines how state legislator policy preferences and higher education interest groups influence state appropriations to higher education, controlling for other variables. Before utilizing more advanced statistical techniques, this study first provides descriptive statistics. Previous quantitative studies investigating the relationship between higher education and other outcomes and state appropriations to higher education provided descriptive statistics of the variables in the studies before employing advanced statistical techniques (e.g., Delaney & Doyle, 2011; McLendon et al., 2009). Specifically, descriptive statistics including the mean, median, minimum, and maximum values for all variables will be calculated. Proportions will also be calculated for all categorical variables to understand the distribution of these variables.

After examining the results of the descriptive statistics, more advanced statistical analyses will be employed to explore the influence of state characteristics (e.g., higher education enrollments, prior appropriation levels), higher education governance systems, competing budget items, and unobservable variables within states on state appropriations to higher education. The most appropriate method to examine how a number of

observable variables and other unobservable variables in a panel data set affect an outcome is panel data analysis.

There are several panel data analysis techniques that have been employed in higher education research. The most commonly utilized panel data analysis techniques are fixed-effects and random-effects regression (Zhang, 2010). Both fixed-effects and random-effects regression analyses explore the relationship between independent variables and a dependent variable. However, fixed-effects regression is utilized to control for individual or unit (e.g., states) heterogeneity (Zhang, 2010). Applied to this study, a fixed-effects analysis would take into account unobservable state characteristics that are influencing the dependent variable, state appropriations to higher education. In contrast, random-effects models are utilized when observable variables are assumed to be uncorrelated with the unit group or the state error. Therefore, either a fixed-effects or random-effects panel data analysis may be employed for this type of study. Typically a Hausman test is conducted to determine whether a fixed-effects or random-effects model is most appropriate, as shown through previous higher education studies (e.g., McLendon et al., 2009).

In previous studies assessing the influencers of state appropriations to higher education, numerous authors found that certain independent variables were correlated with the error (e.g., Delaney & Doyle, 2007, 2011; McLendon et al., 2009; Tandberg & Ness, 2011). Similarly, in this study, it is assumed that the independent variables, such as the state characteristics, are correlated with the error. Fixed-effects models are most appropriate to utilize when independent variables are correlated with the error (Zhang, 2010). In addition, according to Zhang (2010), fixed-effects regression analysis is a



preferred technique when a limited number of years are available for analysis. Therefore, similar to previous higher education studies examining the influence of state appropriations to higher education (e.g., Delaney & Doyle, 2007, 2011; McLendon et al., 2009; Toutkoushian & Hollis, 1998; and Kane et al., 2005), a fixed-effects model should be considered for this study.

Although fixed-effects models have been employed in similar studies, a dynamic fixed-effects panel (DFEP) model is a more appropriate method for this study for a few reasons. First, several researchers suggest the use of a dynamic fixed-effects panel model when a lag of the dependent variable is included as an independent variable within panel data (Arellano & Bond, 1991; Curs, Bhandari, & Steiger, 2011; Titus, 2009). One of the independent variables in this study, prior year's appropriations to higher education, is a lag of the dependent variable (current year's appropriations to higher education). Therefore, due to the presence of a lag of the dependent variable, a dynamic fixed-effects panel model is the most appropriate technique to employ in this study.

Second, previous higher education researchers recommended the use of a dynamic fixed-effects panel model to account for unobserved state-specific fixed-effects and time-related fixed-effects (e.g., Titus, 2009). Applied to this study, a dynamic fixed-effects panel model will account for unobservable variables specific to each state and over time while taking into account other unobservable variables that are of less interest.

Additionally, Titus (2009) suggested the use of a dynamic fixed-effects panel model to account for possible endogeneity of one or more of the independent variables. Therefore, a third reason for employing a dynamic fixed-effects panel model is because this method takes into account possible endogeneity of one or more of the independent

variables. When utilizing panel data analysis techniques such as fixed- or random-effects regression, it is assumed that all independent variables are exogenous (Zhang, 2010). However, some of the independent variables within this study, such as state legislator policy preferences, may be endogenous. Thus, a dynamic fixed-effects panel model is utilized in this study to take into account possible endogeneity of one or more of the independent variables.

As demonstrated by Titus (2009), dynamic fixed-effects panel models allow for an interpretation of how current higher education appropriations are influenced by prior levels of appropriations and predictors of higher education appropriations. Utilizing prior levels of appropriations in this study will allow for an interpretation of the long term trend in growth, or decline, in state appropriations to higher education. Further, because past predictors of state appropriations to higher education are included in a dynamic fixed-effects panel model, persistent effects of variables shown to influence current state appropriations to higher education are taken into account. The past predictors of state appropriations to higher education are reflected as lagged values of the current predictors of state appropriations to higher education in this study.

Arellano (1989) showed that biased estimates are often produced when utilizing dynamic fixed-effects panel models with higher order lags of the dependent variable and when using small samples. Within this study, prior state appropriations to higher education and past predictors of state appropriations are higher order lags of the dependent variable and the independent variables, and the sample size is relatively small (11 years of data). Other scholars (e.g., Arellano & Bover, 1995; Titus, 2009) suggest the use of a dynamic fixed-effects panel model combined with Generalized Method of

Moments (GMM) techniques to more accurately examine how lagged independent variables influence the dependent variable. Utilizing a lagged dependent variable, lags of the endogenous predictor variables, and other exogenous variables, more accurate estimates can be examined by employing a dynamic fixed-effects panel model combined with GMM techniques. When GMM techniques are employed, the endogenous independent variables are instrumented with the lags of the differenced values of the exogenous variables and the endogenous variables, as demonstrated by Titus (2009). Moreover, because this study contains a short time period (11 years), the use of weak instruments allows for more robust parameter estimates, as shown by Arellano and Bover (1995), Blundell and Bond (1998) and Titus (2009). In summary, as recommended by other researchers (e.g., Arellano & Bover, 1995; Blundell & Bond, 1998; Titus, 2009), a dynamic fixed-effect panel model will be estimated via a system GMM estimator for this study.

#### *Dynamic Fixed-Effects Panel Models*

A system of equations can be utilized to portray the use of a dynamic fixed-effects panel model for this study. In the first structural equation below (1), current state appropriations to higher education ( $St\_Appr_{it}$ ) are a function ( $f$ ) of prior appropriations to higher education ( $St\_Appr_{it-1}$ ), state characteristics ( $SC_{it}$ ), higher education governance structures ( $HE_{it}$ ), competing budget items ( $CB_{it}$ ), divided legislature ( $DIV_{it}$ ), political party of the governors ( $GP_{it}$ ), gubernatorial strength ( $GS_{it}$ ), higher education interest groups ( $Int_{it}$ ), and state legislator policy preferences ( $Pref_{it}$ ):

$$St\_Appr_{it} = f(St\_Appr_{it-1}, SC_{it}, HE_{it}, CB_{it}, DIV_{it}, GP_{it}, GS_{it}, Int_{it}, Pref_{it}) \quad (1)$$

Within Equation 1,  $i$  represents the state and  $t$  denotes time. Combining the control variables (state characteristics, higher education governance structures, competing budget items, divided legislature, political party of the governors, and gubernatorial strength) produces the following reduced form of equation 1:

$$y_{it} = \alpha y_{it-1} + \gamma_1 W_{it} + \gamma_2 X_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where  $y_{it}$  is state appropriations to higher education;  $\gamma$  is the coefficient;  $W_{it}$  is the vector of endogenous variables including higher education interest groups and state legislator policy preferences;  $X_{it}$  is the vector of exogenous variables including the control variables;  $\eta_i$  is the state specific error term;  $\lambda_t$  is the time specific error term; and  $\varepsilon_{it}$  is the residual error. Equation 3 shows the subtraction of each variable from the previous time period (i.e., first differences):

$$y_{it} = \alpha(y_{it-1} - y_{it-2}) + \gamma_1(W_{it} - W_{it-1}) + \gamma_2(X_{it} - X_{it-1}) + \lambda_1 + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (3)$$

The state specific error term ( $\eta_i$ ) does not vary across time periods, and is therefore excluded from Equation 3.

