Chapter 13
State Support of Higher Education: Data, Measures, Findings, and Directions for Future Research

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Higher education provides students with the opportunity for upward mobility and personal development. In addition, higher education delivers to states an educated workforce and citizenry as well as economic stimulation. A major factor in determining how well higher education can achieve these objectives is the fiscal resources of the institutions. In fact, there is evidence that state's higher education funding impacts both access and quality and is therefore an issue of real social importance (e.g., Kane & Orszag, 2003; Koshal & Koshal, 2000; Heller, 1999; Volkwein, 1989). In each state, public institutions receive a significant portion of their funding from state coffers. In fact, while the actual level may depend on the precise definition or data source, in 2011, states spent around $79 billion on higher education, not counting tuition and fees (Grapevine System, 2011). Yet, the importance of higher education in each state, expressed through quantity of appropriated funds, varies greatly in the United States. Additionally, measured a variety of ways, states' commitment to higher education has been shown to be fickle, and most recently, in the face of increasingly scarce resources, states have generally shown less of a financial commitment to higher education. This phenomenon is observable to the degree that many scholars, institutional leaders, and policy experts are discussing the "privatization" of public higher education. It makes sense then that state funding for higher education has received much attention in both higher education policy literature and the mainstream media.

Recent scholarly attention to the issue of what factors explain and/or predict state support of higher education has led to a flurry of new theoretical explanations and

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empirical findings. While much of this attention has been motivated by the recent relative decline in state support for higher education, these scholarly advances have been made possible by the introduction of new theories and empirical measures borrowed from political science and economics and new (at least to the field of higher education research) econometric techniques. Recent research has revealed the significant influence of the following: Various political factors, which, until recently, were dismissed as relatively unimportant; other state budgetary demands (i.e., Medicaid); budgetary trade-offs (where one state budgetary area is supported at the expense of another); the business cycle; income inequality; and state higher education governance structures, just to name a few (e.g., Delaney & Doyle, 2011; Doyle, 2007; McLendon, Hearn, & Mokher, 2009; Tandberg, 2010a, 2010b).

Despite the attention paid to state support of higher education in the scholarly literature, considerable confusion remains. This confusion and disagreement exists in regard to trends in state support and what factors influence state support of higher education. The source of the confusion and disagreement is the fact that empirical evaluations of state funding of higher education differ in regard to their data sources, measures (in regard to both dependent and independent variables), methods, and what time periods they cover. In addition, because of the relatively rapid progress in the last several years, it has become difficult to keep up with the many new findings. To date, there has not yet been a comprehensive evaluation of what we know and what we do not know. Such an evaluation would need to make sense of:

1. The various sources that provide data on state funding of higher education
2. The various ways state funding can be conceptualized and measured
3. The various guiding theories on determinants of state support
4. The independent variables (and categories of variables) that have been found to significantly impact state funding of higher education
5. The various methods for evaluating state funding of higher education and factors related to it
6. Any innovations in this area
7. What is left unknown and directions for future research

This chapter attempts to do just that, with an emphasis on informing the direction of future, empirical research designed to predict and explain state support of higher education. Therefore, when data sources and measures are discussed, they will be discussed from the perspective of their utility in explanatory models. Likewise, this chapter will primarily focus on studies which employ inferential statistics meant to explain state support of higher education and theories that can guide such research. Put succinctly, the ultimate goal of this chapter is to provide future researchers interested in predicting and explaining state support of higher education with the tools they need to advance the field's understanding of this important topic.

This chapter will begin with a review of the popular sources for data on state funding of higher education and then go into a discussion of the most commonly used measures of state support. The chapter begins with these discussions because it is critical to understand these details in order to make sense of the disparate findings in the literature, to properly understand state support of higher education

and examine the historical trends in state support. Therefore, these first two sections will inform the remainder of the chapter. The chapter will then move on to discuss the other topics in the order listed above.

Analysis of State Higher Education Funding Data Sources

Researchers need to understand the distinctions among the various sources of data and carefully choose the source that best matches what they are trying to explain. Additionally, researchers must be clear when discussing their data why they chose their particular source and explain the relevant details regarding what constitutes the data and possible implications for the results of their study. This section will attempt to provide researchers with the information they need to accomplish both of those tasks.

Policy analysts and researchers primarily rely on five data collection efforts for measures of state funding of higher education. These sources are the National Association of State Budget Officers' (NASBO) annual *State Expenditure Reports*, the Grapevine *Annual Compilation of State Fiscal Support for Higher Education*, the State Higher Education Executive Officers' *State Higher Education Finance* (SHEF) report, the US Census, and the National Center for Education Statistics (NCES). The organizations discussed here do far more than simply collect data on state funding of higher education, and several produce rather sophisticated reports that include additional data (beyond what are discussed here) and analysis related to higher education finance. However, for the purposes of this chapter, the discussion will center specifically on the higher education funding data each organization collects.

1. NASBO's *State Expenditure Reports*: NASBO collects higher education expenditure data as part of its annual *State Expenditure Report*. The *State Expenditure Reports*, published since 1987, include state spending on all major state expenditure areas.
2. *Grapevine*: The Grapevine project was begun in 1958 by M. M. Chambers and entails an annual survey of state higher education and government officials. The *Grapevine* data is collected by The Center for the Study of Education Policy at Illinois State University.
3. *State Higher Education Finance* (SHEF) data: The SHEF data is collected by State Higher Education Executive Officers (SHEEO). SHEF builds directly on an earlier 25 year effort by Kent Halstead and reports data from 1980. The reports include extensive data analysis with the intent of helping state policymakers answer several critical higher education finance questions related to adequacy and productivity as well as trends. Since the 2009–2010 collection year, the *SHEF* and *Grapevine* surveys have been merged, creating the State Support for Higher Education Database. This was done to streamline the data collection efforts and to minimize the burden placed on states in reporting these data. Nevertheless, the focus of the respective organizations' reports maintains many of their historic distinctions.

4. *United States Census*: Census data on state expenditures for higher education come from two surveys: (1) the Annual Survey of State and Local Government Finances and (2) the Annual Survey of State Government Finances. These data have been collected annually since 1951.[1]
5. *NCES*: NCES currently collects financial data via their Integrated Postsecondary Education Data System's (IPEDS) finance survey. This data collection effort has existed under this name since 1987. Data are available from the IPEDS website. Previous to 1987, similar data were collected via the now discontinued Higher Education General Information Survey for *The Digest of Education Statistics*. Currently, *The Digest* relies on IPEDS data.

Comparison of Data Collected

There are several state budgetary concepts that need to be understood in order to properly understand and discuss state funding of higher education and the various collections of those data. First, the difference between appropriations and expenditures needs to be understood. Appropriations include the money that the state governments have set aside for higher education. *Grapevine* and SHEF both collect data on appropriations. Expenditures, on which NASBO and the Census collect data, include the money that was actually spent on higher education. The latter of course are only available at a later date than the former. The amounts can and do vary, as mid-year changes are common (in response to budgetary demands, states may not end up giving all the promised support or ask for funds back). IPEDS collects data on funds received by the institutions and, therefore, can be understood as measuring actual state expenditures as reported by them.

Second, it is important to understand the various categories or types of state appropriations and expenditures. These are commonly broken down as follows:

• *General funds* are funds that are appropriated through the normal budgetary or appropriations process. Most often when a state-funded organization discusses their "state budget," they are referring to their general fund appropriation. These appropriations are mostly funded by broad-based taxes; however, to a greater or lesser extent (depending in the state), they may also be funded by nontax resources such as state lotteries.
• *Capital funds* may be distributed through the annual (or biennial, as the case may be) appropriations process or through a separate process. These funds go toward the specific purpose of supporting new construction; significant

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[1]Researchers have also gathered state funding of higher education data from *The Statistical Abstracts of the United States* (the country's data book). However, since *The Statistical Abstracts* rely on other data sources for their funding figures (including recently SHEF for state funding of higher education data and NASBO for total state expenditure data), they are not discussed here.

improvements; and the purchase of equipment, land, and existing structures. These are often funded by the tax resources of the state, bonds, and/or special state endowments.

- *Non-appropriated funds* are those funds that are designated for a specific purpose and are not distributed through the normal state budgetary or appropriations process. Examples of these types of funds include institutional support generated from receipt of lease income and oil/mineral extraction fees.
- *State grants and contracts* are nonrecurring and are entered into on an as-needed basis between the state and specific institutions for the delivery of some sort of service such as an evaluation project.

The various data collections reviewed here include all or some of these funds (several also include tuition and fees). Additionally, several of the data sources allow for the tracking of local support of higher education. The specific types of monies within these fund categories will be considered within the discussion of each data collection. This section discusses each collection in detail, examining exactly what each attempts to measure and the data each collects. Table 13.1 summarizes this information.

National Association of State Budget Officers (NASBO)

NASBO defines state support of higher education as expenditures reflecting support for community colleges; public colleges and universities; vocational education, law, medical, veterinary, nursing, and technical schools; assistance to private colleges and universities; as well as capital construction, tuition, fees, and student loan programs. Higher education expenditures exclude federal research grants and endowments to universities.[2, 3]

Fund revenue sources include:

- Sales tax
- Gaming tax
- Corporate income tax
- Personal income tax
- Other taxes and fees (depending on the state, these may include cigarette and tobacco taxes, alcoholic beverage taxes, insurance premiums, severance taxes, licenses and fees for permits, inheritance taxes, and charges for state-provided services)
- Tuition and fees and student loan programs (in most states)

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[2] The reporting instructions have remained consistent since 1990. In 1989, states were given very general guidance (i.e., to *exclude* federal research grants and to *include* tuition and fees and support for community colleges). In the first 2 years (1987 and 1988), states were asked to exclude tuition and fees and federal research grants.

[3] For additional details and to view examples of NASBO's *State Expenditure Reports*, visit their website here: http://nasbo.org/

Table 13.1 Characteristics of state higher education funding data sources

	NASBO[a]	Grapevine	SHEF	Census	NCES/IPEDS
Timeframe	Fiscal year	Fiscal year	Fiscal year	Fiscal year	Fiscal year
State endowment income included	No	Yes	Yes	Yes	No
Med/health included	Yes	Yes	No	Yes, for medical education	Yes
State governing or coordinating boards included	Assume yes	Yes	Yes	Assume yes	Yes
Tuition and fees included	Yes	No	Yes	Assume yes	Yes
Student loan programs included	Yes	No	No	No	No
Student grant aid included	Assume yes	Yes	Yes	No	Yes
Capital funding included	Yes	No	No	Yes	No
Private higher education included	Yes	Yes	Yes (delaminated only after 1999)	No	Yes
Nontax appropriated funds included	Assume yes	No before 2010; Yes after	Yes	Yes	Yes
Funding received from non-appropriated sources included	Assume yes	No before 2010; yes after	Yes	Yes	Assume yes
Funding received from Nonreccurring sources (grants, contracts, etc.) included	No (not clear)	No (not clear)	No (not clear)	Yes	Yes
Federal flow-through funds included	Yes	No	No	Yes	No
Auxiliary enterprises included	Assume no	No	No	Yes	Yes
Separately reports ARRA funds	No	Yes	Yes	No	No
Sector data provided	No	Years before 2010	No	No	Yes, by aggregating
Institution level data provided	No	Years before 2010	No	No	Yes

	State governments	State governments	State and local governments	State and local governments	Institutions (data may be aggregated to the state level)
Unit of analysis	State governments	State governments	State and local governments	State and local governments	Institutions (data may be aggregated to the state level)
Years included	1986 to current	1961 to current	1980 to current	1951 to current	Separately: HEGIS 1966–1986; IPEDS – 1987 to current
Person/organization responsible	Chief state budget officers	State higher education finance officer	State higher education finance officer	State finance/ budget officers	Higher education institutions
Appropriations or expenditures	Expenditures	State appropriations	State and local appropriations	Total expenditures	Institution's governmental revenues

aThe lack of specificity in the reporting guidelines, and their general reporting categories, makes it difficult to precisely determine all of what is included in, or reported by the states into, the NASBO collection

NASBO breaks their expenditure data down into six categories including general fund expenditures, federal funds, other state funds, bond expenditures, state funds, and total funds. NASBO also reports state capital expenditures separately. Capital expenditures for each area are broken down into the same categories listed above. NASBO asks states for lump sum amounts for each of the categories; therefore, the data cannot be broken down any further. They define the six categories in this way:

- General fund: The predominant fund for financing a state's operations. Revenues are received from broad-based state taxes.
- Federal funds: Funds received directly from the federal government (other than research grants).
- Other state funds: Expenditures from revenue sources that are restricted by law for particular governmental functions or activities (i.e., tuition and fees and lottery supported expenditures).
- Bonds: Expenditures financed by the sale of bonds.
- State funds: General funds plus other state fund spending, excluding state spending from bond proceeds.
- Total funds: Refers to funding from all sources – the sum of general fund, federal funds, other state funds, and bonds.

Figure 13.1 below displays the amount for total funds and general funds expended for HE from 1990 to 2010. The general fund declines from 2008 through 2010 most likely occur because that category does not include federal stimulus dollars (assumed to be included in the federal funds category) and also does not include tuition and fees, both of which increased to help stabilize total institutional revenue during the most recent recession.

The NASBO *Expenditure Reports* include a table which indicates what expenditure sources were excluded by which states. For example, in calculating higher education expenditures for fiscal 2010, 11 states wholly or partially excluded tuition and fees, and 19 states wholly or partially excluded student loan programs. Additionally, other items that are wholly or partially excluded include university research grants (32 states), postsecondary vocational education (17), and assistance to private colleges or universities (22). The items excluded by various states generally, though not always, fall into the "Other State Funds" category. It is not clear from the NASBO data whether, for example, each of the 22 states that did not provide any assistance to private institutions or if some of them did but were not reporting those data. These reporting figures also vary year to year, for example, in 2009, 13 states wholly or partially excluded tuition and fees compared to the 11 in 2010 (this could be the result of changes in state finance practices or because states chose not to fully report in 2010). This possible variation in reporting practices may explain why there is more year-to-year variance in the NASBO data than there is in either the Grapevine, SHEF, or Census data. It also potentially makes cross-state comparisons nearly impossible.
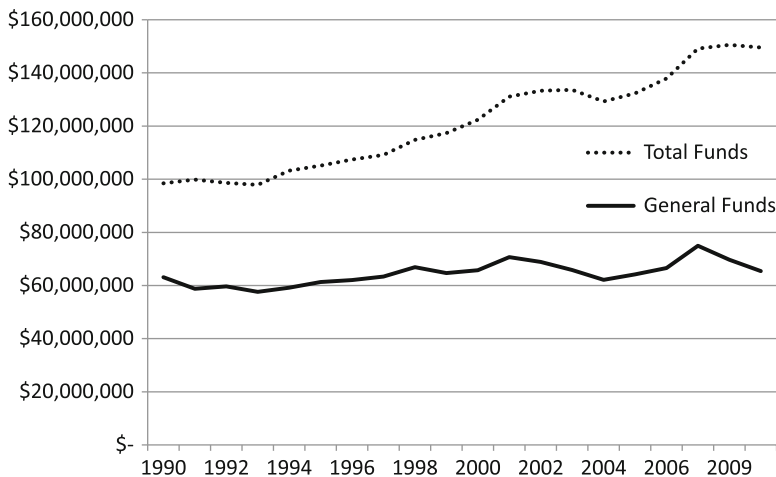
Fig. 13.1 NASBO expenditures on higher education (all US states), 1990–2009 (Source: NASBO; Calculations: Author's; real dollars (thousands) adjusted by HECA [The Higher Education Cost Adjustment (HECA) is an inflation adjustment developed by SHEEO specifically for higher education. The details of HECA can be found in the SHEF reports (http://www.sheeo.org/finance/shef/SHEF_FY11.pdf)])[4]

Benefits of the NASBO data:

- The six separate categories of funds allow the researcher to isolate the expenditure areas of interest.
- Provides data on capital expenditures
- Provides data on federal flow-through funds that can be separated from state-originated funds.
- Provides total state expenditures and expenditures by major state budgetary area, providing a single source for comparison purposes.
- Allows for yearly corrected data.