A number of researchers (e.g., Arellano & Bover, 1995; Blundell & Bond, 1998; Nickell, 1981; Titus, 2009) concluded that ordinary least square (OLS) and fixed-effects regression analyses might lead to biased estimators of first-differenced models. In particular, causality may be reversed between the endogenous predictors and the dependent variable. To correct for biased estimators and the possible reverse causation in first-difference models, previous researchers (Arellano & Bover, 1995; Blundell & Bond, 1998; Titus, 2009) utilized system GMM estimation. System GMM estimation includes past and future values of differences of strictly exogenous variables as instruments to

correct for reverse causation (Blundell & Bond, 1998). Additionally, as shown by Blundell and Bond (1998), the system GMM estimator includes a matrix of the prior levels and differences of the lagged dependent and independent variables as instruments. Further, because system GMM may produce standard errors with a downward bias, system GMM is employed with a finite sample correction procedure for small samples (Windmeijer, 2004) in order to yield robust standard errors. Therefore, Equation 3 can be modified to include the system GMM estimator and will be employed to examine the first research question: How do state characteristics, higher education governance systems, competing budget items, higher education interest groups, divided legislature, political party of the governors, gubernatorial strength, and other unobservable variables influence state spending on higher education?

$$y_{it} = \alpha + \beta y_{it-1} + \gamma_1(W_{it} - W_{it-1}) + \gamma_2(X_{it} - X_{it-1}) + \lambda_1 + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (4)$$

Equation 4 represents a dynamic fixed-effects panel model with a GMM estimator where  $\beta$  is the coefficient of the lagged dependent variable;  $y_{it}$  is state appropriations to higher education;  $\gamma$  is the coefficient;  $W_{it}$  is the endogenous variable higher education interest groups;  $X_{it}$  is the vector of exogenous variables including the variables for state characteristics, competing budget items, higher education governance structures, divided legislature, political party of the governors, and gubernatorial strength;  $\eta_1$  is the state specific error term;  $\lambda_1$  is the time specific error term; and  $\varepsilon_{it}$  is the residual error. This equation includes lags of the levels equations, as shown in Equation 2, and lags of the first-differences equations, as depicted in Equation 3.

A slightly different equation (5) will be employed to address the second research question: Taking into account state characteristics, higher education governance systems,

competing budget items, higher education interest groups, divided legislature, political party of the governors, gubernatorial strength, and other unobservable variables, how do state legislator policy preferences influence state spending on higher education?

$$y_{it} = \alpha + \beta y_{it-1} + \gamma_1 (W_{it} - W_{it-1}) + \gamma_2 (X_{it} - X_{it-1}) + \lambda_1 + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (5)$$

In Equation 5, the variable state legislator policy preference is added to the vector of endogenous variables ( $W_{it}$ ). A different equation (6) will be employed to address the third research question: 3. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

$$y_{it} = \alpha + \beta y_{it-1} + \gamma_1 (W_{it} - W_{it-1}) + \gamma_2 (X_{it} - X_{it-1}) + \lambda_1 + (\varepsilon_{it} - \varepsilon_{it-1}) \quad (6)$$

This equation is similar to the equations 4 and 5 employed for the first second research questions, respectively. However, in this equation,  $W_{it}$  is a vector that reflects the following variables: policy preferences, higher education interest groups, and the interaction of policy preferences and higher education interest groups. These variables will be multiplied to examine how their interaction influences state appropriations to higher education.

The Hansen  $J$  test, as demonstrated by Arellano and Bond (1991) is used as a post-estimation test to check for over-identifying restrictions in the model by examining whether the GMM-style instruments are uncorrelated with the error term. As

demonstrated by Titus (2009), rejecting the null hypothesis ( $p < 0.05$ ) specifies that the instruments are not valid.

A violation of the assumptions of regression analysis may occur when employing a dynamic fixed-effects panel model. In particular, serial correlation may be present. In regression analysis, serial correlation refers to a correlation of the error terms across different time periods. Applied to DFEP models, the Arellano-Bond test can be utilized to test for first- and second-order serial correlation. The Arellano-Bond test for first-order correlation is expected to be statistically significant, which would verify the use of DFEP modeling. However, the Arellano-Bond test for second-order correlation is not expected to be statistically significant, specifying that the variable transformations accurately corrected for serial correlation (Arellano & Bover, 1995).

### *Limitations*

This study may be limited in a few ways. First, in dynamic fixed-effects panel data analysis, causality cannot be determined; rather, it can only be inferred. Second, though this study intends to include all the independent variables influencing state appropriations to higher education, there may be other possible variables, not included in the analysis, which may influence the dependent variable. Third, this study is limited in the number of years included for analysis. Because one of the key independent variables, state legislator policy preferences, has only been consistently collected for each state from 1998 to 2009, only 12 years of data are used in this investigation.

## Interpretation of the Results

The results of this study will be based on the outcomes of the statistical techniques described above. For ease of interpretation of the results, all continuous variables are log transformed, which allows for an interpretation of the estimated coefficients in terms of percent change.

Analyzing the results of the descriptive statistics will be conducted prior to assessing the results of the panel data analysis. Understanding the descriptive statistics of the variables used in this study shows the distribution of the data and reveals whether there are outliers or highly skewed variables. Additionally, presenting the marginal effects shows how each independent variable influences the dependent variable at the mean, median and 25<sup>th</sup>/75<sup>th</sup> percentile of the dependent variable. After reviewing the descriptive results, an interpretation of the panel data analysis can take place.

Interpreting the results of the dynamic fixed-effects panel model shows how the political variables, including state legislator policy preferences, higher education interest groups, and the interaction of state legislator policy preferences and higher education interest groups, influence state appropriations to higher education, controlling for state characteristics, competing budget items, higher education governance structures, divided legislature, political party of the governors, and gubernatorial strength.



## Chapter 4: Results

### Introduction

Using the spatial theory of voting and advanced statistical techniques, this study examines the influence of state legislator policy preferences and higher education interest groups on state funding to higher education, controlling for other variables. The following research questions are addressed in this study:

1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?

2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

3. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

This chapter begins by presenting a number of descriptive statistics on the variables within this study, including; state demographic and economic characteristics, political variables, state appropriations to higher education, higher education governance structures, and competing budget items. After displaying the descriptive statistics, the results of the dynamic fixed-effects panel model estimated via Generalized Method of Moments (GMM), techniques will be shown.

## Descriptive Statistics

### *State Appropriations to Higher Education*

The descriptive statistics, shown in Table 4.1, include information about the analytic sample of all 50 US states over a period of 12 years (1998 to 2009). Additionally, Table 4.1 depicts the descriptive statistics on state appropriations to higher education, per capita, expressed in 2009 dollars using the Consumer Price Index (CPI) Inflation Multiplier Calculator. State appropriations to higher education, per capita, vary from a minimum of \$95.30 per capita to a maximum of \$563.47 per capita, portraying the fluctuation of funding to higher education across states and over this period of time.