Potential drawbacks:

- The lack of consistency makes cross-state comparisons difficult, as what is reported often varies significantly by state.[5]

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[4] For example, Zumeta (1992, 1996) reported that in 1988, 21 states provided direct financial support to private colleges and universities. NASBO reports that in 1988, 20 states excluded data on funding for private colleges and universities, meaning 30 states reported those data. However, some may have reported $0s.

[5] As indicated, NASBO does track which states leave out what elements, which helps when attempting to make cross-state comparisons.

- Data definitions are not very detailed.
- Does not provide any local government expenditure data.
- Data are only available in PDF form.
- Data cannot be disaggregated any further than the six fund categories provided in the reports.

Grapevine

As indicated earlier, the Grapevine report draws its data from the State Support for Higher Education Database collection which asks states to report only appropriations, not actual expenditures, and report only sums appropriated for annual operating expenses (State Higher Education Executive Officers [SHEEO], 2011).

From this collection, the Grapevine report makes use of the following data elements: state support generated from taxes and those generated from nontax sources (previous to 2010 Grapevine only included appropriations from tax monies). The resulting figure is what Grapevine refers to as "state effort."[6]

The tax-generated data points include[7]:

- Sums appropriated to four-year public colleges and universities
- Sums appropriated for state aid to local public community colleges, for the operation of state-supported community colleges, and for vocational-technical two-year colleges or institutes that are predominantly for high school graduates and adult students
- Sums appropriated to statewide coordinating boards or governing boards, either for board expenses or for allocation by the board to other institutions or both
- Sums appropriated for state scholarships or other student financial aid
- Sums destined for higher education but appropriated to some other state agency (as in the case of funds intended for faculty fringe benefits that are appropriated to the state treasurer and disbursed by that office)
- Appropriations directed to private institutions of higher education at all levels

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[6] Additional information and the Grapevine data can be found at the project website here: http://grapevine.illinoisstate.edu/

[7] For those years in which American Recovery and Reinvestment Act (ARRA) dollars were provided to states to support higher education, states were asked by SSHED to report:

- "education stabilization funds used to restore the level of state support for public higher education;
- government services funds used for public higher education (excluding modernization, renovation, or repair); and
- government services funds used for modernization, renovation, or repair of higher education institutions (public and private).

Government services funds used for modernization, renovation, or repair of higher education institutions were excluded from *Grapevine* analyses."

Since 2010, states are also asked to report on nontax-based funds, including:

- Funding under state auspices for appropriated nontax state support (i.e., monies from lotteries set aside for institutional support or for student assistance)
- Funding under state auspices for non-appropriated state support (e.g., monies from receipt of lease income and oil/mineral extraction fees on land set aside for public institution benefit).
- Nontax sums destined for higher education but appropriated to some other state agency.
- Interest or earnings received from state-funded endowments set aside for public sector institutions.
- Portions of multiyear appropriations from previous years.

States are asked to exclude:

- Appropriations for capital outlays and debt service
- Appropriations of sums derived from federal sources, student fees, and auxiliary enterprises

In addition, the Grapevine project does not include local tax and nontax appropriations to higher education.

Figure 13.2 displays state tax appropriations using the Grapevine data (pre-2010 data). The data is inclusive of federal stimulus funds which helped state higher education tax appropriations continue their upward trajectory, albeit at a slightly slower rate.

Benefits of the Grapevine data:

- A well-established and recognized source for state operating appropriations for higher education
- The second longest running data source for state funding of higher education
- Clear data standards and definitions
- Provides additional analysis and relevant data on their website

Potential drawbacks:

- Does not include local support of higher education.
- A significant amount of their data is only available in PDF form on their website.
- After 2010, disaggregation by institution, system level, and funding type (financial aid, etc..) is no longer possible.
- They do not provide data on state capital appropriations, federal "flow-through" money (federal dollars that are appropriated by the state to higher education), or auxiliary enterprises.
- Because they began adding nontax funds to their measure in 2010, the data from their website going forward cannot be compared to pre-2010 data.[8]

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[8] Using data from the State Support for Higher Education Database and available from SHEEO, a consistent State Tax Effort measure can be constructed.
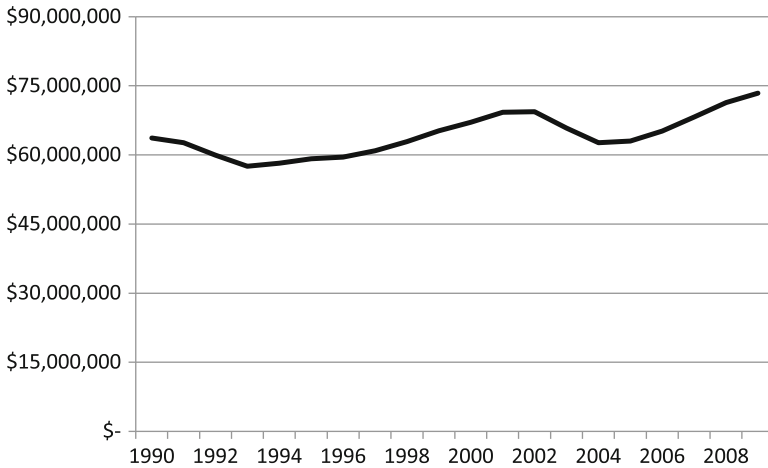
Fig. 13.2 Grapevine state tax effort for higher education (tax appropriations) (all US states), 1990–2009 (Source: Grapevine; Calculations: Author's; real dollars (thousands) adjusted by HECA)

SHEEO-SHEF

The annual SHEF report generated by SHEEO utilizes the State Support for Higher Education Database and uses the Grapevine "State Effort" measure as its base. It also makes use of local tax appropriations and tuition and fee data.[9] The SHEF report breaks their data down into six primary categories:

1. State support: This measure is identical to Grapevine's "State Effort" measure (from 2010 forward).
2. Local tax appropriations: Annual appropriations from local government taxes for public higher education institution operating expenses.
3. State and local support: State support plus local tax appropriations.
4. Educational appropriations: State and local support minus spending for research, agricultural, and medical education and support for independent institutions or students attending them.
5. Net tuition revenue: The sum of gross tuition and mandatory fees minus state-funded student financial aid, institutional discounts and waivers, and medical school student tuition revenue.
6. Total educational revenue: The sum of educational appropriations and net tuition revenue excluding any tuition revenue used for capital and debt service or similar nonoperational expenses.

[9] For additional information and for examples of the SHEF reports, please visit SHEEO's website at http://www.sheeo.org/
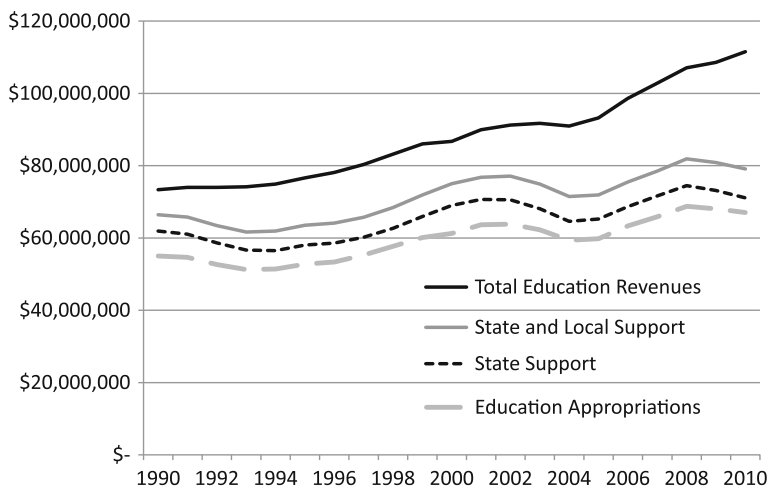
Fig. 13.3 SHEF state support of higher education (all US states), 1990–2010 (Source: SHEEO; Calculations: SHEEO's and author's; real dollars (thousands) adjusted by HECA)

The SHEF reports use these appropriations and revenue data as the basis for additional analysis utilizing cost and inflation adjustments and state full-time equivalent enrollments to address questions related to adequacy and productivity.

Figure 13.3 displays the trend lines for the SHEF categories. Each category shows a decline beginning in 2008 despite the inclusion of the federal ARRA dollars (federal stimulus funds), except total education revenues which includes tuition and fees.

Benefits of the SHEF data:

- Much of the raw data is available allowing the researcher the ability to cut, combine, and analyze the data in the way he or she chooses (including or excluding tuition, private higher education, local support, ARRA funding, etc.).
- A significant amount of the data is accessible via their website in Excel format.
- The description of the data and the data definitions are clear, specific, and easily found.
- The survey instrument is provided in their annual report.
- They provide a variety of inflation and cost adjustments with their data.
- The data collection has existed for a long enough period of time such that their data standards and survey instrument have become well understood and accepted.
- The SHEF report provides researchers and policymakers with extensive and useful data analysis.

Potential drawbacks:

- They do not make their entire dataset available for download from the website.
- They do not provide institutional or system level data.
- They do not provide data on state capital appropriations, federal "flow-through" money, or auxiliary enterprises.

Census

Census data on state expenditures for higher education comes from two surveys: (1) the Annual Survey of State and Local Government Finances and (2) the Annual Survey of State Government Finances.[10] These data have been collected annually since 1951.[11]

The Census surveys define expenditures as all amounts of money paid out by a government during its fiscal year – net of recoveries and other correcting transactions. Expenditures include payments from all sources of funds, including not only current revenues but also proceeds from borrowing and prior year fund balances. Expenditures include amounts spent by all agencies, boards, commissions, or other organizations categorized as dependent on the government concerned. Excluded from the Census expenditure data are:

- Loans or other extensions of credit
- Refunds of revenues collected during the same fiscal year
- Erroneous payments and other outlays that are recovered during the same fiscal year
- Purchase of securities for investment purposes
- Payments for the retirement of debt principal (interest on debt is reported as an expenditure)
- Transfers to other agencies or funds of the same government
- Agency or private trust transactions
- Noncash transactions
- Depreciation of capital assets

Within the larger expenditure categories described above, expenditures are broken down into direct expenditures that include everything (including capital) except intergovernmental expenditures (money directed from one government office to another) and current operations expenditures, which are direct expenditures minus capital expenditures. These expenditures are reported at both the state and local levels.

Within these surveys, expenditures for higher education include those directed to degree-granting institutions operated by state or local governments that provide academic training beyond the high school (grade 12). Reported expenditures include activities for instruction, research, public service (except agricultural extension services), academic support, libraries, student services, administration, and plant maintenance. Based on examination of the data, it appears that tuition and fees are included here. Also reported as higher education expenditures are those directed to auxiliary enterprises which include dormitories, cafeterias, bookstores, athletic

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[10] Additional details and the Census data can be found here: http://www.census.gov/govs/estimate/

[11] Researchers have also gathered state funding of higher education data from *The Statistical Abstracts of the United States* (the country's data book). However, since *The Statistical Abstracts* rely on other data sources for their funding figures (including, recently, SHEF for state funding of higher education data and NASBO for total state expenditure data), they are not discussed here.

facilities, contests, events, student activities, lunch rooms, student health services, college unions, college stores, and the like. State expenditures on higher education auxiliary enterprises amounted to $18 billion nationally in 2008. Direct expenditures, expenditures for auxiliary enterprises and capital outlays, are separable for analysis. Likewise, local expenditures are reported separately using the categories discussed above.

Excluded expenditures include those directed to training academies or programs which do not confer college-level degrees; state vocational-technical schools which award certificates equal to less than 2 years of college; hospitals for the general public operated by universities; agricultural experiment stations, farms, and extension services; state scholarships and fellowships awarded to students; state aid to or in support of private colleges; and state administration of school building authorities.

Higher education-related capital expenditures are also collected by these surveys and are reported separately and also within the direct expenditures category. The Census defines capital outlay and project funds as: "Direct expenditures for contract or force account construction of buildings, grounds, and other improvements, and purchase of equipment, land, and existing structures. Includes amounts for additions, replacements, and major alterations to fixed works and structures. However, expenditure for repairs to such works and structures is classified as current operation expenditure."

Figure 13.4 displays the trend lines for the Census data. There is a fairly consistent trend upward progressing through the duration of the chart. The continued upward trajectory into the recession is indicative of the data including tuition and fees.

Benefits of the Census data:

- Census data collections are widely recognized and respected.
- It is the longest running collection.
- Data on higher education expenditures can be compared to data on expenditures in other areas from the same collection.
- It has long established data standards and definitions.
- Capital and auxiliary enterprise expenditures are included in the collection but are separable for analysis.
- Data are available in electronic form from their website.

Potential drawbacks:

- Aside from being able to separate out auxiliary, local, and capital expenditures, no additional disaggregation or combinations are possible.
- They do not provide institutional or system level data.
- It is not entirely clear what all is included under the category of higher education expenditures, that is, are tuition and fees included? Comparisons with the other data collections would indicate that they are. However, the inability of researchers to disaggregate tuition and fees is problematic for many analytic purposes.
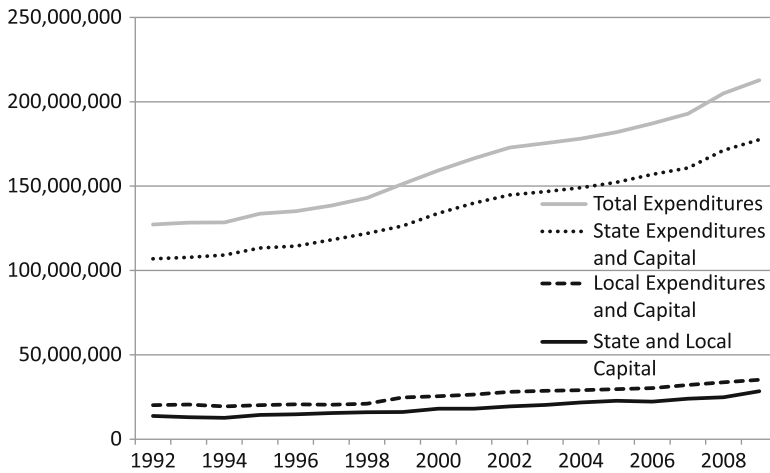
Fig. 13.4 Census expenditures on higher education (all US states), 1992–2009 (Source: U.S. Census; Calculations: Author's; real dollars (thousands) adjusted by HECA)

NCES

IPEDS collects data directly from institutions through a number of surveys addressing a number of different data domains. The data are provided to researchers at the institutional level via the IPEDS website.[12] Within the IPEDS finance survey, several relevant data points are collected. These include (reported separately for state and local sources)[13]:

- Institutional revenue from state and local appropriations: Defined as amounts received by the institution through acts of a state or local legislative body for meeting current operating expenses, not for specific projects or programs. Not included are grants and contracts and capital appropriations.
- Institutional revenue from state and local operating grants and contracts: Defined as revenues that are for specific research projects or other types of programs and that are classified as operating revenues.
- Institutional revenue from state and local nonoperating grants and contracts: Defined as amounts reported as nonoperating revenues from state governmental agencies that are provided on a non-exchange basis. This excludes capital grants and gifts.

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[12] Additional information and the extensive IPEDS data can be found here: http://nces.ed.gov/ipeds/datacenter/

[13] Institutions report data using the accounting standards they employ at their institutions (FASBE or GASBE); therefore, the categories vary slight depending on the chosen standard. The Delta Cost Project has developed a useful crosswalk to merge across the standards.

- Revenue from grants by state/local government: Grants by state/local government include expenditures for scholarships and fellowships that were funded by the state.

The finance survey includes net institutional revenue from tuition and fees defined as revenues from all tuition and fees assessed against students (net of refunds and discounts and allowances) for educational purposes. The Delta Cost Project (discussed later) uses the IPEDS data and further refines the tuition and fees revenue measure by developing a net student tuition revenue measure which is net tuition and fee revenue coming directly from students (not including Pell, federal, state, and local student aid grants). The IPEDS finance survey also collects data on revenue from capital appropriations; however, it is a single category that combines federal, state, and local sources into one.

While the IPEDS system, and the web interface they have created, provides a huge amount of institutional level data that can be aggregated by the researcher to the state and national levels, that can be an unwieldy process. Fortunately, there are at least two sources that report out the IPEDS data in more usable formats. These are *The Digest of Education Statistics*, published by NCES, and The Delta Cost Project. The *Digest* has been reporting state and local appropriations since 1962. Since 1987, it has aggregated the IPEDS data to report those appropriation amounts.

The Delta Cost Project[14] is a nonprofit, grant-supported organization whose primary mission is to bring greater attention to college spending through better data, cost metrics, and communication. One of the primary ways they are doing this is by using IPEDS data on institutional operating expenditures and revenues (like state appropriations) to develop measures of costs per student and costs per degree/certificate produced, organized into Carnegie classifications and separating public and private nonprofit institutions. The organization puts out regular reports which provide institution, state, and national level data. Additionally, The Delta Cost Project allows users to instantly download IPEDS state and local institutional revenue (appropriations and both types of grant and contracts) and expenditure data (with the Delta Cost Project's uniquely developed measures), plus a significant amount of additional institution level data, in a single, clean, and usable file.[15]

Displayed in Fig. 13.5, the NCES/IPEDS data (downloaded from the Delta Cost Project) are cut in several different ways: (1) state appropriations, which does not include grants and contracts; (2) state and local appropriations; (3) total state expenditures, which includes state appropriations plus state grants and contracts; (4) total state and local expenditures; and (5) total education expenditures which includes total state and local expenditures, net student tuition revenue (see above), and institutional revenue from state student grant aid. The first four data categories show a slight dip in 2008, which may indicate that institutions did not report stimulus funds

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[14] The full name is *The Delta Project on Postsecondary Education Costs, Productivity, and Accountability*. Additional information and the data can be found on its website found here: http://www.deltacostproject.org/

[15] Starting in 2012, NCES will take over maintenance of the Delta Cost Project Database.
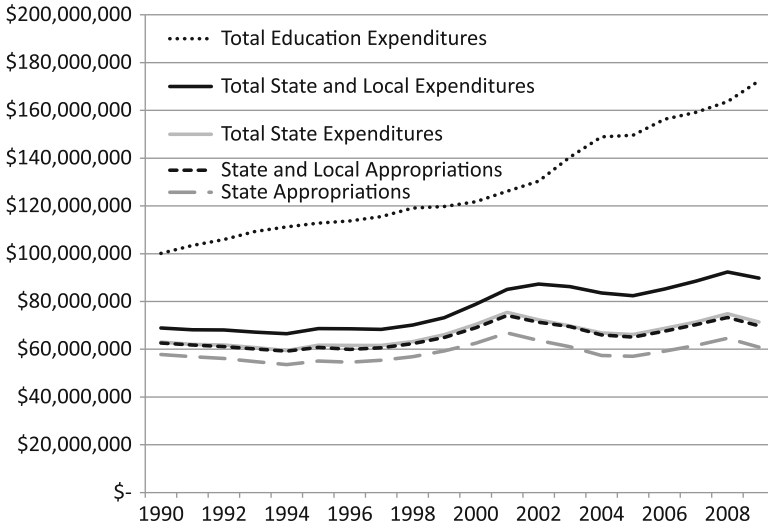
Fig. 13.5 NCES expenditures on higher education (all US states), 1990–2009 (Source: NCES/
Delta Cost Project; Calculations: Delta Cost Project & Author's; real dollars (thousands) adjusted
by HECA)

as state appropriations or it may simply show a general agreement with the SHEF
data. The data reveal that institutions more than made up for any loss in government
revenue with increases in tuition and fee revenue.

Benefits of the NCES data:

- Single source for extensive institutional data (enrollment, student demographics,
  revenues and expenditures, program, and other data points)
- A well-established survey from a well-known source
- Clear definitions
- Ability to cut the data by system, institution, and institution type (sector, level,
  classification, etc.)

Potential drawbacks:

- The data can be somewhat unwieldy for state and national analyses.
- Does not separate out state and local capital revenue.
- Extensive disaggregation by state budgetary categories is not possible.

Data Comparisons

In order to get a better sense of how the differences in what is collected by the vari-
ous organizations impacts the actual data, the most comparable measures from each
organization are placed in the same charts. First, the most exclusive data from each
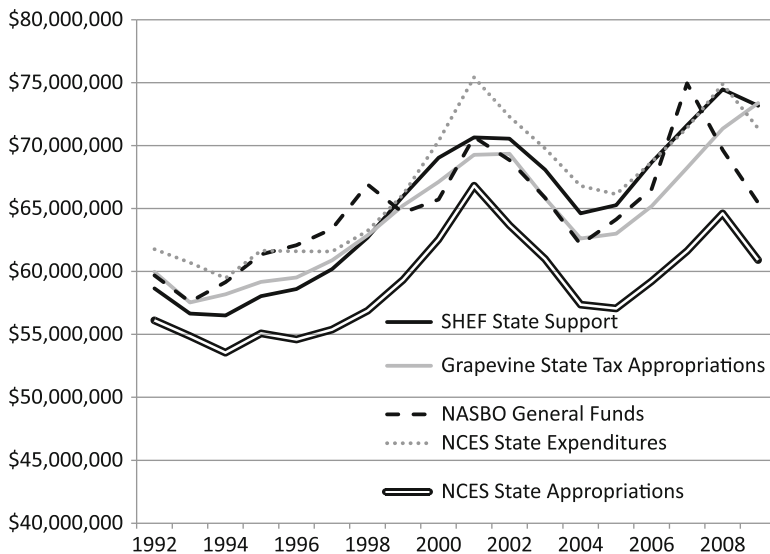
Fig. 13.6 Comparison of state general fund appropriations and expenditure data sources (Source: Grapevine, NASBO, NCES, & SHEEO; Calculations: Author's; real dollars (thousands) adjusted by HECA)

organization are compared. These data tend to isolate only state general fund appropriations or expenditures.[16] Second, the most inclusive data from each organization are compared. These tend to include all state and local appropriations and expenditures, including expenditures from tuition and fees and for capital, financial aid, and grants and contracts.[17]

   The trend lines for state general fund appropriations and expenditures (Fig. 13.6) tend to display similar patterns (while the levels vary significantly resulting from the differences in what is collected by each organization) with each revealing rather dramatic fluctuations throughout the time series. The most significant difference occurs at the end of the series, with the NASBO general fund data showing a dramatic decline in 2007, the two NCES measures and the SHEF data also showing declines, and the Grapevine data showing a slight increase (including ARRA funds).

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[16] Data from the Census are not included in the comparison as the most comparable Census measure (not including auxiliary enterprises, capital, or local expenditures) indicates that there was $135 billion in state higher education expenditures in 2008. The closest of the other four sources (Grapevine) shows only $73 billion in state higher education appropriations. The difference is most likely due to the Census data including tuition- and fee-based expenditures.

[17] Grapevine data are not included in the second chart because the organization does not include a complete measure of total spending for higher education.
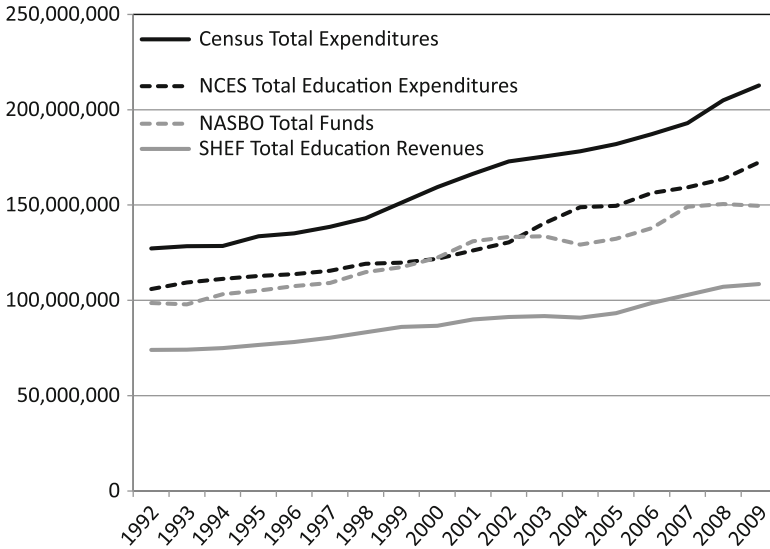
Fig. 13.7 Comparison of complete measures of higher education expenditures data sources (Source: Census, NASBO, NCES, & SHEEO; Calculations: Author's; real dollars (thousands) adjusted by HECA)

The NASBO data appear somewhat more erratic than the other measures. This is most likely due to the apparent lack of consistency in the way states report their data from year to year.

Simple correlation analysis (Table 13.2) reveals that the data series are highly correlated with each other. The NASBO data is the least correlated with the other measures. This again suggests the inconsistency of the NASBO data.

Analyzing the most inclusive state higher education expenditure data reveals that again the trends are fairly consistent, with the NASBO data showing a bit more volatility than the other series (Fig. 13.7).[18] Much of the variation seen in the general fund data is smoothed, revealing how other revenue sources are used to make up for any year-to-year losses in base funding.

Predictably, these data are even more highly correlated than the general fund data, revealing almost perfect correlation (see Table 13.3). The NASBO data also correlate considerably better with this data series.

Both the various state general fund data and the various total expenditure data compared here tend to tell similar stories. However, there are important differences

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[18] As Grapevine does not include a "complete" measure of state support they are not included in this comparison.

Table 13.2 Correlation of state general fund appropriations and expenditures data sources

	NASBO general fund	Grapevine tax appropriations	SHEF state effort	NCES state expenditures	NCES state appropriations
NASBO general fund	1.000				
Grapevine tax appropriations	0.792	1.000			
SHEF state effort	0.839	0.974	1.000		
NCES state expenditures	0.808	0.896	0.905	1.000	
NCES state appropriations	0.824	0.936	0.964	0.971	1.000

Table 13.3 Correlation of complete measures of higher education expenditures data sources

	NASBO total expenditures	SHEF total education revenues	Census total expenditures	NCES total education expenditures
NASBO total expenditures	1.000			
SHEF total education revenues	.985	1.000		
Census total expenditures	.982	.988	1.000	
NCES total education expenditures	.940	.963	.975	1.000

in the levels of funding they report and also, at times, in the patterns of support over time. These differences are a result of the way the various organizations conceptualize state funding of higher education, what they intend to collect, and how they define their specific elements. As indicated at the beginning of this section, researchers need to understand the distinctions between the various sources of data and carefully choose the source that best matches what they are trying to explain. Additionally, researchers must be clear when discussing their data why they chose their particular source and explain the relevant details regarding what constitutes the data they employ and possible implications for the results of their study.

Measures of State Support of Higher Education

Using the data sources discussed above, researchers have conceptualized state support for higher education in a number of ways and developed quantitative measures accordingly. These measures have been developed in an effort to address certain underlying concepts of interest and to create normalized measures that can

be compared across the states (Trostel & Ronca, 2009). Some of the more popular ones include the natural log of actual state funding, funding per capita, funding per $1,000 of personal income, funding as a share of total state expenditures, funding per full-time equivalent student (FTE), and finally a relatively new measure of what they call "state support of higher education" developed by Trostel and Ronca. This section will evaluate each measure overtime and compare and contrast them.

When the trend lines of the various measures do not agree, it is important to remember that this variation does not indicate that some measures are more accurate than others. Rather, the measures vary because they include different elements and are meant for different purposes. Therefore, they are telling different stories. It is likewise important to indicate at the outset that the goal of this section is not to identify the one "true" measure of state support of higher education as we are not considering the measures for comparative purposes; instead, we are considering these measures for their possible utility in explanatory models.[19] When researchers attempt to explain and predict state support of higher education, they should be guided by their research questions and the underlying theory guiding their research when choosing their dependent variable. (What exactly are they trying explain?) For example, is the researcher primarily interested in the factors which predict how higher education fares in relation to other state budgetary areas? Or is the researcher interested in revealing the factors associated with the value states place on higher education relative to their state resources (e.g., appropriations in relation to state personal income)? This section will therefore endeavor to provide researchers with adequate information so that they can make informed decisions about their choice of dependent variable. Additionally, this section is meant to help set the stage for the later literature review portion, by providing more detailed information about the dependent variables employed.

All but one of the measures reviewed here involve dividing state higher education funding by a variable of interest. Trostel and Ronca (2009) divided several of the more commonly employed variables into two categories; these include what they call *ability to pay* variables and *need* variables. Ability to pay variables attempt to get at the capacity of the state to pay for (or support) higher education (i.e., state personal income). When ability to pay variables are used as a denominator under higher education funding, the result can be understood as a measure of a state's "effort" in regard to higher education (capacity for funding compared to actual funding). Need variables attempt to gauge the demand for resources (e.g., FTE enrollments or youth population). When need is used as the denominator under actual funding, the resulting figure can be understood as a measure of adequacy (need for funding relative to actual funding). Most higher education funding measures can be placed into one of these categories. The majority of the remainder of

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[19] If the reader is interested in comparing and contrasting state higher education support measures, the discussion provided by Trostel and Ronca (2009) and the annual SHEF reports (SHEEO, 2011) are good places to start.
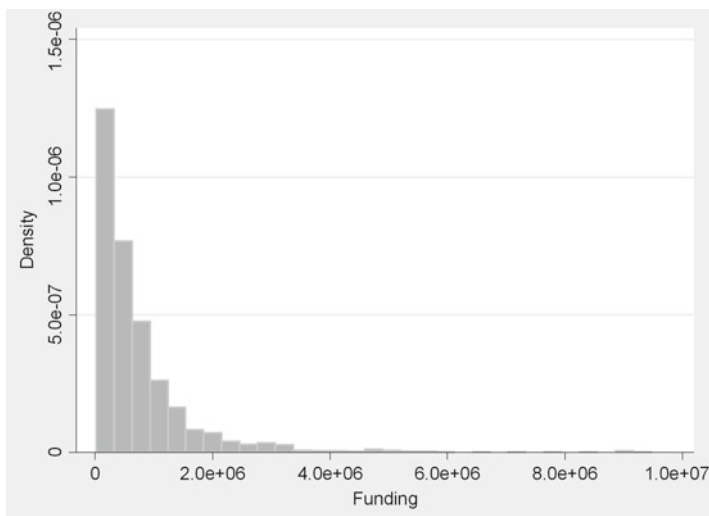
Fig. 13.8 Distribution of state tax support of higher education (1976–2005, all 50 states) (Source: Grapevine; Calculations: Authors')

this section will use these categories as a way of examining state higher education funding measures. First, however, we will discuss a more technical issue: using the natural log of actual state funding in regression equations.

The Natural Log of State Funding of Higher Education

Often, researchers seek to predict actual state funding of higher education and include any normalizing variables as predictor variables on the right-hand side of the regression equation (e.g., Lindeen & Willis, 1975; Rabovsky, 2012; Toutkoushian & Hollis, 1998). However, state funding for higher education is not normally distributed as this histogram using the Grapevine data on all 50 states from 1976 to 2005 shows the following (Fig. 13.8).

Therefore, researchers use the natural log of their funding variable which significantly improves the normality of the distribution (Fig. 13.9).