Table 4.1. *Descriptive Statistics*

<b>Variable Name</b>	<b>Mean</b>	<b>SD</b>	<b>Minimum</b>	<b>Maximum</b>	<b>25<sup>th</sup> Percentile</b>	<b>75<sup>th</sup> Percentile</b>	<b>Percent</b>
<u>State appropriations to higher education</u> State appropriations to higher education per capita (2009 dollars)	256.59	72.36	95.30	563.47	207.52	293.15	
<u>Competing budget items</u> K-12 expenditures per capita (2009 dollars)	1535.78	321.13	1015.94	2870.41	1310.42	1669.62	
Medicaid expenditures per capita (2009 dollars)	950.57	326.69	328.60	2463.20	752.01	1093.25	
Prison expenditures per capita (2009 dollars)	155.61	57.31	1.93	437.83	119.62	181.00	
<u>State Characteristics</u> Unemployment Rate	5.0%	1.61%	2.30%	13.40%	3.9%	5.7%	
Tax and Expenditure limitations laws							49.0%
Total Enrollment in higher education per capita	0.058	0.010	0.038	0.130	.050	.064	
Share of higher education enrollment in private institutions	22.85%	12.24%	3.19%	57.71%	14.00%	27.77%	
<u>Political Variables</u> State Legislator Political Preferences: House	0.082	0.516	-1.395	1.001	-.208	.492	
State Legislator Political Preferences: Senate	0.071	0.551	-1.166	1.024	-.426	.499	
Higher Education Interest Group Ratio	0.014	0.696	0.006	0.149	.028	.050	
Republican Governor							44.33%
Gubernatorial Strength	3.47	0.42	2.50	4.30	3.2	3.8	
Divided legislature							23.47%
<u>Higher Education Governance Systems</u> Coordinating Agency							53.27%
Governing Board							41.12%
Both Coordinating Agency and Governing Board							5.61%

### *State Demographic and Economic Characteristics*

Table 4.1 depicts the descriptive statistics for state demographic and economic characteristics, including state unemployment rate, tax and expenditure limitation laws, share of higher education enrollment in private institutions, and total enrollment in higher education institution. These statistics show that 49% of the states, during the period of 1998 to 2009, had tax expenditure and limitation laws. Furthermore, an average of 22.85% of higher education enrollments was in private institutions across all states from 1998 to 2009.

### *Competing Budget Items*

Similar to state appropriations to higher education, competing budget items were measured in 2009 dollars and per capita. As shown in Table 4.1, both K-12 expenditures and Medicaid expenditures, on average, were funded at significantly higher levels compared to higher education. However, prison expenditures, on average, were funded at slightly lower levels compared to higher education expenditures.

### *Political Variables*

Descriptive statistics reveal that 44.33% of the US states, from 1998 to 2009, had a Republican Governor in power. Additionally, 23.47% of the US states had a divided state legislature during the time period of the study, meaning that Republicans controlled one house of the state legislature while Democrats controlled the other house.

### *Higher Education Governance Structures*

Table 4.1 shows that 53.27% of the US states had a coordinating agency governance structure. Additionally, 41.12% had a governing board governance structure and 5.61% had both a coordinating board and governing board from 1998 to 2009.

Statistical tests for correlation were employed to measure the relationship between the independent variables. As depicted in Table A1 in the Appendix, a statistically significant correlation exists between the House and Senate state legislator policy preference scores ( $r = 0.8078$ ). Because of the correlation between the House and Senate policy preference, scores were averaged together for each state, for each year. Averaging the House and Senate policy preferences to create a new variable is a technique utilized by other scholars to address the statistically significant correlation between the House and Senate policy preference scores (e.g., McGhee, Masket, Shor, Rogers and McCarty, 2014).

### Results by Research Question

The results of each of the three research question are described in this chapter.

#### *Research Question 1*

How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided

legislature, and other unobservable variables influence state spending on higher education?

Before examining the influence of state legislator policy preferences on state appropriations to higher education, a number of variables analyzed in previous literature are examined to determine their influence on state appropriations to higher education. As outlined in Chapter 3, a dynamic fixed-effects panel model estimated via Generalized Method of Moments (GMM) techniques is the most appropriate method to examine how a number of variables influence state spending on higher education. This method is most suitable because it allows for an interpretation of how current higher education appropriations are influenced by prior levels of appropriations and other predictors of higher education appropriations. In particular, system GMM techniques combined with dynamic fixed-effects panel modeling produce efficient and precise estimates when examining a lag of the dependent variable and lags of the endogenous variables, along with other exogenous variables.

Utilizing the system GMM technique along with dynamic fixed-effects panel modeling, endogenous variables are instrumented with the lags of the differenced values of the endogenous variables and values of the exogenous variables. When working with a small sample and short time periods, these instruments provide more precise and efficient estimates (Blundell & Bond, 1998).

When assessing the results of the dynamic fixed-effects panel model with system GMM techniques, a cutoff value of .05 is employed to evaluate the statistical significance of the overall model and coefficients. Using this cutoff, Table 4.2 shows that the results of the dynamic fixed-effects panel model with system GMM techniques for the first research question is statistically significant [ $F(15,48) = 13.06; p < .001$ ].

Two post-estimation tests should be examined to determine if a dynamic fixed-effects panel model with system GMM techniques is the most appropriate technique to address the research question. First, the Hansen  $J$  statistic should be reviewed to ensure that the full set of instruments introduced into the model is valid. The Hansen test specifies whether the exogenous variables are correlated with the error term. The null hypothesis of the Hansen test is that instruments included in the model are exogenous and uncorrelated with the error. In the model representing the results of the first research question, the Hansen  $J$  statistic depicts that instruments are exogenous and uncorrelated with the error ( $\chi^2 = 17.47; p < .10$ ).

The second post-estimation test is the Arellano-Bond test for serial correlation. This test examines whether there is autocorrelation between the lagged dependent variable and any other endogenous variables. The null hypothesis of the Arellano-Bond test states that the variables are exogenous (autocorrelation is not present). The Arellano-Bond test for autocorrelation in the first-differenced residuals is expected to be significant, indicating that dynamic fixed-effects panel modeling is the appropriate technique. Table 4.2

shows the Arellano-Bond results for autocorrelation in the first-differenced residuals (AR1) to be insignificant ( $Z = -2.89; p < .01$ ). The Arellano-Bond test also examines second-order serial correlation, which is expected to be statistically significant. A statistically significant estimate for second-order serial correlation would indicate that the variable transformations have corrected for autocorrelation (Roodman, 2006). As depicted in Table 4.2, the findings of the Arellano-Bond test for second-order serial correlation (AR2) depict that the model does not contain autocorrelation ( $Z = 0.38; p < .80$ ).

As displayed in Table 4.2, prior appropriations to higher education, lagged one year, is positively related to current year appropriations to higher education ( $\beta = 1.01; p < .001$ ). State-wide unemployment rate is not a statistically significant predictor of state appropriations to higher education ( $\beta = -.09; p < .20$ ). K-12 appropriations is positively related to higher education appropriations ( $\beta = -.70; p < .05$ ). Medicaid appropriations is not a statistically significant predictor of higher education appropriations ( $\beta = -.04; p < .70$ ). Similarly, prison appropriations is not statistically significant ( $\beta = -.06; p < .50$ ) nor is higher education enrollment ( $\beta = -.35; p < .20$ ). Share of enrollment in private institutions is not statistically significant ( $\beta = .02; p < .40$ ) nor is higher education interest groups ( $\beta = .03; p < .80$ ). Gubernatorial strength is positively related to higher education appropriations ( $\beta = 1.54; p < .05$ ). Tax and limitation policies is not statistically significant ( $\beta = .03; p < .90$ ) nor is gubernatorial political party ( $\beta = .01; p < .90$ ). Variables representing higher education governance structures are not



statistically significant: both a coordinating agency and governing board (beta = -1.52;  $p < .20$ ); governing board (beta = -1.60;  $p < .20$ ); coordinating agency (beta = -1.81;  $p < .20$ ). Divided legislature is not statistically significant (beta = .04;  $p < .40$ ).

Table 4.2. *Results by Research Question: Dynamic fixed-effects panel analysis model estimated coefficients and standard errors: 1998-2009.*

	<b>Research Question 1</b>	<b>Research Question 2</b>	<b>Research Question 3</b>
Constant	4.469 (2.033)	3.961 (1.316)	5.561 (1.982)
Prior year higher education appropriations	1.013*** (0.215)	0.560*** (0.114)	0.727** (0.212)
State legislator policy preferences		-0.288** (0.082)	
State legislator policy preferences * higher education interest groups			-0.856 (0.431)
Unemployment rate	-0.088 (0.061)	-0.067 (0.046)	-0.095 (0.070)
K-12 appropriations	-0.695* (0.293)	-0.026 (0.179)	-.0372 (0.301)
Medicaid appropriations	-0.043 (0.102)	-0.145 (0.086)	-0.189 (0.119)
Prison appropriations	-0.060 (0.076)	0.009 (0.048)	-0.000 (0.065)
Higher education enrollment	-0.345 (0.209)	0.152 (0.184)	0.119 (0.242)
Share of enrollment in private higher education	-0.082 (0.081)	-0.178* (0.087)	-0.228 (0.127)
Higher education interest groups	0.017 (0.059)	0.027 (0.060)	
Gubernatorial strength	1.536* (0.667)	0.057 (0.324)	0.264 (0.402)
Tax and expenditure limitation policy	0.028 (0.119)	-0.033 (0.066)	-0.022 (0.063)
Political party of the Governor	0.006 (0.818)	-0.020 (0.037)	0.006 (0.039)
Higher education governance structure			
Coordinating agency and governing board	-1.524 (1.128)	0.149 (0.232)	0.161 (0.181)
Governing board	-1.595 (1.135)	0.054 (0.162)	-0.024 (0.126)
Coordinating agency	-1.812 (1.199)	0.054 (0.180)	-0.067 (0.110)
Divided legislature	0.037 (0.040)	-0.029 (0.053)	-0.021 (0.066)
Observations	539	435	435
Number of states	49	48	48
Number of instruments	26	27	32
Year dummies?	Yes	Yes	Yes

F-Statistic	13.06***	7.30***	3.01**
Hansen <i>J</i> Statistic	17.47	15.78	14.93
Arellano-Bond tests for			
AR(1) in first differences (Z)	-2.89***	-2.45**	-1.50
AR(2) in first differences (Z)	0.38	0.11	0.21

Notes: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; standard errors are in parentheses

All continuous variables in this study are log transformed. All financial variables were transformed into 2009 dollars.

### *Research Question 2*

Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

The second research question seeks to understand whether state legislator policy preferences influence state spending on higher education. The overall model is significant [ $F(16, 47) = 7.30; p < .001$ ] and the Hansen *J* statistic reveals that the instruments are valid and the exogenous variables are uncorrelated with the error term ( $\chi^2 = 15.78; p < .20$ ). Additionally, the test for

second-order serial correlation is not significant, indicating that the variable transformations have corrected for autocorrelation ( $Z = 2.59$ ;  $p < .20$ ).

Similar to the findings from the first research question, prior appropriations to higher education, lagged one year, is positively related to current year appropriations to higher education ( $\beta = 0.56$ ;  $p < .001$ ). The share of enrollment in private higher education institutions is also statistically significant in this model ( $\beta = -0.18$ ;  $p < .05$ ). In particular, current year appropriations are negatively related to the share of enrollment in private institutions. Therefore, as the share of enrollment in private higher education institutions increases, there is a decrease in state appropriations to higher education.

The results of the model addressing the second research question also indicate that state legislator policy preferences are statistically significant ( $\beta = -0.29$ ;  $p < .01$ ). The negative coefficient indicates that current state appropriations to higher education are negatively related to state legislator policy preferences. Specifically, the negative coefficient specifies that more liberal state legislator policy preferences positively influence state appropriations to higher education. Varying levels of state legislator policy preferences were also examined to depict how states with more liberal state legislator policy preferences, compared to states with more conservative state legislator policy preferences, influenced state appropriations to higher education. Following the dynamic fixed-effects panel model with systems GMM techniques, marginal effects were analyzed to discern how various

levels of state legislator policy preferences influenced state appropriations to higher education. Table 4.3 portrays the marginal effects. More conservative state legislator policy preferences are represented as the 25<sup>th</sup> percentile and more liberal state legislator policy preferences are represented as the 75<sup>th</sup> percentile. Depicted in Table 4.3, states with more conservative state legislator policy preferences (25<sup>th</sup> percentile) are negatively influencing state appropriations to higher education (beta = 0.07;  $p < .01$ ) while states with more liberal state legislator policy preferences (75<sup>th</sup> percentile) are positively influencing state appropriations to higher education (beta = -0.14;  $p < .01$ ).

Table 4.3. *Estimated Marginal Effects of State Legislator Policy Preferences at the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> Percentile from the dynamic fixed-effects panel analysis model (Research Question 2) in Table 2, 1998-2009.*

State Legislator Policy Preferences Quartile	Marginal Effects
25 <sup>th</sup> percentile	0.070** (0.022)
50 <sup>th</sup> percentile	-0.060** (0.019)
75 <sup>th</sup> percentile	-0.140** (0.044)

Notes: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; standard errors are in parentheses. The standard errors are estimated using the delta-method, which treat the independent variables at which the dependent variable is evaluated as given or fixed (e.g., at the mean, 25<sup>th</sup> percentile, 75<sup>th</sup> percentile, etc.).

### *Research Question 3*

Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

The third research question seeks to understand whether state legislator policy preferences, interacting with higher education interest groups, influence state spending on higher education. As shown in Table 4.2, the overall model is significant [ $F(21, 47) = 3.01; p < .01$ ]. Additionally, the Hansen  $J$  statistic shows that the instruments are valid and the exogenous variables are uncorrelated with the error term ( $\chi^2 = 14.93; p < .20$ ). As seen in the results for the first two research questions, the test for second-order serial correlation is significant, indicating that the variable transformations have corrected for autocorrelation ( $Z = 0.21; p < .90$ ).

The higher education interest group variable was transformed into four separate variables to examine whether state legislator policy preferences, interacting with higher education interest groups, influences state appropriations to higher education. Specifically, higher education interest group ratios were grouped into four quartiles: Quartile 1 reflects the lowest levels of higher education interest groups (states with higher

education interest group ratios in the bottom fourth relative to other states). Quartile 2 represents states with higher education interest group ratios falling within the second to lowest group. Quartile 3 reflects states with higher education interest group ratios within the second to highest group relative to other states while Quartile 4 represents the states with the highest levels of higher education interest groups ratio. Dummy variables were created to represent the quartiles of higher education interest groups. Transforming higher education interest groups into quartiles allowed for an examination of how state legislator policy preferences, interacting with each of the quartiles of higher education interest groups, influence state appropriations to higher education. The results of the model, as represented by the marginal effects in Table 4.4, show that state legislator policy preferences, interacting with higher education interest groups, do not have a statistically significant relationship, regardless of the level of higher education interest groups.

Table 4.4. *Estimated Marginal Effects of Higher Education Interest Groups Interacting with State Legislator Policy Preferences Interacting at the 25<sup>th</sup>, 50<sup>th</sup>, and 75<sup>th</sup> Percentile from the dynamic fixed-effects panel analysis model (Research Question 3) in Table 2, 1998-2009.*

Higher Education Interest Group Quartile * State Legislator Policy Preference Score	Marginal Effects
25 <sup>th</sup> percentile * State Legislator Policy Preference Score	0.538 (0.348)
50 <sup>th</sup> percentile * State Legislator Policy Preference Score	0.762 (0.429)
75 <sup>th</sup> percentile* State Legislator Policy Preference Score	0.791 (0.430)

Notes: \* p<0.05; \*\* p<0.01; \*\*\* p<0.001; standard errors are in parentheses. The standard errors are estimated using the delta-method, which treat the independent variables at which the dependent variable is evaluated as given or fixed (e.g., at the mean, 25<sup>th</sup> percentile, 75<sup>th</sup> percentile, etc.).