Clearly, researchers must either take the natural log or use a normalizing variable (like one of those discussed below) before using state funding of higher education in a regression equation. The benefit of using the natural log of actual state funding is that the researcher can talk in clear terms about the impact of the independent variables on state funding rather than the slightly more complex measures discussed next. The potential drawbacks of using this measure are that
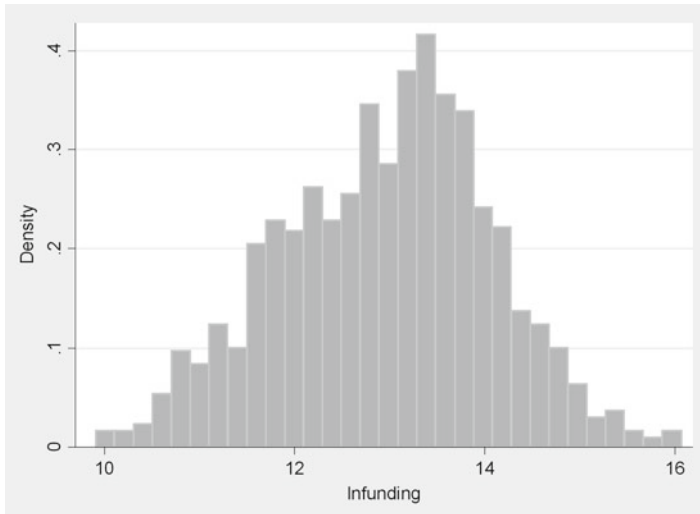
Fig. 13.9 Distribution of the natural log of state tax support of higher education (1976–2005, all 50 states) (Source: Grapevine; Calculations: Authors')

the logged values themselves are for the most part meaningless to the average reader; likewise, the regression coefficients can be difficult to understand and translate, and finally, the measure itself does not take into account the ability of states to pay for higher education nor the financial need of the higher education institutions as reflected by enrollments or some similar indicator. However, such factors (enrollments) can be treated as independent/explanatory variables in the regression equation, which again hearkens back to the need to reflect on the purposes of the researcher.

State Higher Education Funding per Capita

State higher education funding per capita has been employed by various researchers (i.e., Goldin & Katz, 1998; Kane, Orszag, & Gunter, 2003). It may be seen as a measure of adequacy or effort, as the denominator in the equation, population, may appropriately be viewed, at least indirectly, as an ability to pay variable or as a need variable. Seen as an effort measure, states with larger populations may have a larger tax base (taxable citizens, products, commerce, and industries) and therefore be able to direct greater resources toward higher education. In fact, Trostel and Ronca (2009) suggest that population might be viewed as an ability to pay measure. Additionally, as an adequacy measure, a larger population may mean greater demand for higher education, as states with larger populations presumably have more students and prospective students to serve.
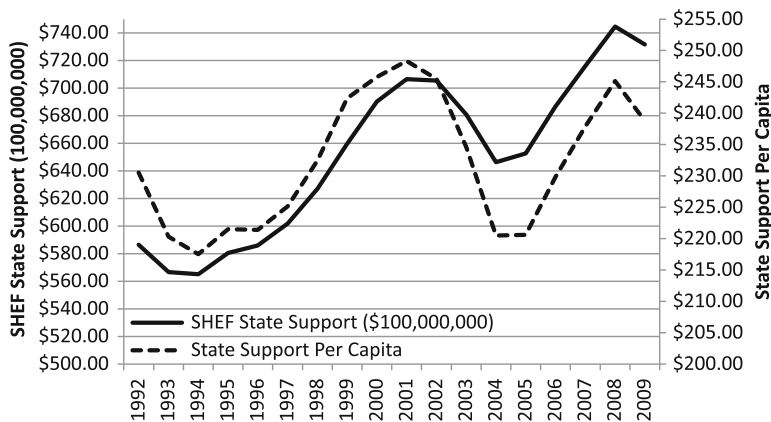
Fig. 13.10 State support per capita (Source: SHEEO, U.S. Census; Calculations: SHEEO's and Author's; real dollars (thousands))

Viewed from a national perspective, this state funding per capita is not terribly interesting, as the nation's population has been steadily increasing, and so any significant variance in the measure is driven almost entirely by changes in the funding portion of the equation, which has risen faster than the nation's population (see Fig. 13.10). However, a number of states have experienced significant population changes in the last 30 years (e.g., Arizona (+) and Michigan (−)) (US Census, 2011), and therefore, the measure becomes more meaningful at the state level, which is where most of higher education's funding comes from.

Higher education funding per capita is an easily understood measure, and people are used to seeing state financial data displayed in per capita terms. It also accomplishes the important goal of normalizing state funding for higher education for population differences. However, from the perspective of it serving as a measure of effort or adequacy, it has some limitations as states with larger populations are not necessarily wealthier and states with larger populations do not necessarily send a significant portion of their population to college. If population is something a researcher is interested in, or desires to control for in a regression equation, it may make more sense to include it as an independent variable on the right-hand side of the equation where its impact on state higher education support can be controlled for and measured directly.

State Funding per $1,000 of Personal Income

One of the more popular dependent variables in studies attempting to predict state support of higher education is state funding per $1,000 of personal income
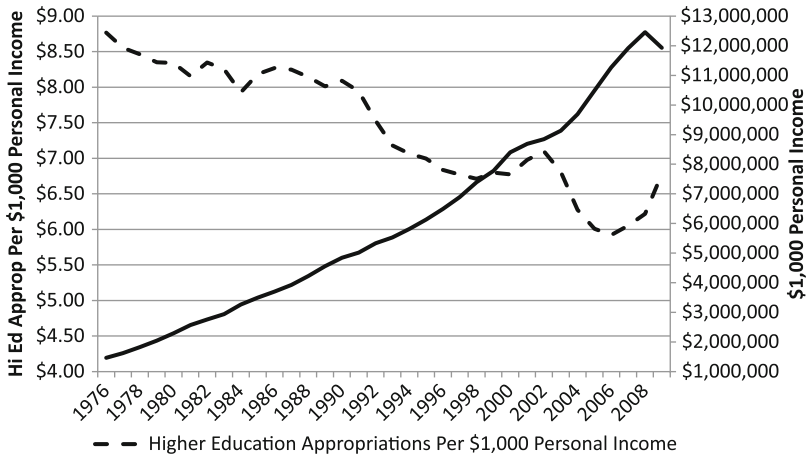
Fig. 13.11 State tax fund appropriations for higher education per $1,000 of personal income (Source: Grapevine, Bureau of Economic Analysis; Calculations: Authors')

(e.g., Archibald & Feldman, 2006; Dar & Spence, 2011; McLendon, Hearn, et al., 2009; Tandberg, 2010b). Trostel and Ronca (2009) place personal income squarely within the ability to pay category of measures. In fact, those authors argue that (comparing personal income to other possible measures of ability to pay): "Income, however, is the most frequently used basis. State personal income is presumably the best measure of ability to pay. This is consistent with taxation systems throughout the developed world, which are generally based on income and/or consumption, which depends on income" (p. 221). Extending the ability to pay idea further, when linked to state higher education appropriations, this measure therefore becomes a measure of a state's *effort* in supporting higher education relative to its available tax base or wealth (Archibald & Feldman, 2006; McLendon, Hearn, et al., 2009; Mortenson, 2005).

Analyzed using this measure, state support for (or effort in regard to) higher education has been declining fairly steadily for over 30 years (see Fig. 13.11).[20] This changed in the late 2000s with personal income dipping sharply in 2008 and state tax fund appropriations for higher education increasing significantly since the mid-2000s with that upward slope only moderating slightly in 2008 (when federal stimulus funds are included).

When interpreting what a change in state funding for higher education per $1,000 of personal income means, researchers are making the assumption that the income elasticity of nominal higher education appropriations equals one, and this assumption may not be entirely accurate (Archibald & Feldman, 2006). Additionally,

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[20] The mid-1970s represented a high point for this measure. In 1960, the states appropriated just over $3.00 for every $1,000 of personal income.

Archibald and Feldman point out that when this dependent variable is employed, the researcher cannot use nominal personal income as an independent variable. However, these authors argue that there is no clear rationale for why nominal income would impact state funding for higher education per $1,000 of personal income.

Researchers must be cognizant when using this measure as a dependent variable of state support for higher education (or any of the other measures discussed here) that they employ accurate language and interpret their results carefully. Once state funding of higher education is adjusted by personal income, it becomes an entirely new measure, a measure of state effort relative to its tax base. Therefore, it would not be accurate to discuss the results in regard to the independent variables' impact on state funding of higher education as that is not the dependent variable, state effort is. Likewise, the researchers should construct their arguments and interpret their results keeping in mind both sides of the equation, higher education funding and personal income, and how the two components interact.

State Higher Education Spending as a Percentage of Total State Spending

State spending on higher education relative to total state spending has been used as a dependent variable in a variety of studies in the recent past (e.g., Dar & Spence, 2011; Tandberg, 2010a).[21] Trostel and Ronca (2009) argue that total state spending ought to be categorized as an ability to pay variable, in that it highlights the total available resources for expenditure of the state. This would make higher education spending relative to total state spending a measure of higher education effort.

As Fig. 13.12 reveals, using two different data sources (Census and NASBO), state higher education spending as a percentage of total state spending has fluctuated over the past 20 years, with a significant dip in the late 1980s and early 1990s. As discussed earlier, the NASBO data again shows greater variability and more dramatic fluctuations.

There are several reasons why researchers might employ this measure as their dependent variable. First, it allows the researcher to control for general increases or decreases in state spending and therefore isolates the specific relationship each independent variable has with spending on higher education. Second, using state higher education spending as a percentage of total state spending may enable the researcher to capture different dynamics of the state budgetary process than other measures of state support of higher education. For example, states are generally

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[21] Rizzo (2004) uses a similar measure(s) however his conceptualization led him to develop three dependent variables:

1. EDShare – Education's share of total state expenditures
2. HEShare – Higher education's share of total state education expenditures
3. InShare – Institution's share of total state higher education expenditures
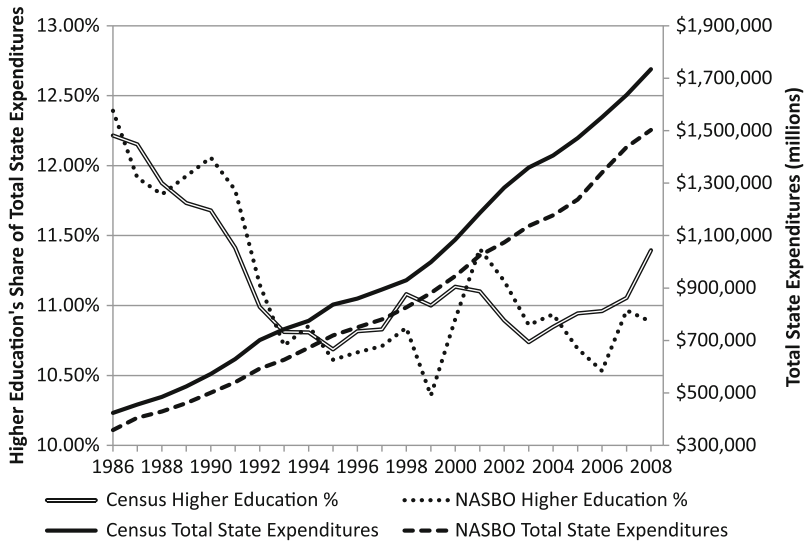
Fig. 13.12 Higher education's share of total state expenditures (Source: U.S. Census, NASBO; Calculations: Authors')

required to balance their budgets. Therefore, an increase in one area often necessitates a decrease in another because of state policymakers' reluctance to increase taxes. Using this variable as the dependent variable in a regression equation may capture that tradeoff. Furthermore, the decision regarding which area gets how much funding is a political one involving give-and-take between interest groups, individual actors with their own interests and attributes, and numerous other factors. This variable may help capture that complex dynamic. In this regard, state higher education spending as a percentage of total state spending may better highlight the internal budgetary and political factors that influence the decision making of state policymakers as they decide how they will support higher education relative to other major state expenditure areas (Dar & Spence, 2011; Tandberg, 2010a).

However, Trostel and Ronca (2009) argue that, especially when used for descriptive and comparative purposes, state higher education spending as a percentage of total state spending can be a deceptive measure as it can change for reasons unrelated to state postsecondary education funding. As states increase funding in one area and nothing else changes, the percentage higher education receives will go down, even if funding for higher education remains unchanged (funding for higher education could even go up, but if funding for other areas increases more dramatically, higher education's share would go down). This is of interest to higher education researchers as a significant portion of state budgets are made up of case load-driven categories such as Medicaid, corrections, and K-12 education. Higher education is seen as discretionary and capable of generating its own revenue (i.e., tuition and fees).
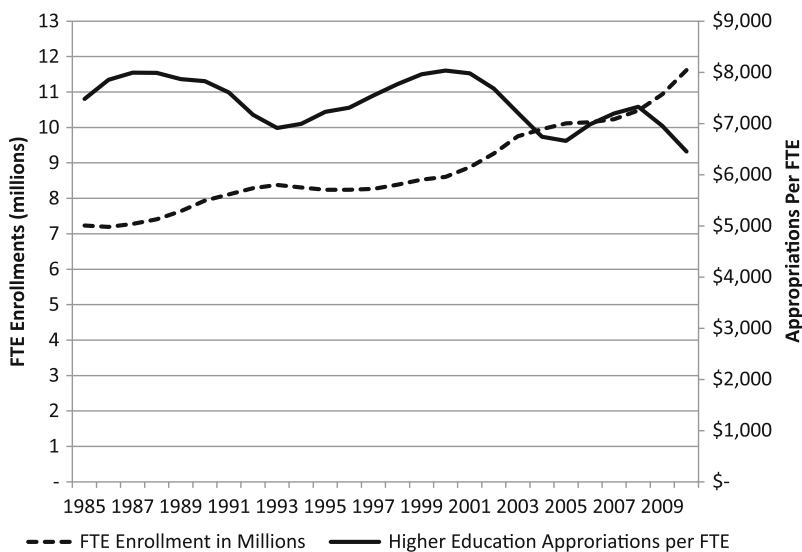
Fig. 13.13 State higher education appropriations per FTE (Source: SHEEO (SHEF's Education Appropriations and FTE measures); Calculations: Authors')

State Funding of Higher Education per FTE Student

State funding of higher education per FTE has been employed as a dependent variable in a number of studies and may, in fact, be the most commonly used measure (e.g., Bailey, Rom, & Taylor, 2004; Cheslock & Gianneschi, 2008; Humphreys, 2000; Koshal & Koshal, 2000; McLendon, Mokher, & Doyle, 2009; Nicholson-Crotty & Meier, 2003; Peterson, 1976; Strathman, 1994). As displayed in Fig. 13.13, state higher education support per FTE has followed a wave pattern with reductions and then commensurate recoveries, until the 2000s where the reduction was followed by a much smaller recovery. Additionally, every successive low point in the chart is lower than the last, with the end point of the chart representing the lowest point on the trend line. The significant dip beginning around 2008 seems to be driven, along with the "Great Recession," by a rapid increase in enrollments.

Trostel and Ronca (2009) classify FTE enrollments as being a gauge of need for funding. Clearly, the more students, the greater the need for financial support from the state. Therefore, the combined measure of FTE enrollments and state appropriations would serve as one way of assessing adequacy. While higher education appropriations per FTE is one of the most popular dependent variables in studies of state support of higher education, Trostel and Ronca raise some concerns about its usage for descriptive time series and comparative purposes. Their primary concern is one of endogeneity. Specifically, increased state funding for higher education may drive increases in enrollments. The authors are right to be concerned about endogeneity;

however, others have investigated this idea, and while there does appear to be an endogeneity problem, the direction of the effect is in the opposite direction of Trostel and Ronca's concerns, with enrollments appearing to drive funding more than funding drives enrollments. Various authors (Clotfelter, 1976; Hoenack & Pierro, 1990; Leslie & Ramey, 1986; Toutkoushian & Hollis, 1998) have found an enrollment elasticity of around 1.0 (with a range of .85–1.55). This means that a 1% increase in enrollments results in approximately a 1% increase in appropriations. This makes sense as public college and university presidents frequently use the existence of increased enrollments as a way to justify requests for increased appropriations. Additionally, state higher education funding formulas generally include enrollments as an important factor. In fact, both Leslie and Ramey (1986) and Toutkousian and Hollis (1998) found some evidence that the enrollment effect was even more pronounced in states where funding formulas are used to distribute state funds to postsecondary institutions.