### Summary

This chapter presents the results of the three research questions in this study. The first research question seeks to examine the influence of prior state appropriations, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables on state spending on higher education. A dynamic fixed-effects panel model with system GMM techniques is utilized to address this question. The findings presented in this chapter show that prior year appropriations to higher education, K-12 appropriations, and gubernatorial strength all influence current-year state appropriations to higher education. The second research question in this study examined the influence of state legislator policy preferences on state higher education



appropriations. A dynamic fixed-effects panel model with system GMM techniques was utilized, and the findings suggest that state legislator policy preferences significantly influence state higher education appropriations. Specifically, more liberal state legislator policy preferences positively influence state appropriations to higher education while more conservative state legislator policy preference negatively influence state appropriations to higher education. The third research question seeks to understand how state legislator policy preferences, interacting with higher education interest groups, influence state appropriations to higher education. The results indicate that state legislator policy preferences, interacting with various levels of higher education interest groups, are not statistically significant. The following chapter will discuss these results in context with the literature.

## **Chapter 5: Discussion**

### **Introduction**

Using the spatial theory of voting and advanced statistical techniques, this study examined the influence of state legislator policy preferences, higher education interest groups, and other variables on state funding to higher education. The study addressed three research questions:

1. How do prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables influence state spending on higher education?

2. Taking into account prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences influence state spending on higher education?

3. Taking into account prior state appropriations to higher education, state characteristics, higher education

governance systems, competing budget items, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables, how do policy preferences varying with higher education interest groups influence state spending on higher education?

This chapter will first provide a discussion of the results presented in chapter 4. The results will be compared with prior research examining state appropriations to higher education. Next, this chapter will discuss contributions to the literature, conclusions, implications for theory and research, and recommendations for future research.

#### Discussion of the Findings

As depicted in chapter 4, prior appropriations to higher education are positively related to current year appropriations to higher education in all three models. Additionally, K-12 appropriations are positively related to state appropriations to higher education in the first model but not in the second and third models. Another variable, gubernatorial strength, depicting the power of a state's governor, is positively related to state appropriations to higher education in the first model. The share of higher education enrollment in private institutions was found to be significant in the second model, but not in the first or third model. State-wide unemployment, Medicaid appropriations, prison appropriations, total enrollment in higher education, higher education interest groups, tax and expenditure limitation policies, political parties of the governor, higher education governance structures, and divided legislature have no statistically significant association

with state appropriations to higher education in any of the models. The variable depicting state legislator policy preferences is statistically significant while the interaction of state legislator policy preferences and higher education interest groups is insignificant. The following section will compare the findings from this study to the results from prior research.

### *Prior Appropriations to Higher Education*

In this study, prior appropriations to higher education are positively related to current year appropriations to higher education. This finding is consistent with previous studies portraying the statistically significant influence of prior year appropriations to higher education on current year appropriations (e.g., Hossler, Lund, Ramin, Tandberg, 2008; Westfall, & Irish, 1997; Wildavsky, 1964). In addition, this finding is consistent with the incremental budgeting approach states employ with respect to funding higher education (State Higher Education Executive Officers Association: Annual Report, 2009).

### *State Characteristics*

Prior studies found that lower state unemployment rates were associated with higher levels of state appropriations to higher education (e.g., Dar & Spence, 2011; Humphreys, 2000; McLendon et al., 2009; Toutkoushian & Hollis, 1998) while other researchers (e.g., Delaney & Doyle; Tandberg & Ness, 2011) found no relationship between unemployment rates and higher education funding. This study did not find a significant relationship between states' unemployment rates and state appropriations to

higher education, consistent with recent research by Delaney & Doyle (2011) and Tandberg & Ness (2011).

The lack of association between state unemployment rates and state appropriations to higher education may be due to the time period examined in this study. Unlike many prior studies, this dissertation examined state appropriations to higher education from 1998 – 2009. During this time period, the average unemployment rate in the US was relatively stable, ranging from around 4% to 6%. However, other studies included time periods with more unstable unemployment rates. For example, Toutkoushian and Hollis (1998) measured state appropriations that included time periods in the 1970's through the early 1990's when unemployment rates varied 5% to 10%. Similar to research by Delaney and Doyle (2011) and Tandberg and Ness (2011), this study examined a time period in the late 1990's and early to mid-2000's when unemployment rates were more stable. Therefore, the lack of association between states' unemployment rates and state appropriations to higher education may be due to the time period examined in this study.

Some recent studies showed that the presence of state tax and expenditure limitation policies negatively influenced state appropriations to higher education (Archibald & Feldman, 2006) while other studies showed no relationship (McLendon et al., 2009). Similar to the research by McLendon et al., (2009), this study finds no relationship between state tax and expenditure limitation policies and state appropriations to higher education.

The lack of association between state tax and expenditure limitation policies and state appropriations to higher education may also be influenced by the time period

examined within prior studies. In the study by Archibald and Feldman (2006), the authors examined the influence of state tax and limitation policies on state appropriations to higher education from 1961 – 2001. The study by McLendon et al., (2009), which found no relationship between state tax and expenditure limitation policies and higher education funding, examined the time period from 1984 – 2004 and this study utilized the timeframe from 1998 – 2009. Because most states enacted tax and expenditure limitations in the late 1970's it is not surprising that studies analyzing the timeframe before and after tax and expenditure limitations were enacted may find a statistically significant relationship (e.g., Archibald & Feldman, 2006). Because this study examined state appropriations to higher education after the enactment of state tax and expenditure limitations, it is not unexpected to find an insignificant relationship between tax and expenditure limitations and state appropriations to higher education.

A number of prior studies found a positive association between total state higher education enrollments and state appropriations to higher education (Clotfelter, 1976; Delaney & Doyle, 2011; Hossler, 1997; Peterson, 1976; Weerts, 2002) while Leslie & Ramey (1986) found a relationship between state appropriations to higher education and total enrollments only within certain states. Results from other studies show no statistically significant relationship between total state enrollments in higher education and state appropriations (Dar, 2012; Tandberg & Ness, 2011). Similar to the research by Dar (2012) and Tandberg and Ness (2011), the results of this study show no relationship between state appropriations to higher education and total state enrollments in higher education.

There are a few potential reasons why the association between total state higher education enrollments and state appropriations to higher education was insignificant in this study. First, total state higher education enrollments were measured per capita within this study, while other researchers used the absolute value of higher education appropriations or the percentage of higher education funding relative to other state budget items (Clotfelter, 1976; Delaney & Doyle, 2011; Hossler, 1997; Peterson, 1976; Weerts, 2002). Second, this study examined multiple states over multiple years, whereas many studies finding a significant association between total enrollments in higher education and state appropriations to higher education examined only one state or only examined a few years (e.g., Clotfelter, 1976; Peterson, 1976). Therefore, the insignificant relationship found between state appropriations to higher education and total enrollments in higher education is likely due to how higher education appropriations are measured and the number of states and years examined within the study.

Recent studies examined the association between the share of higher education enrollment in private institutions and state appropriations to higher education (Dar & Spence, 2011; Delaney & Doyle, 2011; McLendon et al., 2009). The results of these studies show that as the share of enrollment in private institutions increases, state appropriations to higher education decreases. The results of the second research question in this study affirm prior findings that state appropriations to higher education is negatively associated with the share of enrollment in private institutions.

### *Higher Education Governance Systems*

A number of scholars examined the effect of higher education governance structures on state appropriations to higher education. Some studies found appropriations to higher education are related to higher education governance structures (e.g., Lowry, 2001; Tandberg & Ness, 2011; Weerts, 2002) whereas other studies found no association (e.g., Delaney & Doyle, 2011; McLendon et al., 2009). Within this study, state appropriations to higher education were not related to higher education governance structures.

The lack of association between state appropriations to higher education and higher education governance structures may be due to the time period examined in this study. Specifically, few states had a change in higher education governance structures during the time period examined in this study. Comparable to the research by McLendon et al. (2009), the consistency of governance structures found within this study is likely influencing the lack of association between higher education governance structures and state appropriations to higher education.

### *Competing Budget Items*

A number of studies have examined whether other state budget items influence state appropriations to higher education. In particular, many scholars analyzed how K-12 appropriations within a state influence higher education appropriations (Delaney & Doyle, 2007; Kane, Orszag, & Apostolov, 2005; Okunade, 2004). Some studies found that higher education appropriations (e.g., Kane, Orszag, & Apostolov, 2005; Okunade, 2004) are related to K-12 education appropriations while other researchers concluded that



there is no statistical relationship (e.g., Delaney & Doyle, 2007). In this study, the results of the first model show that K-12 appropriations are related to higher education appropriations: as K-12 appropriations increase, state spending on higher education decreases. However, after including the variable representing state legislator policy preferences in the second and third model, K-12 funding was found to be unrelated to state appropriations to higher education.

In the first model, higher education appropriations was related to K-12 appropriations, a finding that is consistent with prior research that included a similar group of independent variables (e.g., Kane, Irszag, & Apostolov, 2005; Okunade, 2004). However, when including political variables such as state legislator policy preferences, the relationship was insignificant. Though K-12 appropriations and the political variables are not correlated (Appendix: Table A1), it is likely that the inclusion of political variables is absorbing the variability of K-12 appropriations resulting in an insignificant relationship between K-12 appropriations and higher education appropriations.

Medicaid appropriations have also been examined in prior researchers to understand whether Medicaid appropriations influence state spending to higher education (e.g., Grogan, 1994; Kane, Orszag, & Apostolov, 2005; Okunade, 2004; Tandberg & Ness, 2011). Some scholars found a significant association (e.g., Archibald & Feldman, 2006; Kane, Orszag, and Apostolov, 2005; Okunade, 2004) while others have found no relationship between Medicaid appropriations and state funding to higher education (e.g., Tandberg & Ness, 2011). This study had comparable results to recent research conducted by Tandberg and Ness (2011), finding no statistically significant association between higher education appropriations and Medicaid appropriations.

Unlike the studies by Kane, Orszag, and Apostolov (2005) and Okunade (2004), this study did not find a statistically significant association between Medicaid appropriations and higher education appropriations. The insignificant association is likely due to the unique technique employed in this study. Within this study, a dynamic fixed-effects panel model with GMM techniques was employed to measure higher education funding across multiple states over a number of years. Prior research investigating the influence of Medicaid appropriations on state funding to higher education did not utilize an advanced econometric technique that appropriately included multiple states over multiple years (e.g., Kane, Orszag, and Apostolov, 2005; Okunade, 2004). Therefore, the lack of association between Medicaid funding and higher education funding is likely due to the advanced technique employed in this dissertation.

Previous scholars have examined whether state appropriations to higher education are related to prison expenditures. Some scholars found a statistically a significant association between prison expenditures and state appropriations to higher education (e.g., Archibald & Feldman, 2006; Okunade, 2004) while other researchers found no association (e.g., Dar & Spence, 2011; Delaney & Doyle; 2011; Tandberg, 2010). Similar to the research by Dar and Spence (2011), Delaney and Doyle (2011) and Tandberg (2010), the results of this study found no statistically significant relationship between prison expenditures and state appropriations to higher education.

### *Political Variables*

A few recent studies examining state appropriations to higher education have sought to understand the influence of higher education interest groups on state

appropriations to higher education. In one study, McLendon et al. (2009) found that as the ratio of higher education interest groups within a state increased, relative to other interest groups, state appropriations to higher education increased. Tandberg (2008, 2010) and Tandberg and Ness (2011) also found that state appropriations to higher education increased as the ratio of higher education interest groups within a state increased.

Within this study, no statistically significant association exists between state appropriations to higher education and higher education interest groups. The difference in findings between this study and prior research may be attributed to a few factors. First, this study used an updated measure of higher education interest groups which included interest group data through 2009 where previous studies included data through 2004 (McLendon et al, 2009; Tandberg, 2008, 2010; Tandberg & Ness, 2011). Second, this study examined the influence of higher education interest groups on state appropriations to higher education from 1998 – 2009, which constitutes a different time periods compared to earlier research. Third, this study utilized a methodological approach that was not employed in prior studies examining the influence of higher education interest groups on state appropriations to higher education. Fourth, measuring higher education interest groups in a different manner may yield alternative results. Though this study considered the ratio of higher education interest groups in a state compared to all other interest groups, it did not consider the strength of the higher education interest groups. Therefore, updated measures of higher education interest groups, the timeframe examined in this study, and an alternative method not employed in previous research all may have

influenced the different conclusions found regarding the influence of higher education interest groups on state appropriations to higher education.

Certain past studies investigating state appropriations to higher education have included an independent variable measuring the political party of the governor (e.g., Delaney & Doyle, 2011; McLendon et al., 2009; Rizzo, 2006; Tandberg & Ness, 2011). McLendon et al., (2009) and Rizzo (2006) found that Republican governors were associated with lower funding levels to higher education while Delaney and Doyle (2011) and Tandberg and Ness (2011) found no relationship between the party of the governor and state appropriations to higher education. Within this study, no statistically significant relationship was found between the political party of the governor and state appropriations to higher education.

One reason that might explain the statistical insignificance of the political parties of the governor on state funding for higher education is that state legislators are the political actors deciding funding levels for various state budget items, including higher education funding. Governors, on the other hand, do not typically shape the funding levels of higher education appropriations. Therefore, the insignificant relationship between the political party of the governor and state appropriations to higher education is unsurprising.

A different variable in this study, gubernatorial strength, is related to state appropriations to higher education within the first model, but not within the second and third models. Specifically, the first model in this study shows that lower state appropriations to higher education are associated with more powerful governors. Prior research confirms the result found in the first model that lower funding levels to higher

education (e.g., Peterson, 1976; McLendon et al., 2009; Tandberg & Ness, 2011) are associated with powerful governors. However, this variable is insignificant when state legislator policy preferences are introduced in the second and third models. Although gubernatorial strength is not statistically correlated with state legislator policy preferences (Appendix: Table A1), it is likely that the variability of gubernatorial strength is being absorbed by state legislator policy preferences in the second and third models.

This study also analyzed whether a divided or unified state legislature influenced state appropriations to higher education. As shown in Chapter 4, no statistically significant association was found between state appropriations to higher education and a divided legislature. Prior studies have shown mixed results in regards to whether a divided legislature influences state appropriations to higher education. In particular, Tandberg and Ness (2011) found no association while Tandberg (2008, 2010) found that unified legislatures have a negative influence on state funding to higher education. Overall, this study confirms the most recent results by Tandberg and Ness (2011), finding no significant association exists between state funding for higher education and a divided legislature.