As noted, Trostel and Ronca (2009) raise some important concerns about the FTE measure when used for descriptive and comparative purposes; however, it appears that, while endogeneity is inherent in the measure, the stronger relationship runs in the opposite direction to that with which they are concerned. Likewise, including enrollments as part of the dependent variable is one way of controlling for its effects. More importantly however, while Trostel and Ronca suggest an alternative measure of need, which will be discussed next, enrollment remains the only direct and immediate measure of need available to researchers.

Trostel and Ronca's (2009) "Unifying Measure of State Support for Postsecondary Education"

Trostel and Ronca (2009) address a persistent issue in the state higher education finance discussions, which is the disagreement over how to measure state support for higher education. As Longanecker (2006) reveals, and the charts above show, the levels of support and the trajectory over time vary significantly depending on how they are measured. Those who desire to show that state support for higher education has decreased have been able to find measures to support their case. Likewise, those who want to show that support has remained steady or increased have likewise been able to find measures to support their case (though, due to the recent recession and increasing enrollments, finding such measures has become increasingly difficult). In an effort to minimize such disagreements and confusion, Trostel and Ronca set out to develop a unified measure of state support for higher education and in the process correct for any deficiencies in other established measures.

As indicated earlier, Trostel and Ronca (2009) categorize the various normalizing variables into two categories: ability to pay and need. They argue that state per capita personal income is the best ability to pay measure and that the number of high school graduates over the last 4 years is the best measure for need. As previously discussed, the reason they suggest high school graduates instead of current

postsecondary enrollments is primarily because of concerns about the endogeneity of state higher education funding and current enrollments.[22] The resulting index of state support for postsecondary education is a measure of need relative to ability to pay and is calculated by dividing their need-based indicator (total number of high school graduates over 4 years) by their ability-to-pay indicator (state per capita income). State funding for higher education is then divided by the result of the need relative to ability to pay equation. In the equation below, *F* equals state funding, *i* equals state per capita income, *S* equals state support, *G* equals high school graduates over the previous 4 years, *t* represents time, *k* represents state, and *s* represents year:

Equation 1: Unifying measure of state support for postsecondary education

$$S_{kt} = \frac{F_{kt}}{i_{kt} \sum_{s=t-4}^{t-1} G_{ks}}.$$

Source: Trostel and Ronca (2009), p. 225

The authors suggest that the final index best captures the concept of "state support" of higher education. The majority of the article is spent justifying their use of total number of high school graduates over the previous 4 years as a proxy for need. This is appropriate as the idea is not without its own apparent weaknesses. The authors directly address various possible weaknesses with their measure and provide some data to address them. A few of the most important of them will be discussed here.[23] The authors concisely state their primary assumptions in regard to this measure in this way:

> Thus, in summary, states' number of potential traditional, four-year, in-state college students is conservatively assumed to be proportional to their total need for public support for post-secondary education (i.e., the sum of the needs from research, public service, nontraditional students, graduate education, etc.). (Trostel & Ronca, 2009, p. 225)

These assumptions are based on a variety of factors. Using national data, the authors show that the rate of students going directly from high school to college has remained fairly steady from 1992 (65.5%) to 2006 (65.8%), although it has increased since. They also show, again using national data, that the majority of students in college are undergraduate students and the proportion has only changed slightly from 1980 to 2006; that a slight majority of students enroll in four-year institutions (something that has remained fairly consistent since 1980); and that the ratio of GEDs to high school diplomas varies significantly year to year. Therefore, from a national per-spective, while it is not a perfect proxy (e.g., it ignores adult students and those who enter with a GED, and around 35% of high school graduates are not entering college right away, not to mention needs for graduate education and research capacity), the

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[22] For a full discussion of their concerns, please see Trostel and Ronca (2009).

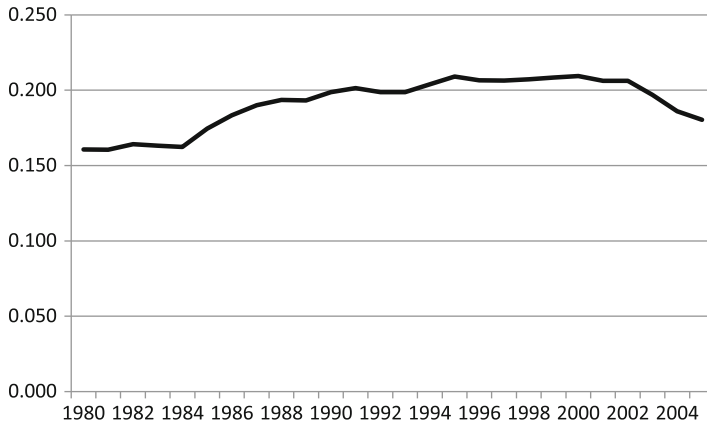[23] For a full discussion, please see Trostel and Ronca (2009).

Fig. 13.14 Trostel and Ronca's (2009) "Unifying Measure of State Support for Postsecondary Education" (Source and Calculations: Trostel and Ronca)

authors make the case for it being a reasonable proxy and one that avoids any endogeneity issues. Further, it is the only measure that takes both need and ability to pay into consideration.

The real issue is at the state level where there are very large differences between states in rates at which students enter college immediately after college, their adult participation rates, proportion of students enrolled in private institutions, the ratio of students enrolled in two-year institutions to those enrolled in four-year institutions, their GED programs, the rate at which students stay in state or go out of state for college, etc. For example, 45.7% of high school graduates go directly to college in Alaska, and in Mississippi, the figure is 77.4%. The result of these differences is that in some states, the need will be significantly overstated by the proposed measure while in other states the need will be significantly understated. Therefore, the measure may be of limited use for cross-state comparison purposes.

Based on the Trostel and Ronca (2009) measure, state support of higher education increased fairly rapidly starting in 1983, plateaued somewhat through the 1990s and then began declining in the early 2000s. This pattern is significantly different than appears in any of the other measures. This difference is logical due to the fact that this measure is the only one to take both need and ability to pay into account (Fig. 13.14).

Similar to the choice of data source, when it comes to the measures employed, researchers ought to think carefully about the phenomenon they are interested in assessing and carefully choose the appropriate measure of state support and provide some justification for and explanation of their choice in relation to their research questions. The measures can tell dramatically different stories; therefore, it makes sense that they are impacted by different forces which can and do result in significantly different findings.

Theories and Frameworks

This chapter focuses directly on the program spending patterns of state governments and specifically analyzes state support of public higher education. In so doing, appropriations and expenditures are seen as manifestations of institutional (governmental) commitments. State spending is one important measure of the relative salience that state-level public officials accord to various social and political issues – in this case, to state public higher education (Baumgartner & Jones, 1993). In other words, patterns of spending represent the "governmental decision agendas" within the respective states (Kingdon, 1995). By analyzing appropriations and expenditures, researchers focus on the tangible distribution of public resources and not merely on the intentions of politicians and office holders, because adequate financing is a necessary precondition for any meaningful policy activity (Garand & Hendrick, 1991). As such, expenditure commitments are the targets of those who aim to influence government (e.g., parties and interest groups, as well as individual citizens). Furthermore, state budgeting has a profound effect on the ways that state governments ultimately address issues and ameliorate social problems. In short, policy spending represents a critical concept deserving of attention from political scientists and issue-specific policy scholars and analysts.

In line with Kingdon's (1984) and Baumgartner and Jones's (1993) means of conceptualizing governmental expenditures, Jacoby and Schneider (2001) define state policy priorities as "the component of governmental decision-making in which public officials allocate scarce resources, in the form of expenditures, to different program areas" (p. 545), essentially the budgetary process. Policy research has several well-developed theories to explain the policy process and policy outputs. Since appropriations decisions are processed through the same system and organization as other policy decisions, it seems natural to assume that general policy theoretical frameworks may also be applied to state budgetary research.

This section will begin by reviewing two popular ways of understanding the behavior of political actors and government behavior: the median voter theorem and new institutionalism. The review of new institutionalism will naturally lead to a discussion of two frameworks that developed out of the new institutionalism school of thought. The first was developed by Elinor Ostrom (1991, 1999) and is referred to as the institutional rational choice framework. The second takes off from Ostrom's framework and adapts it to state funding of higher education. This section will conclude with a discussion of principal-agent theory, which also has its roots in new institutionalism.

Median Voter Theorem

The median voter theorem is a widely utilized model among researchers attempting to explain elected official decision making. The theorem argues that when running

for office, politicians will attempt to maximize their number of votes by committing to the policy position preferred by the median voter. Likewise elected politicians will attempt to position themselves on policy and finance issues nearest the preferences of the median voter for fear of not being reelected. From the perspective of the median voter theorem, the preference of the median voter dominates the preferences of the electorate and therefore drives the actions of popularly elected officials. Of course, the central assumption of the theorem is that the primary motivation driving politicians' behavior is a desire to be reelected (Black, 1948; Coughlin & Erekson, 1986; Downs, 1957; Holcombe, 1989).

When applying the median voter theorem to state funding of higher education, researchers face a particular challenge in that it can be difficult to determine what the median voters' preferences are in regard to higher education a priori. Nevertheless, several scholars have utilized the median voter theorem when examining state higher education funding decisions (e.g., Borcherding & Deacon, 1972; Clotfelter, 1976; Doyle, 2007; Tandberg & Ness, 2011; Toutkoushian & Hollis, 1998). Toutkoushian and Hollis use the median voter theorem as a way of establishing a theoretical link between various state economic and demographic factors (including postsecondary enrollments) and legislative demand for higher education, exhibited through state appropriations. The authors essentially make the implicit argument that, for example, since their regression analysis reveals that as state median income rises, so too does legislative demand for higher education (increased appropriations for higher education), and therefore, it can be deduced that as the income of the median voter increases, he or she prefers increased appropriations for higher education.

Doyle (2007) extends the discussion of the median voter theorem and state support of higher education further by using the theorem as a way of examining the relationship between income inequality, income redistribution, and state support of higher education. Doyle adapts a model developed by Fernandez and Rogerson (1995), which argues that, from the perspective of the median voter theorem, median voters with greater than average income will prefer lower taxes and general subsidy rates and that the opposite should hold true for median voters with less than average income. Doyle then goes on to argue that as income inequality increases (increased wealth concentration among those with greater than average income), support for increased spending on higher education should decrease. Doyle's empirical test finds support for this theory, as he finds that, holding other factors constant, increased inequality leads to lower appropriations for higher education.

Doyle (2007) argues that the median voter theorem and the results of his analysis reveal that appropriations for higher education are not driven entirely by a simple mathematical formula which takes into consideration last year's appropriation, this year's available resources, and the needs of higher education (i.e., enrollments),but are instead, at least partially, driven by elected officials attempting to maximize their reelection chances and an electorate attempting to "exclude certain parts of the population from attendance in higher education" (p. 401).

Doyle's (2007) application of the median voter theorem for higher education and the results of his study may help researchers better interpret certain results and also

develop more sophisticated models. For example, it might be illuminating to interact a measure of voter turnout with income inequality. Theoretically, greater voter turnout should magnify the effect of income inequality as increased turnout should force elected officials to be even more cognizant of the desires of the electorate. The median voter theorem can help researchers understand the relationship between a host of measures of state population attributes including, for example, political ideology measures and age group shares (McLendon, Hearn, et al., 2009; Toutkoushian & Hollis, 1998; Dar, 2012). The median voter theorem, however, is not as helpful when it comes to helping researchers account for system level attributes of the political and governmental systems.

New Institutionalism

Increasingly, recent research has highlighted political institutions' influence on state budgetary practices and outputs (e.g., Alt & Lowry, 1994; Barrilleaux & Berkman, 2003; Jacoby & Schneider, 2001; Thompson & Felts, 1992; McLendon, Hearn, et al., 2009). Even some of the early foundational research on incrementalism provided some evidence of the effect of institutions on budgetary outputs (Sharkansky, 1968). Of particular interest to this study is what has been termed "new institutionalism" (March & Olsen, 1984; Shepsle, 1979, 1989). New institutionalism is more of a general perspective on social behavior than a specific theory. In fact, the perspective encompasses numerous theories, such as institutional rational choice, normative (or sociological) institutionalism, and historical institutionalism. Many other theories within policy research have been birthed or heavily influenced by new institutionalism, even though some do not have the word "institutionalism" in their names (Sabatier, 1999).

Used within the context of new institutionalism, the term "institution" is broadly defined to include the formal and informal rules, norms, and strategies of an organization; shared concepts used by actors in repetitive situations; plus the formal organizations and structures of government and public service. Even more broadly, institutions might include patterns of behavior, negative norms, and constraints (Coriat & Dosi, 1998; Ostrom, 1999). Institutionalists argue that institutions define the goals, meaning, and actions of individuals who are interacting within governments and therefore impact the decisions and outputs of governments. March and Olsen (1984), when discussing new institutionalism, succinctly assert that institutionalism "is simply an argument that the organization of political life makes a difference" (p. 747).

Shepsle (1989) explains new institutionalism in this way: "Like the rational choice theories that preceded them, and in contrast to the older institutional traditions … these efforts are equilibrium theories. They seek to explain characteristics of social outcomes on the basis not only of agent preferences and optimizing behavior, but also on the basis of institutional features" (p. 135). In viewing institutions more widely, that is, as social constructs, and taking into account the influence that insti-

tutions have on individual preferences and actions, new institutionalism has moved away from its pure institutional (formal, legal, descriptive, and historical) roots and has become a more explanatory discipline within political science and policy research. This wide-angle view has also extended to budgetary research. Kiel and Elliott (1992) explain that a proper understanding of budgeting must consider the relationships between relevant institutional actors and other exogenous forces.

The new institutionalism perspective has recently migrated to the state higher education policy and finance literature. It has been used, often in combination with other perspectives, to explain state political actors' higher education policy decisions (e.g., Cornwell, Mustard, & Sridhar, 2006; Doyle, McLendon, & Hearn, 2010; McLendon, Deaton, & Hearn, 2007; McLendon, Hearn, & Deaton, 2006; McLendon, Heller, & Young, 2005; McLendon, Mokher, & Flores, 2011). It has also recently been used in efforts to predict state support of higher education (e.g., Dar & Spence, 2011; McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Rizzo, 2004; Tandberg, 2010a, 2010b; Weerts & Ronca, 2006). The new institutionalism perspective has helped scholars move away from seeing state support of higher education as being driven entirely by economic- and higher education-related factors to also being affected by various political and governmental institutions and other political characteristics of the states. As will be discussed in greater detail later, the inclusion of various political factors in predictive models of state support of higher education has been a fruitful development as many of the political variables have been proven to be significant predictors and to operate in theoretically predictable ways.

Institutional Rational Choice Framework

While there has existed significant debate about the merits of rational choice theory versus new institutionalism, there has also been convergence of the two ideas in a framework offered by Elinor Ostrom. She argues that the two schools of thought converge at key elements of the choice process. As she explains: "To offer coherent rational choice explanations of complex institutional behavior, however, requires a deep understanding of the logic of institutions and institutional choice. Thus, rational choice and institutional analysis are likely to be essential complements in the political science of the twenty-first century" (1991, pp. 242–243).

While Ostrom is not the only scholar to merge elements of rational choice theory and institutionalism (Dowding & King, 1995; Grafstein, 1992), hers is perhaps the most influential. Ostrom calls her framework institutional rational choice (IRC). IRC is a general analytic framework that stresses how various norms, rules, structures, and strategies affect the internal incentives confronting individuals. IRC argues that actions are a function of the attributes of the individuals (e.g., values and resources) and the attributes of the decision situation (Kiser & Ostrom, 1982; Ostrom, 1991, 1999). The latter is a product of institutional rules, the nature of the relevant good(s), and the attributes of the community/environment (Kiser & Ostrom, 1982; Sabatier, 1991). Rational choice institutionalism sees institutions as evolving

over time as politicians seek to remake them in order to further their own interests (Geddes, 1994, 1996; North, 1990).