A variable depicting state legislator policy preferences was included in this study and found to be related to state appropriations to higher education. As shown in Chapter 4 and looking at the distribution state legislature policy preferences at the 25<sup>th</sup>, 50<sup>th</sup> and 75<sup>th</sup> percentile, states with more conservative state legislator policy preferences negatively influenced state appropriations to higher education while states with more liberal state legislator policy preferences positively influenced state appropriations to higher education. Therefore, a more conservative state legislature, depicted as the 25<sup>th</sup>

percentile, was associated with the lowest levels of higher education funding while a more liberal state legislature, depicted as the 75<sup>th</sup> percentile, was associated with the highest levels of higher education funding. Though prior scholars utilized different variables to measure state legislator policy preferences, this finding aligns with previous findings. In particular, McLendon et al., (2009) found that conservative state legislatures were associated with lower levels of state funding to higher education. Similarly, Tandberg (2010) found that more liberal state legislatures, as measured as the percent of Democratic legislators, were associated with higher levels of state funding to higher education. Although prior studies found that policy preferences were related to state appropriations to higher education, a less accurate measure for policy preferences was used. Specifically, Dar (2012) and McLendon et al. (2009) utilized measures of policy preferences based off members of the US Congress and Tandberg (2010) measured the relative percentage of state legislators that were Democrats vs. Republicans. Because this dissertation utilized direct measures of legislator preferences, rather than proxies, this finding notably advances prior research on this topic. Moreover, this significant finding regarding the influence of state legislator policy preferences on higher education funding aligns with the central concept of the spatial theory of voting guiding this study: legislators evaluate policy alternatives and vote for policies aligning with their personal preferences. Overall, the findings of this study portray that more liberal state legislator policy preferences are associated with higher levels of higher education funding while more conservative state legislator policy preferences are associated with lower levels of higher education funding.

State legislator policy preference scores, interacting with higher education interest groups, were not found to be significant in this study. As explained earlier, higher education interest groups are not related to higher education funding. Therefore, it is not surprising that higher education interest groups, interacting with state legislator policy preferences was not statistically significant.

### Contributions to the Literature

This dissertation provides three major contributions to the literature in higher education and political science. First, this study connects a theoretical framework from the field of political science to the higher education literature. Prior research analyzing higher education funding has utilized frameworks such as the median voter theorem (e.g., Clotfelter, 1976; Doyle, 2007; Tandberg & Ness, 2011; Toutkoushian & Hollis, 1998), new institutionalism (e.g., Alt & Lowry, 1994; McLendon et al., 2009; Rizzo, 2004), and the state fiscal policy framework (e.g., Tandberg, 2008, 2010). However, no prior studies within political science or higher education have utilized the spatial theory of voting to guide research on state appropriations to higher education. Thus, the application of the spatial theory of voting in this study adds another theoretical framework to the higher education and political science literature.

Second, this dissertation utilizes a newly developed variable, state legislator policy preferences, which has not been examined in prior higher education research. Previous studies in higher education have been using a proxy to understand the policy preferences of state legislators (e.g., Dar, 2012; Dar & Spence, 2011; McLendon et al., 2009; Tandberg, 2010; Tandberg & Ness, 2011). However, this newly developed

variable by Shor and McCarty (2011) more accurately depicts the policy preferences of state legislators. Moreover, because the variable depicting state legislator policy preferences was only recently developed, few studies in other disciplines have utilized these new measures of state legislator policy preferences (e.g., McGhee et al., 2014; Tausanovitch & Warshaw, 2013). Overall, this dissertation showcases the use of a new political variable depicting state legislator policy preferences to investigate state appropriations to higher education.

Third, this dissertation employs an advanced econometric technique that has been utilized in only one other higher education study by Titus (2009). Moreover, dynamic fixed-effects panel modeling with Generalized Methods of Moments (GMM) techniques has not been used in any studies examining higher education funding. As explained in Chapter 3, a dynamic fixed-effects panel model combined with GMM techniques is the most appropriate technique to assess how prior levels of state appropriations to higher education, along with other independent variables, influence current appropriations to higher education. Recent quantitative studies examining state appropriations to higher education have typically employed panel data techniques. Overall, this dissertation provides a detailed description of the use of a dynamic fixed-effects panel model with GMM estimating techniques to examine the influence of prior appropriations to higher education, state legislator policy preferences, and other variables on state funding to higher education.



## Conclusions

There are at least four conclusions that can be drawn from this study. First, the spatial theory of voting, a theory never utilized in the field of higher education, helps guides studies examining the influence of political influences on state appropriations to higher education. Specifically, the results of this study validate the central construct of the spatial theory of voting: legislators evaluate policy alternatives and make policy decisions based on their own preferences (Enelow & Hinich, 1984). In particular, the theory utilized in this study helps guide the selection of political variables in this study and explain the association between policy preferences and higher education funding.

Second, this study utilized newly developed measures of policy preferences to determine that that state appropriations to higher education are influenced by state legislator policy preferences. This is an important finding, given that a number of prior studies utilized proxies for state legislator policy preferences developed by Berry et al., (2010) rather than direct, more accurate, measures of legislator policy preferences (e.g., Archibald & Feldman, 2006; Dar, 2012; McLendon et al., 2009; Tandberg, 2010; Tandberg & Ness, 2011). Recently, Berry et al. (2010) wrote, “If valid direct measures of state citizen and government ideology eventually become available for the 50 states over a sufficient period of years, we would certainly favor using them over BRFH’s less direct proxies” (Berry et al. 2010). Furthermore, this study expanded previous research investigating the influence of policy preferences on higher education funding by examining the influence of varying levels of state legislator policy preferences on state funding for higher education. In particular, this study showed how more liberal state legislator policy preferences were associated with higher levels of state appropriations to

higher education while more conservative state legislator policy preferences were associated with lower funding levels to higher education. Overall, this study utilized a newly developed, direct measure of legislator policy preferences to explain the significant relationship between state legislator policy preferences on state appropriations to higher education.

Third, there is no evidence of a significant relationship between state legislator policy preferences, interacting with higher education interest groups, on state appropriations to higher education from 1998 to 2009. Because the variable representing the interaction of state legislator policy preferences and higher education interest groups is insignificant, changes in state appropriations to higher education may not be due to varying levels of higher education interests groups interacting with state legislator policy preferences.

Fourth, this study demonstrates that advanced statistical methods can be used to examine the predictors of state appropriations to higher education. In particular, this dissertation utilized dynamic fixed-effects panel modeling with GMM estimating techniques to accurately examine the influence of prior year appropriations to higher education, state characteristics, higher education governance systems, competing budget items, divided legislature, political party of the governors, gubernatorial strength state legislator policy preferences, and higher education interest groups on state funding to higher education. In summary, the results of this study affirm that research on higher education funding should be investigated using sophisticated quantitative methods to appropriately examine how of state appropriations to higher education is influenced by a number of independent variables.

## Implications for Theory, Research, and Policy

The results of this dissertation offer a number of implications. The next session of this chapter will discuss the implications for theory, research and policy and provide recommendations for future research on state appropriations to higher education.

### *Implications for Theory*

This study is distinct in that it utilizes a theory from political science to examine the influence of political variables on state appropriations to higher education. In particular, the spatial theory of voting appropriately guides the selection of political variables to examine the influence of state legislator policy preferences on state appropriations to higher education. Variables depicting state characteristics, higher education governance structures, and competing budget items were also included in this study due to their significance in prior research examining state funding to higher education. In total, a broader conceptual framework, which includes the spatial theory of voting along with significant variables from prior research was utilized in this study to examine the influence of prior state appropriations to higher education, state characteristics, higher education governance systems, competing budget items, higher education interest groups, political party of the governors, gubernatorial strength, divided legislature, and other unobservable variables on state appropriations to higher education. Thus, the spatial theory of voting is an appropriate theory to guide studies seeking to understand the influence of political variables, such as state legislator policy preferences, on state funding to higher education. However, including significant variables from other research, along with the spatial theory of voting to guide the selection of political

variables, can be employed to construct a conceptual framework for future research examining state funding to higher education.