A central focus of the IRC is the decision situation (or action arena). The decision situation is in the "social space where individuals interact, exchange goods and services, engage in appropriation and provision activities, solve problems, or fight" (Ostrom et al., 1994, p. 28). Within the decision situation, participants "must decide among diverse actions in light of the information they possess about how actions are linked to the potential outcomes and the costs and benefits assigned to actions and outcomes" (Ostrom et al., p. 29). Institutional rational choice scholars view choice and incentives as being shaped in a significant way by the presence of rules governing the negotiations within the decision situation and also the monitoring and enforcement of consensual agreements (Ostrom, 1992).

While the IRC has received limited attention in the higher education policy literature (i.e., Richardson, Shulock, & Teranishi, 2005; Shakespeare, 2008) and in the state higher education finance literature (Tandberg, 2010a, 2010b), the framework may prove quite useful. The advantages of Ostrom's framework to those interested in learning about the factors influencing state funding decisions for higher education are that it enables the researcher to isolate the decision-making process of the political actors involved in the process and opens the process to the effect of its context, including history and culture. Likewise, the framework isolates the possible effect of the action arena or decision situation for higher education funding. For example, it brings attention to the possible motivation and attributes of those directly involved (within the decision situation) in making the appropriations decisions (e.g., legislators, governors, and perhaps state governance structure officials), those trying to influence those individuals (colleges and universities and competing interests), institutions (various norms, rules, structures, and strategies) of the decision situation (e.g., does the state use a funding formula? How professionalized is the legislature?), and the history and culture of higher education and higher education finance in each particular state. Employing the IRC forces researchers to take a much broader view of the possible factors influencing state finance of higher education, going well beyond last year's appropriation amount, enrollments, and the influence of a few economic and demographic factors.

State Fiscal Policy Framework

Tandberg (2010a, 2010b) took Ostrom's framework and adapted it using previous research on state higher education support and research on interest groups to help explain state support of higher education. This framework is displayed in Fig. 13.15. Similar to other frameworks, Tandberg's makes the assumption that the decisions of elected officials are a function of their individual attributes and the attributes of others involved in the decision process (e.g., values and resources) and also the attributes of the decision situation. The framework suggests that it is within those constraints that actors weigh the expected benefits and costs of their possible actions prior to making
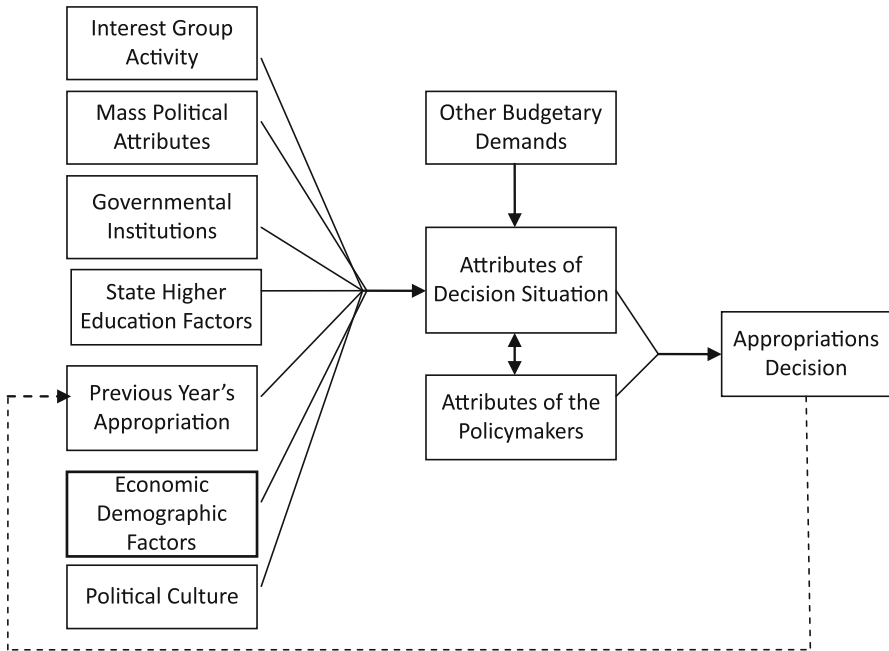
Fig. 13.15 Fiscal policy framework (Source: Tandberg 2010b, Copyright _ 2009, SAGE Publications)

a decision. They then choose the option that best serves their interests. Borrowing from new institutionalism, the framework assumes that various norms, rules, structures, and strategies affect the internal incentives confronting state political decision makers and influence their resulting behavior. These factors are categorized in the following way: political culture, economic-demographic factors, mass political attributes, governmental institutions, and attributes of the policymakers.

The model also accounts for the influence of other state budgetary demands and the potential impact of state interest group activity (Garand & Hendrick, 1991; Gray & Lowery, 1996; Sabatier, 1999). Likewise, the model accounts for the previous year's appropriation and the influence of higher education sector factors. Finally, the model also allows for interactions to occur between various actors and influences as they converge in the attributes of the decision situation.

Tandberg (2010a, 2010b) has examined the applicability of this framework and found that individual variables fitting within each of the categories described above have significant and theoretically predictable influences on state support of higher education measured in two different ways: state tax appropriations for higher education (Grapevine) per $1,000 of personal income and share of state general fund expenditures devoted to higher education (NASBO). Among such variables are citizen political ideology, interest group activity, partisanship of the governor and the

legislature, legislative professionalism, centralization of the state governance structure for higher education, income inequality in the state, institutional fundraising, and others (several of these variables will be discussed in greater detail later in the chapter). While this framework does not function as a predictive model, it can help researchers to frame their studies and think about and account for the multiple factors which influence state support of higher education.

Principal-Agent Theory

As McLendon (2003) suggests, principal-agent theory provides a useful conceptual lens through which facets of political control of the state higher education institutions and bureaucracy can be examined. In general terms, principal-agent theory helps researchers understand the relationship between two or more parties in which one party (the principal) engages another party (the agent) to perform some task or service on the behalf of the principal (Eisenhardt, 1989; Ross, 1973; Moe, 1984). Within an established principal-agent relationship, both parties are assumed to be self-interested actors, and therefore, their preferences often diverge. This results in goal conflict between the parties. Additionally, these relationships are plagued by informational asymmetries which generally favor the agent. These conditions compel the principals to invest resources in monitoring the behavior of agents in an effort to control their behavior. How the various actors manage their relationships and individual interests are primary concerns of principal-agent theorists and researchers (Moe, 1987).

Within state higher education systems, principals include elected officials (both legislative and executive) and to a greater or lesser extent (depending on the state) state-level governance structures. The agents are the public institutions themselves who have been contracted (by their state charters and their annual appropriations) to provide educational services to the state. The complex relationship between higher education institutions and state government provides theoretically and empirically rich soil for the investigation of principal-agent relationships. As McLendon (2003) explains: "Principal-agent perspectives provide a useful starting point for conceptualizing how and why elected officials seek control of state higher education agencies, how agencies respond to political control, and in what ways agency structure influences policy implementation" (p. 174). Additionally, the principal-agent perspective can shed new light on the appropriations process for higher education. Possible areas for investigation might include the following: How agency structures might influence the process or rules and levels of funding; how greater or lesser state oversight and control may impact support for higher education; how greater gubernatorial, legislative, or state governance agency power might alter state support; and how principals and agents might attempt to use, manipulate, or alter the annual appropriations process to further their own self-interest in a number of ways not limited to level of funding.

Indeed, recently, a growing number of researchers have been integrating principal-agent theory into the study of higher education policy and governance

(e.g., Kivisto, 2005, 2007; Lane, 2003, 2005, 2007; Lane & Kivisto, 2008; McLendon et al. 2006; Payne, 2003; Payne & Roberts, 2004).[24] Additionally, several scholars (even if they have not cited principal-agent theory by name) have examined the impact of state-level governance structures on state support of higher education (e.g., McLendon, Hearn, et al., 2009; Tandberg, 2010a, 2010b). Nicholson-Crotty and Meier (2003) and Tandberg (2010c) further advanced these analyses by examining how state-level governance structures condition the impact that other political variables have on state support of higher education. Despite these recent endeavors, there is certainly more to be learned through the application of principal-agent theory to the appropriations process for higher education.

Literature Review

The literature on explaining and predicting state support of higher education has progressed through a series of stages as conceptual understanding, methods, and data have all advanced and improved. This section will discuss these trends and along the way highlight some of the more important studies. This section will also review some innovative findings in regard to specific independent variables.

Two studies published in the mid-1970s by several political scientists (Lindeen & Willis, 1975; Peterson, 1976) proposed relatively broad conceptualizations of the possible factors influencing state funding decisions for higher education.[25] Both studies accounted for various political, demographic, and economic factors. In both cases, they found that the economic and demographic factors have a large impact on state support measured multiple ways but perhaps more interesting is that they also found that various political variables have a significant impact on state support. These included such variables as voter turnout, measures of governmental innovation and governmental centralization, legislative conflict, interparty competition, governors' powers, and legislative professionalism. Both studies used cross-sectional data (state-level data from single years) and basic methods such as descriptive statistics, correlation analysis, and simple linear regression. Nevertheless, their findings suggested that the state budgetary process for higher education was open to be influenced by various demographic and economic factors and also various political factors. It was not until much later that the politics of state funding of higher education again received any significant attention.

Researchers' perspective took an interesting turn in the 1980s and 1990s as they abandoned the approach of Lindeen and Willis (1975) and Peterson (1976) and instead viewed factors influencing state support of higher education more narrowly.

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[24] For an extensive review of principal-agent theory and its application to higher education, see Lane and Kivisto (2008).

[25] Lindeen and Willis's (1975) primary dependent variable was total expenditures per tax payer, and their data source was the precursor to the IPEDS survey, the Higher Education General Information Survey. Peterson's (1976) primary dependent variables were appropriations per capita and per student, and his data source was also the Higher Education General Information Survey.

In fact, Layzell and Lyddon (1990) concluded that the only significant predictor of current state higher education appropriations were past appropriation levels. Similarly, Hossler et al. (1997)[26] found that public higher education enrollments and previous appropriation levels were the only significant predictors of current state higher education appropriations. However, cross-sectional data were utilized, which means that their sample size was at most an *n* of 50. Such a small sample size means that it would have been very difficult for any of the individual independent variables to reach statistical significance, which may have limited their findings.

Later, attention returned to the possible impact of state economic, demographic, and higher education sector variables. One of the first studies to return to this broader view of the factors influencing state support of higher education was Toutkoushian and Hollis (1998).[27] The authors employed panel data covering the year 1982–1996 for all 50 states. They also employed a fixed effects model which allowed them to isolate the impacts of state and year effects from the effect of the independent variables. Finally, for one of their models, they employed a two-stage least squares approach which allowed them to treat enrollments as endogenous and obtain accurate estimates of their elasticity with respect to appropriations. The authors found that indeed state funding of higher education is significantly impacted by various economic and demographic factors, that enrollments also affect state appropriations, and that state funding formulas generally have a significant positive impact on levels of funding. Other researchers later reported similar findings (Kane et al., 2003; Kane, Orszag, Apostolov, Inman, & Reschovsky, 2005; Okunade, 2004; Toutkoushian & Hollis, 1998). These latter studies revealed the influence of a variety of demographic-, economic-, and higher education-related variables, including unemployment levels, population size, other state budgetary demands (i.e., Medicaid), and public and private sector enrollments.

In the 2000s, attention returned to the possible influence of state-level political influences on state support of higher education (Archibald & Feldman, 2006; Lowry, 2001; Nicholson-Crotty & Meier, 2003; Rizzo, 2004; Weerts & Ronca, 2008). For example, Archibald and Feldman found democratic control of the lower chambers of state houses and of governors' offices to be positively associated with funding levels and likewise found that liberal states were more generous toward higher education. Rizzo found Republicans and unified party control of the legislature were negatively associated with the share of state education budgets allocated to public higher education. Additionally, Weerts and Ronca found that partisanship of the governor (Republican – yes/no) and the legislature (percentage of Republicans) and voter turnout were significantly associated with state support of higher education.

Most recently, three studies have significantly expanded our understanding of the role of politics and political institutions in influencing state support of higher education. Borrowing theory and measures from political science, McLendon, Hearn et al. (2009)

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[26] Hossler et al. (1997) used levels of state appropriations to public four-year institutions. The data were from the Grapevine surveys.

[27] Toutkoushian and Hollis (1998) used the natural log of state appropriation levels as their dependent variable. Their data source was the precursor of the SHEEO SHEF compilation, the *State Profiles*: *Financing Public Higher Education* data collected by Kent Halstead.

and Tandberg (2010a, 2010b)[28] engaged in similar analyses, and their results taken together also showed that partisanship of the governor and the legislator were significantly associated with state support of higher education, but also that legislative professionalism, whether the state had term limits, gubernatorial powers, the impact of interest groups (measured a number of different ways), political ideology, the existence of a unified legislature and a consolidated state governing board for higher education, and political culture[29] all significantly impacted state support for higher education. These authors' models also included a number of economic-, demographic-, and higher education-related independent variables that were found to play a role. Finally, and most recently, research by Dar (2012) has significantly improved our understanding of political ideology and states' trend toward greater privatization of public higher education.

Independent Variables

Appendix A provides basic information on over 30 different studies meant to account for state support of higher education. There may have been additional studies published that were missed; however, this is believed to be a fairly comprehensive listing of the studies published since 1980 (plus a few published in the 1970s).[30] Researchers can use Appendix A to determine, for each of these studies, which variables have been used in past research; which independent variables have been found to be significant predictors of state support measures, the direction of the effect; and which dependent variable(s) – that is, which measures of state support for higher education – they have been associated with, the years covered and related sample information, the empirical approach, and other methods employed.

There have been many independent variables employed to explain some measure of state support of higher education. Some of those variables measure aspects of the higher education systems in the states; others measure various political attributes of, and aspects of the governmental systems in, the states; and some of the more traditional variables can be categorized as economic and demographic variables.

Of the various independent variables that have been evaluated for their possible impact on state support of higher education, this section will only focus on several key variables that fall within the political category. This area is chosen for special focus because it has only recently received significant attention, and this attention

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[28] McLendon, Hearn et al. (2009) employed state tax appropriations per $1,000 of personal income as their dependent variable (Grapevine data). Tandberg (2010b) likewise used the same variable and Grapevine data. Tandberg (2010a) employed higher education's share of total state general fund expenditures as his dependent variable (NASBO data).

[29] See Tandberg (2010a, 2010b) and Hero and Tolbert (1996) for details on the political culture measure.

[30] We apologize for any studies we missed and for any inaccuracies in Appendix A. They were not intentional.

has led to important new findings that have caused researchers to reconsider state finance of higher education. The variables/factors from this political category that will be discussed are interest groups, state higher education governance structures, and legislative professionalism. All three are worth considering for inclusion in future analytic efforts and also represent areas for future theoretical and empirical development.

Interest Groups

Interest groups remain a conceptually and empirically underdeveloped concept within the larger state higher education policy and finance literature. Within political science, interest groups have been and remain a central and well-developed area of study. Political scientists have developed measures and theories which have led to significant findings in regard to the influence of interest groups on policy and finance decisions (e.g., Gray & Lowery, 1996, 2001; Nownes, 2006; Toma, Berhane, & Curl, 2006) but only recently has the higher education literature begun paying attention to this area of research (Ness, Tandberg, & McLendon, 2008).[31]

Truman (1951) defines an interest group as "any group that, on the basis of one or more shared attitudes, makes certain claims upon other groups in the society for the establishment, maintenance, or enhancement of forms of behavior that are implied by the shared attitudes" (p. 235). The members of such groups presumably establish shared attitudes, providing members a similar frame of reference for interpreting behaviors or events. In the context of American politics, Thomas and Hrebenar (2004) describe an interest group as "an association of individuals or organizations or a public or private institution that, on the basis of one or more shared concerns, attempts to influence policy in its favor" (p. 102). Interest group research generally attempts to understand interest groups, their attributes and behaviors, and the influence they have on governments and policy outcomes or outputs. Interest groups attempt to influence governmental outcomes and outputs through direct and indirect lobbying activities (Thomas & Hrebenar). While higher education is by no means the most influential lobby in the American states, as a sector, colleges and universities have become more influential over time (Nownes, Thomas, & Hrebenar, 2008; Thomas & Hrebenar, 1999, 2004), and there is reason to believe that, when it comes to issues particular to their sector (i.e., higher education appropriations), they can have a significant impact over governmental decision making (McLendon, Hearn, et al., 2009; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011).