Because the spatial of theory appropriately guided this study examining the influence of state legislator policy preferences on higher education funding, this theory can be applied to other research topics. Studies investigating other state budget items, such as Medicaid appropriations or K-12 appropriations can employ the spatial theory of voting to examine the influence of state legislator policy preferences on other budget items. Additionally, the spatial theory of voting can be utilized to examine the influence of state legislator policy preferences on other state policy outcomes. Overall, this study showed how the spatial theory of voting can be employed in other studies examining state legislator policy on policy outcomes.

#### *Implications for Research*

Within this study, prior year appropriations to higher education, is included as a lag of the dependent variable, current year appropriations to higher education. Dynamic fixed-effects panel models with GMM estimating techniques are recommended when a lag of the dependent variable is included as an independent variable (Arellano & Bond, 1991; Curs, Bhandari, & Steiger, 2011; Titus, 2009). Therefore, dynamic fixed-effects panel modeling with GMM techniques may be a viable option in other studies including a lag of the dependent variable as an independent variable.

This study also shows the effectiveness of utilizing newly developed measures of policy preferences to understand the influence of state legislator policy preferences on state appropriations to higher education. The dataset compiled by Shor and McCarty

(2011) represents a vast improvement over prior datasets representing state legislator policy preferences. Given this advancement in measuring state legislator policy preferences, future studies can include this variable to accurately examine the influence of state legislator policy preferences on a variety of state policy outcomes. Additionally, this study portrayed how varying levels of state legislator policy preferences influenced state appropriations to higher education. Thus, future research can continue to examine how more liberal state legislators compared to more conservative state legislators influence different policy outcomes.

#### *Implications for Policy*

This dissertation showed that a number of variables influence state funding to higher education. An understanding of the influencers of higher education appropriations will allow policymakers and administrators to more accurately predict future higher education funding levels. If policymakers and administrators are better able to forecast higher education funding levels, they may attempt to influence policy outcomes to better meet their funding objectives. However, because this is an initial study examining the political influences of higher education funding, implications for policy should be taken cautiously. Future research can expand upon the preliminary findings in this study and offer additional implications for policy.

#### Recommendations for Future Research

This study builds upon the higher education literature by employing a theory that has not been utilized in previous higher education literature. Moreover, the quantitative

method utilized in this study has only been employed in one prior higher education study (Titus, 2009). Building on this study, future research could be expanded by examining other types of political variables, other forms of state support for higher education, further exploring the influence of state legislator policy preferences on state appropriations to higher education, and examining how political factors influence funding in a few specific states. The next section of will detail the recommended areas for future research.

A number of recent higher education studies have examined the influence of political variables on state appropriations to higher education (e.g., Dar, 2011; McLendon et al., 2009; Tandberg, 2008, 2010; Tandberg & Ness, 2011). Although this study advanced the literature by including new political variable, state legislator policy preferences, there are other political variables that warrant consideration in future research. For example, future research should examine whether political variables such as term limits, gubernatorial policy preferences, legislative professionalism, and polarization influence state appropriations to higher education.

Within this study the dependent variable was represented as state appropriations to higher education per capita. However, other potential dependent variables can be used in future research to understand the influencers of higher education funding. For example, higher education appropriations, as the relative share of state funding to all budget items, can be examined future research. Another potential dependent variable is state appropriations per full-time enrollee in higher education. Therefore, future research can potentially examine how different measures of higher education funding are related to state demographic characteristics, competing budget items, and political variables.

This study examined whether higher education interest groups influenced state appropriations to higher education. Though no statistical significance was found, there may be different ways to measure higher education interest groups in future research to more accurately assess their relative strength. Future studies might consider examining the size of the higher education interest groups within a state or their relative strength, compared to other interest groups within the a state. Thus, future research should consider alternative measures of higher education interest groups to determine their influence on state funding to higher education.

This dissertation examined the influence of state legislator policy preferences on state appropriations to higher education. However, this study did not examine how state legislator policy preferences influenced state appropriations to higher education within different states. Understanding differing effects of state legislator policy preferences for different states can be studied in future literature to portray differences across states. For example, examining how political factors influenced state funding for higher education in New Jersey compared to California may provide further explanation of how political influences vary from state to state. Further, this studied analyzed the time period from 1998 – 2009. Ideally, future research should examine how state legislator policy preferences influence state appropriations to higher education over a longer time frame.

## Appendix A

*Table A1: Correlation Statistics of the Independent Variables*

	Unempl rate	K-12 approp	Med approp	Prison approp	Higher ed enroll	Share private	Higher ed int	Gov strength	Divided gvt	House policy pref
Unempl rate	1.0000									
K-12 approp	0.0874	1.0000								
Med approp	0.2639	0.4926	1.0000							
Prison approp	0.2055	0.4066	0.1543	1.0000						
Higher ed enroll	-0.0426	-0.0336	0.0289	-0.0142	1.0000					
Share private	-0.1565	0.0527	0.3237	-0.0371	0.2539	1.0000				
Higher ed int	0.0385	-0.3426	-0.0477	-0.2456	-0.1496	-0.1063	1.0000			
Gov strength	0.0855	0.2188	0.1254	0.0999	-0.0056	0.0714	-0.0337	1.0000		
Divided gvt	0.0490	-0.0733	-0.0197	0.0814	-0.1024	0.0269	-0.0392	-0.1024	1.0000	
House policy pref	-0.0189	-0.2891	-0.2818	-0.1400	0.0190	-0.2452	0.1178	-0.1577	-0.0605	1.0000
Senate policy pref	0.0102	-0.2613	-0.2999	-0.1733	-0.0391	-0.2864	0.0323	-0.1329	0.0042	0.8078
TEL	0.2284	-0.0390	-0.0615	0.2765	-0.0579	-0.0630	-0.1431	-0.0968	0.0183	-0.0579
Dem Gov	-0.0876	-0.0415	-0.0905	-0.0016	-0.0624	-0.0165	-0.1333	0.0112	-0.1300	0.0857
Repub Gov	0.1020	0.0345	0.0680	0.0224	0.0835	0.0017	0.1287	-0.0180	0.1292	-0.0714
Neither coord/gov	0.0944	0.1873	0.0738	0.1895	0.1588	0.0367	0.0181	-0.1975	0.0355	-0.2128
Coord & gov brd	0.1065	0.1268	0.2137	0.1354	-0.0137	-0.0587	-0.1461	0.0997	-0.0528	0.1411
Gov board	-0.2155	-0.0327	-0.2455	-0.0857	0.0138	-0.0175	-0.0886	-0.0294	-0.1218	0.0321
Coord agency	0.1079	-0.1328	0.0866	-0.0845	-0.0807	0.0369	0.1729	0.0620	0.1414	-0.0197



	Senate policy pref	TEL	Dem Gov	Repub Gov	Neither coord/gov	Coord & gov brd	Gov board	Coord agency
Senate policy pref	1.000							
TEL	-0.0997	1.000						
Dem Gov	0.1468	-0.0431	1.000					
Repub Gov	-0.1298	0.0628	-0.9817	1.000				
Neither coord/gov	-0.2148	-0.0565	0.0063	-0.0018	1.000			
Coord & gov brd	0.1101	0.1245	0.0041	0.0020	-0.0800	1.000		
Gov board	-0.0385	0.1169	0.0887	-0.1083	-0.2281	-0.3127	1.000	
Coord agency	0.0732	-0.1707	-0.0969	0.1113	-0.1871	-0.2564	-0.7308	1.000

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