The majority of the work related to state-level interest groups and higher education policy and finance has been case study evaluations of interest group activity in one

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[31] For a detailed discussion of interest groups and state higher education policy research, see Ness et al. (2008).

or two states (e.g., deGive & Olswang, 1999; Frost, Hearn, & Marine, 1997; Ness, 2010; Sabloff, 1997; Tandberg, 2006; Tankersley-Bankhead, 2009). There have also been a few scattered survey-based studies (e.g., Blackwell & Cistone, 1999; Ferrin, 2003, 2005). These studies have revealed insights into coalition building, interest group alliances, the relative perceived influence of various actors and interest groups, and the activities of campus-based lobbyists. Only recently have higher education scholars turned their attention to the impact these groups have on governmental decision making.

Tandberg (2008, 2010a, 2010b) borrowed a widely used measure from the political science literature developed by Gray and Lowery (1996) which they refer to as a "relative density" indicator. Tandberg employed data provided by these authors and available in public archives to construct his measures of state interest group activity in regard to higher education. Both measures attempt to account for the wider interest group environment in the states, assume that interest groups compete for scarce resources, and assume therefore that the relative size of the higher education lobby matters. States with more interest groups may be less generous to higher education, and states with more powerful higher education lobbies may be more generous. The first measure is a higher education interest group ratio. This measure indicates the density of the higher education lobby relative to the larger interest group universe in a given state. It is a ratio that positions all higher education interest groups relative to all non-higher education interest groups. The variable is constructed by dividing the total number of state higher education institutions and registered noncollege or nonuniversity higher education interest groups by the total number of interest groups in the state minus the registered colleges and universities or other registered higher education interests groups that may lobby for higher education. The second is an interest group density measure, which attempts to measure the size of the total non-higher education lobby. It is constructed by taking the total number of registered interest groups minus the total number of registered higher education interest groups.[32]

Using his measures, Tandberg (2008, 2010a, 2010b) found that the ratio of higher education interest groups to all state-level interest groups (state higher education interest group ratio) has a positive effect on higher education appropriations per $1,000 of personal income, while the total number of non-higher education interest groups in a state has a negative effect on higher education's share of total state expenditures appropriations. McLendon, Hearn et al. (2009) also found a positive effect of the total number of higher education interest groups in a state on higher education appropriations. Most recently, Tandberg and Ness (2011) found that Tandberg's higher education interest group ratio is associated with increased state spending on higher education capital projects.

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[32] See Gray and Lowery's (various years) extensive discussions on the use of interest group density measures.

The limited extant literature on interest groups and state higher education funding decisions supports the notion that interest groups matter in significant and measurable ways. Indeed, this in an area of research ripe for further exploration and development, including, for example, the exploration of lobbying strategies of institutions and their possible impact on levels of state funding for higher education and how differences in states' interest group ecologies (the mix of interest groups in a state) might impact their generosity toward higher education.

State Higher Education Governance Structures

All states have some sort of governance structure for higher education.[33] These structures are meant to provide some level of oversight and coordination of public higher education in the various states. However, the specific structure employed and the power granted to the structure differ from state to state. McGuinness (2003) developed a state governance typology based on (in descending order) strength of control: (1) consolidated governing board, (2) regulatory coordinating board, (3) weak coordinating board, and (4) planning agency. Consolidated governing boards and regulatory coordinating boards possess direct control over the academic and fiscal affairs of campuses. Weak coordinating boards and planning agencies' authorities are limited to reviewing campus policies and making recommendations to the legislature or governor. In this second group of governance models, decision authority is less centralized, which allows individual campuses to have far more autonomy (McGuinness, 2003; McLendon et al., 2005).

A growing body of literature supports the idea that the way a state arranges its higher education governance structure can influence the higher education policies the state pursues (Doyle et al., 2010; Hearn & Griswold, 1994; McLendon et al., 2005, 2006, 2007; Zumeta, 1996). A smaller group of studies have examined the impacts of governance structures on state funding for higher education (e.g., Lowry, 2001; McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011). While at least a couple have not reported significant results (McLendon, Hearn, et al., 2009; Tandberg, 2010a), these analyses have tended to find distinctive connections between postsecondary governance arrangements and financing levels. For example, Tandberg's studies reveal that the existence of a consolidated governing board for higher education

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[33] Michigan does not have a traditional state-level coordinating or governing agency for postsecondary education. However, the State Board of Education has very limited state postsecondary coordinating functions. While its primary responsibility is for elementary and secondary education, the board does have limited responsibility for the coordination of services for public two-year and four-year colleges and universities. Vermont likewise does not have a traditional structure. Instead, it has a voluntary state higher education coordinating system plus two system level boards (McGuinness, 2003).

is negatively associated with state tax appropriations per \$1,000 of personal income and with state capital expenditures for higher education but is not significantly associated with the share of total state expenditures received by higher education.

Tandberg (2010c) and Nicholson-Crotty and Meier (2003) further highlight the role of state governance structures in influencing state funding decisions for higher education by examining their conditioning effect on other political factors and those factors' influence on state appropriations decisions. Tandberg found that indeed various political measures had differing impacts on state funding decisions in regard to size and direction depending on whether a state employed a consolidated governing board or not. State higher education interest groups' impact was muted, the influence of the governor was diminished, and the influence of the legislature was magnified (among other findings) with or without such a board. Nicholson-Crotty and Meier engaged in a similar analysis which likewise revealed conditioning effects of state higher education governance structures. Further analysis of the conditioning role of state higher education governance structures and new measures of governance structures themselves are possible areas for future research.

Legislative Professionalism

One of the political variables that has the most consistent and, in fact, largest impact on state support of higher education is legislative professionalism (e.g., McLendon, Hearn, et al., 2009; Nicholson-Crotty & Meier, 2003; Peterson, 1976; Tandberg, 2008, 2010a, 2010b; Tandberg & Ness, 2011). In each of these studies, legislative professionalism has been found to have a significant and positive impact on state support of higher education measured a number of different ways. Legislative professionalism represents the degree of institutional resources in the legislature (full-time staff, session length, and member pay) (Squire, 2000). There is substantial variation across states in terms of the professionalism of their legislatures, which makes the variable quite useful for empirical analyses. Legislative professionalism has been linked with higher public spending generally (Squire & Hamm, 2005) and, as indicated earlier, has specifically been found to positively impact spending for higher education, including higher education's share of total state expenditures (Tandberg, 2010a).

Legislative professionalism has been measured in two different ways. First, and most popular, is the Squire index. This is an index of the state legislature's average member pay, average days in session, and average staff per member relative to the US Congress (Squire & Hamm, 2005). A value of 1.0 indicates a perfect resemblance to Congress and therefore a high level of professionalism, while a value close to 0.0 indicates little institutional professionalism. McLendon, Hearn et al. (2009) utilized this measure. The second, utilized by Tandberg (2008, 2010a, 2010b;

Tandberg & Ness, 2011), simply uses the legislature's average pay. This approach has also been used in the political science literature for some time (e.g., Barrilleaux & Berkman, 2003; Carey, Niemi, & Powell, 2000; Fiorina, 1994). Either measure produces similar results.

The remaining question is why does legislative professionalism produce these results? We do not clearly know yet. However, Tandberg theorizes that there may be at least two possible reasons. First, more professionalized legislatures generally attract more educated members, who may be more sympathetic toward higher education and value it more highly. And second, McLendon, Hearn et al. (2009) and Tandberg (2010a), both recognize that the greater analytic ability of more professional legislatures may have something to do with the results. The basic argument is that more educated legislatures may value higher education more highly (Pascarella & Terenzini, 2005), as will legislatures with access to better information and resources, which may be more sympathetic toward higher education. Nevertheless, this is an area warranting further theoretical and analytical attention. As McLendon, Hearn et al. ask: "Why and how, precisely, does professionalism influence decision making in legislative bodies, particularly in the context of decisions about higher-education funding? Conceptually, why does professionalism seem to influence this particular kind of policy activity, i.e., state funding decisions, whereas previous studies have shown scant evidence of the effect of legislative professionalism in other areas of postsecondary policy?" (p. 700).

Methodological Advances

The most significant methodological development in the area of state finance of higher education is the creation of large-scale panel data sets and the use of fixed effects. Panel data sets greatly increase the analytical degrees of freedom by increasing the sample size. For example, a study utilizing data on all 50 states over the course of 20 years will have an *n* of 1,000. A simple cross-sectional study will only have an *n* of 50. The larger *n* dramatically increases the possibility of statistically significant findings. The larger *n* also frees the researcher to be able to include many more variables because of the increased degrees of freedom. This has led researchers to collect numerous economic-, demographic-, political-, and higher education- related variables, and the findings from these studies have significantly improved our understanding of the budgetary process.

In conjunction with the introduction of the panel data sets has come the use of fixed effects models. These models remove state-specific and time-specific effects from the coefficient estimates of the variables of interest. In other words, fixed effects allow researchers to control for unobservable characteristics about states and time that may impact state support for higher education. Generally, fixed effects are implemented within an ordinary least squares (OLS) model with the inclusion of dummy variables for state and/or time effects (Zhang, 2010;

Toutkoushian & Hollis, 1998).[34] Such a model, meant to predict state support of higher education and primarily focused on examining the role of politics, might look like this:

Equation 2: OLS fixed effects model

$$y_{it} = a + b_1 p_{st} + b_2 c_{st} + \tau_t + \delta_s + v_{st}.$$

where y is the dependent variables (a measure of state support of higher education), a is the intercept coefficient, p_{st} represents the vector for various political variables, c_{st} represents the vector for various higher education and economic and demographic control variables, τ_t represents the year effects, δ_s represents the state effects, v_{st} is the pure residual, s and t are indices for individual states and time, and b_1 and b_2 represent the coefficients associated with the variables included in each vector.

Additionally, the use of interaction terms may continue to be a fruitful approach going forward. The use of interaction terms made the examination of the conditioning effect of state higher education governance structures, conducted by Tandberg (2010c) and Nicholson-Crotty and Meier (2003), possible (see above for a more detailed discussion). When an interaction term is created, the effect of two, or more, variables are not simply additive; instead, the effect of one variable depends on the value of another. Interaction terms are computed by multiplying the two main effect terms by each other. When a dummy variable for governance form is included in an interaction term (as they were in the Tandberg and Nicholson-Crotty & Meier studies), whether the results for the interaction terms are significant or not generally indicates whether there is a significant difference for states with and without a consolidated governing board for each political variable. For example, if the interaction term including budget powers of the governor and the dummy variable for higher education governance structure (coded 1 if such a board exists in a given state/year and 0 if not) is significant, then the difference between the results for different budget powers of the governor varies significantly depending upon whether a state is with or without a consolidated governing board. When employing interaction terms with a dummy variable, the final step is to split the sample based on whether each state/year has a consolidated governing board and then run two additional regressions: one including only those state/years coded 1 and one including only those state/years coded 0. This reveals the impact of the independent variables with and without the conditioning variable of interest (Tandberg).

A final methodological advance might be the use of two-stage least squares to address the possible endogeneity between various independent variables (i.e., enrollments) and state support of higher education (Toutkoushian & Hollis, 1998). Of course, there may be many other advances, and more will be developed if research in this domain continues. Indeed, the advancements in data and methods have been at the core of the recent expansion of our understanding of the factors that influence state support of higher education.

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[34] See Zhang (2010) for a full discussion of the use of panel data in higher education research.

Conclusion

The data, measures, theories, literature, findings, and methods analyzed and reviewed in this chapter should provide a solid foundation for future empirical examinations of the factors associated with state support of higher education. Future researchers should be sensitive to the differences in the measures of state funding of higher education data depending on the source and its purpose. They should justify their decision in regard to their data source and provide a discussion of what the data includes and does not include. Likewise, researchers ought to think carefully about the phenomenon they are interested in assessing and carefully choose the appropriate measure of state support of higher education and provide some justification for, and explanation of, their choice. Researchers may want to consider one of the theories or frameworks reviewed here as they provide reasonable guides to, and explanations of, political decision making within a larger context and make room for the influence of politics and economic-, demographic-, and higher education system-related factors. They will also help researchers make better sense of their findings. The use of theory to guide research into the factors related to state support of higher education has, by and large, been sorely underutilized in the literature to date. Researchers also ought to carefully review and then build upon what has already been found in the literature to date. Hopefully, Appendix A will help in this regard. Researchers should consider utilizing and further investigating the three political variables discussed at length in this chapter (state interest groups, state higher education governance structures, and legislative professionalism) for there remains much to be learned about how they influence state support of higher education. Additionally, researchers ought to continue to explore research from other disciplines (e.g., public policy, public finance, political science, and economics) in order to investigate whether there are other variables of possible significance to add to the large panel data sets.

We need to learn more about the dynamics of the political decisions being made in regard to state support of higher education, and we need to arrive at better understandings and explanations for many of the relationships we have already observed. As indicated at the beginning of this chapter, state higher education funding impacts both access and quality and is therefore an issue of real social importance. Arriving at a better understanding of what drives it is critical for those who want to influence it. As Layzell and Lyddon (1990) explained in reference to state budgeting for higher education: "You have got to know the system to beat the system" (p. xix).

Appendix A: Studies of State Appropriation to Higher Education[a]

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
1.	Archibald, R. B., & Feldman, D. H.	2006	Archibald, R. B., & Feldman, D. H. (2006). State higher education spending and the tax revolt. *Journal of Higher Education, 77*(4), 618–643	State appropriations to higher ed. per $1,000 of personal income (excluding federal and lottery funds)	Grapevine, Census, Book of the States	1961–2001 Panel data, fixed Zeffects	47 States	Democratic Governor, + Democratic Strength, + Super Majority Requirement, + Corrections Spending, + Health Spending, + Tax and Expenditure Limits, −
2.	Bailey, M. E., Rom, M. C., & Taylor, M.	2004	Bailey, M. E., Rom, M. C., & Taylor, M. (2004). State competition in higher education: A race to the top or a race to the bottom? *Economics of Governance, 5*(1), 53–75	Change in state support for higher education, annually (higher ed. exp. per state resident; higher ed. exp. FTE, CPI adjusted)	IPEDS, ICPSR, state finances	1986–1987 Panel data, two-way fixed effects	48 States	Democratic Strength, − Competition (spending between states and neighbors), − Convergence (policy measure between states and neighbors), − Personal Income per Capita, − Student Aged Pop. (18–24), + Elderly Pop. (65<), +

	Authors	Year	Citation	Dependent variable	Data source	Time period/Method	Sample	Variables and findings
3.	Cheslock, J., J., & Gianneschi, M.	2008	Cheslock, J., & Gianneschi, M. (2008). Replacing state appropriations with alternative revenue sources: The case of voluntary support. *Journal of Higher Education, 79,* 208+	State appropriations per student (adjusted CPI, HEPI, FTE)	IPEDS ICPSR, state finances	1994–2004 Panel data	All public four-year institutions that offer undergraduate degrees, have a 2000 Carnegie Classification of Research/ Doctoral, Masters, or Baccalaureate, 47 states	Barron's Selectivity Ranking, +; Enrollment, +; Research/Doctoral Carnegie Classification, +; US News Ranking, –; Personal Income per Capita, +; State Appropriations Previous Year, +; Unemployment Rate, –
4.	Coughlin, C. C., & Erekson, O. H.	1986	Coughlin, C. C., & Erekson, O. H. (1986). Determinants of state aid and voluntary support of higher education. *Economics of Education Review, 5(2),* 179–190	State appropriations per student	Halstead, *How States Compare in Financial Support of Public Higher Education,* 1983–1984	1980–1981 Cross-sectional OLS	52 Major research universities	Top Undergraduate Quality, +; SAT, +; Top Faculty, +; Tuition, –; Relative Tuition, +; Per Capita State Income, +; Tax Effort, +; NCAA Appearance, +; TV Appearances, +; Basketball Winning %, +

Appendix A (continued)

Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
5. Dar, L., & Franke, R.	2010	Dar, L., & Franke, R. (2010). *Revisiting the political economy of government support for higher education: Evidence from a new unifying measure for the American states.* Presented at the Annual Consortium for Higher Education Researchers, Oslo, Norway	Trostel and Ronca's (2009) "unifying measure of state support of higher education"	Trostel and Ronca (2009)	1980–2005 Panel data, fixed effects	49 States	Carnegie Classification I or II, + Private Enrollment FTE, – Tuition per FTE, – Democratic Strength, + Polarization, + State Policy Priority Score, – Personal Income per Capita, – Student Aged Pop. (18–24), + State Revenue, + Unemployment Rate, +

No.	Author	Year	Citation	Measure	Data source	Method	Sample	Variables
6.	Dar, L., & Spence, M. J.	2011	Dar, L., & Spence, M. J. (2011). Partisanship, political polarization, and state budget outcomes: The case of higher education. *SSRN eLibrary*, Retrieved from http://ssrn.com/abstract=1577365	Appropriations per $1,000 in personal income, relative appropriations by share of budget	STATE GOVERNMENT FINANCES 1900–2004 – File provided by the Census Bureau Staff Grapevine/Center for the Study of Education Policy – Illinois State University http://coe.ilstu.edu/grapevine/Welcome.htm	1976–2004 Panel Data, fixed effects	49 States	Private Enrollment FTE, – Tuition per FTE, – Democratic Strength, + Polarization, + State Policy Priority Score, – Personal Income per Capita, – Student Aged Pop. (18–24), + Pop. Share of School Aged (18–24), + State Revenue, + Unemployment Rate, –
7.	Delaney, J. A., & Doyle, W. R.	2007, 2011	Delaney, J. A., & Doyle, W. R. (2011). State spending on higher education: Testing the balance wheel over time. *Journal of Education Finance, 36*(4), 343–368	State appropriations for higher education (CPI adjusted) (1) Absolute levels of state funding for higher ed. (2) Year-to-year funding for Higher ed. by state and by year data evaluated by decade and business cycle	Grapevine, http://www.grapevine.ilstu.edu/historical/index.htm	1985–2004 Panel Data	49 States	Enrollment, + Private Enrollment FTE, – Share of Public, 2 year Enrollment, - Share of Private, 2 year Enrollment, – Share of Public, 4 year Enrollment, – Gross State Product, + Total Expenditure all Budget Categories other than HE, +

(continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
8.	Doyle, W. R.	2007	Doyle, W. R. (2007). The political economy of redistribution through higher education subsidies. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. XXII, pp. 335–409). Dordrecht, The Netherlands: Springer	State tax appropriations for higher education (CPI adjusted)	Center for the Study of Education Policy, US Census Bureau, Grapevine	1985–1989 1951–2007 (no data for 1973) Panel data, two-stage least squares estimation	50 States 48 States	Private Enrollment FTE, + Student Aged Pop. (18–24), +
9.	Hossler, D., Lund, J. P., Ramin, J., Westfall, S., & Irish, S.	1997	Hossler, D., Lund, J. P., Ramin, J., Westfall, S., & Irish, S. (1997). State funding for higher education: The Sisyphean Task. *The Journal of Higher Education, 68*(2), 160–190	Levels of state appropriations to public four-year institutions	Grapevine	1990, 1991, 1992, Separately CROSS-TABs, regression analyses, and exploratory factor analyses	50 States	Enrollment, + State Appropriations Previous Year, +

#	Author	Year	Citation	Dependent variable	Data source	Methodology	Sample	Findings
10.	Humphreys, B. R.	2000	Humphreys, B. R. (2000). Do business cycles affect state appropriations to higher education? *Southern Economic Journal, 67(2),* 398–413	Real state appropriations for higher ed. per FTE (HEPI adjusted)	Department of Commerce, Grapevine, IPEDS	1969–1994 Panel data, fixed effects	50 States	Growth in Income, +; Personal Growth in Income Expansionary Years, +; Personal Growth in Income Recessionary Years, +; Personal Income Expansionary Years, +; Personal Income Recessionary Years, +
11.	Kane, T. J., Orszag, P. R., & Gunter, D. L	2003	Kane, T. J., Orszag, P. R., & Gunter, D. L. (2003). *State fiscal constraints and higher education spending: The role of Medicaid and the business cycle.* Washington, DC: Brookings Institution	(1) Real higher education appropriations per capita ($1,000) (2) Real higher education appropriations as % of GSP	Dept. of Commerce, Grapevine, *Digest of Higher Education Statistics*	1981–2001 Panel data, two-way fixed effects (state, time) regression	48 States	Democratic Strength, +; Avg. Income Tax on Wages, +; Medicare Appropriations,–; State Revenue, +; Top Marginal Income Tax Rate, +; Unemployment Rate, –

Appendix A (continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
12.	Knott, J., & Payne, A.	2004	Knott, J., & Payne, A. (2004). The impact of state governance structures on management and performance of public organizations: A study of higher education institutions. *Journal of Policy Analysis and Management*, 23(1), 13–30	State appropriations institution (adjusted for 1996 price indices)	CASPAR, Institute for Scientific Information	1997–1998 Panel data	48 States, comprehensive and Ph.D.-granting public universities	Medical School, + Faculty Size, + Undergrad Enrollment, + HE Governance Structure, −
13.	Koshal, R. K., & Koshal, M.	2000	Koshal, R. K., & Koshal, M. (2000). State appropriation and higher education tuition: What is the relationship? *Education Economics*, 8(1), 81–89	Appropriation per FTE in a state	*The Statistical Abstract of the United States*	1990 Panel data, two-stage least squares	47 States (Nebraska excluded)	Share of Public, 2 year Enrollment, + Tuition per FTE, − Democratic Strength, + FTE Ratio to High School Grad 4 year, − Personal Income per Capita, − State Revenue, +

#	Authors	Year	Citation	Dependent/Measure	Data Source	Method	Sample	Findings
14.	Leslie, L. L., & Ramey, G.	1986	Leslie, L. L., & Ramey, G. (1986). State appropriations and enrollments: Does enrollment growth still pay? The Journal of Higher Education, 57(1), 1–19	Real (inflation-adjusted) appropriations in year	Chambers's State Tax Funds for Operating Expenses of Higher Education	1965–1981 Panel Data, OLS Regression	439 Public colleges and universities: 25 research I universities, 31 research II universities, 35 doctoral-granting I, 18 doctoral-granting II, 235 comprehensive I, and 95 comprehensive II institutions (using Carnegie classifications)	Enrollment, – Research/Doctoral Carnegie Classification, –
15.	Lindeen, J. W., & Willis, G. L.	1975	Lindeen, J. W., & Willis, G. L. (1975). Political, socioeconomic and demographic patterns of support for public higher education. The Western Political Quarterly, 28(3), 528–541	(1) Public Financial Support: Total Amount per Taxpayer; Taxpayer Effort (2) Increase in state Support. 1960–70: gross net Percentage; Net Percentage Increase	Statistical Abstract of the United States(1962), Statistical Abstract of the United States, (1972), Digest of Educational Statistics (1971), Ohio Basic Data Series: Higher Education (1971)	1960–1970 Correlation analysis, OLS	48 States	Gross % Increase State Support, + Taxpayer Effort, –

Appendix A (continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
16.	Lowry, R. C.	2001	Lowry, R. C. (2001). The effects of state political interests and campus outputs on public university revenues. *Economics of Education Review, 20*(2), 105–119	Dollar amount of state government appropriations, grants and contracts per 100,000 voting-age residents in the state	IPEDS	1994–1995 Panel data, two-stage least squares regression (separate analyses)	All public, four-year institutions in the 50 states for which complete financial and enrollment data was available at the time (428 universities in most cases)	Graduate & Professional Enrollment, + Mean Faculty Compensation, + Medical School, + Private Enrollment FTE, − Tuition per FTE, + Undergrad, Non-resident Enrollment, + Undergrad, Resident Enrollment, + HE Governance Structure, − LocalGovernmentFunds,− Elderly Pop. (65<), − Public Service Spending, + Research Spending, +

#	Author	Year	Citation	Measure	Data source	Method	Sample	Findings
17.	McLendon, M. K., Hearn, J. C., & Mokher, C. G.	2009	McLendon, M. K., Hearn, J. C., & Mokher, C. G. (2009). Partisans, professionals, and power: The role of political factors in state higher education funding. *The Journal of Higher Education, 80*(6), 686–713	State appropriations per $1,000 of personal income (CPI adjusted 2004)	Grapevine, Postsecondary Opportunity	1984–2004 Panel Data, regression model, fixed effects	49 States (e.g., Nebraska)	Private Enrollment FTE, – Share of Public, 2 year Enrollment, + Gubernatorial Power, – HE Interest Groups, + Legislative Professionalism, + Republican Governor, – Republican Strength, – Term Limits, + Student Aged Pop. (18–24), – Elderly Pop. (65<), – Unemployment Rate, –
18.	McLendon, M. K., Mokher, C. G., & Doyle, W.	2009	McLendon, M. K., Mokher, C. G., & Doyle, W. (2009). "Privileging" public research universities: An empirical analysis of the distribution of state appropriations across research and non-research universities. *Journal of Education Finance, 34*(4), 372–401	State appropriations per FTE for each institution	IPEDS	2003–2004 Random effects model conditioned on the mean of individual-level variables	501 Institutions in 46 states, excluding institutions with missing data	Graduate & Professional Enrollment, + Proportion Completion in STEM, + Democratic Strength, + Gubernatorial Budget Powers, – Inst. Located in State Capital, + of Appropriations Comm. Members Graduating from Inst, + Term Limits, – Student Aged Pop. (18–24), –

Appendix A (continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
19.	Morgan, D., Kickham, K., & LaPlant, J.	2001	Morgan, D., Kickham, K., & LaPlant, J.	State and general education expenditures for	*Digest of Education Statistics*, Census	1986–1995 Panel data	49 States (e.g., Arizona)	Enrollment, + Federal Aid, − Faculty Size, +
20.	Nicholson-Crotty, J., & Meier, K. J.	2003	Nicholson-Crotty, J., & Meier, K. J. (2003). Politics, structure, and public policy: The case of higher education. *Educational Policy, 17*(1), 80–97	State/local appropriations per Student	*Digest of Education*	1989–1996 Panel data, fixed effects	47 States (e.g., Nebraska, Michigan, Delaware)	Citizen Ideology (Berry Data), − HE Governance Structure, − Government Ideology, + Legislative Professionalism, −
21.	Okunade, A. A.	2004	Okunade, A. A. (2004). What factors influence state appropriations for public higher education in the united states? *Journal of Education Finance, 30*(2), 123–138	Public higher education appropriation share of the total state budget	US Census	1993–1994, 1994–1995 OLS, GLS, pooled regression, Panel Data	50 States	Per Capita Enrollment, + Tuition per FTE, − Annual Expenditure per Inmate, + Debt to Expenditure Ratio, + Medicare Appropriations, −

No.	Author	Year	Citation	Measure	Data Source	Data/Time	Sample	Findings
22.	Peterson, R. G.	1976	Peterson, R. G. (1976). Environmental and political determinants of state higher education appropriations policies. *The Journal of Higher Education, 47*(5), 523–542	Appropriations for both per capita and per student, for: (1) All public institutions (2) Public 4 year (3) Public 2 year	US Office of Education, US Bureau of the Census	1960, 1969 Panel data, 2 cross-sectional studies	50 States	Enrollment, + Share of Public, 2 year Enrollment, + Share of Private, 2 year Enrollment, – Share of Public, 4 year Enrollment, + Adults w/College Degree, + Hofferbert's Influence Factor Scores, + Hofferbert's Industrialization Factor Scores, – Median Yrs. School completed by Pop, +
23.	Rabovsky, T.	2012	Rabovsky, T. M. (2012). Accountability in higher education: Exploring impacts on state budgets and institutional spending patterns. *Journal of Public Administration Research and Theory*	State appropriations, measured in constant dollars	SHEEO	1999–2008 for stage one; 1998–2008 for stage two Panel data	50 States	Graduate & Professional Enrollment, + Graduation Rate, + *% Black,* + *% Hispanic,* – Performance Funding, + Research/Doctoral Carnegie Classification, + Selectivity, + Undergrad Enrollment, +

Appendix A (continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
24.	Rizzo, M. J.	2004	Rizzo, M. J. (2004). State preferences for higher education spending: A panel data analysis, 1977–2001. *Federal Reserve Bank of Cleveland's Conference on Education and Economic Development*	(1) Share of the public general fund budget allocated to education (2) Share of the education budget allocated to higher education (3) Share of the higher education budget allocated to institutions	US Bureau of the Census, State Government Finance Files(1972–2001), IPEDS, HEGIS, NASSGAP, Grapevine	1977–2001 Panel data	50 States	Giving, − PhD/BA Degrees Awarded, − Regional Non-Resident Tuition, − Share of Public, 2 year Enrollment, + State-Based Merit Scholarship, − Assembly Seats Per Capita, − Voter Turn Out, − Court Reform State, − Crime Rate, − Gross In-Migration, − Gross Out-Migration, − Median Household Income, − Median Household Income Squared, + Student Aged Pop. (18–24), + Race Interact, + Revenue Corporate Income Tax, + Revenue from Fuels, − Revenue Income Tax. +

No.	Author	Year	Reference	Dependent variable	Data source	Method	Sample	Variables
25.	Strathman, J. G.	1994	Strathman, J. G. (1994). Migration, benefit spillovers and state support of higher education. *Urban Studies, 31*(6), 913–920	State and local appropriations per FTE student	*Digest of Education Statistics, Statistical Abstract of the US* Census	1989–1990 Three-stage least squares parameter estimates	48 States	Revenue Lottery, – School Race Ratio, – Share of GSP (Ag, Fishing, Mining), + Share of GSP (Construction, Manufacturing, Trans. And Utilities), + Share of GSP (Government), + Share of GSP (Trade), + Unemployment Rate, + Unemployment Rate Non-White, – Gross Out-Migration, – Personal Income per Capita, +

Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
26. Tandberg, D. A.	2008	Tandberg, D. A. (2008). The politics of state higher education funding. *Higher Education Review*, 5, 1	Higher education appropriation as a % of state general fund expenditures	Grapevine, Census	1971–2001 Panel data, fixed effects	50 States	Giving, − In State Tuition (lagged), − Private Enrollment FTE, + Regional Non-Resident Tuition, + Democratic Governor, + Democratic Strength, + Electoral Competition, + HE Interest Ratio, + Legislative Unity, − Appropriations to K-12, − Gross State Product, + Health (Medical CPI) Share of pop. > 65 year, − Inequality, + Medicaid, − Medicaid CPI, − Student Aged Pop. (18–24), − Elderly Pop. (65<), − Population Below PELL, − Race Interact, + Unemployment Rate, −

| 27. | Tandberg, D. | 2010 | Tandberg, D. (2010). Interest groups and governmental institutions: The politics of state funding of public higher education. *Educational Policy*, 24(5), 44 | State appropriations per US$1,000 personal income | Grapevine, Postsecondary Opportunity | 1976–2004 Panel data, fixed effects | 50 States | Private Enrollment FTE, +
 Share of Public, 2 year Enrollment, −
 State uses Formula Funding, +
 Tuition Avg 4 year, −
 Democratic Governor, +
 Democratic Strength, +
 HE Governance Structure, −
 Government Ideology, +
 HE Interest Ratio, +
 Legislative Professionalism, +
 Legislative Unity, −
 Gini Coefficient, −
 Gross State Product, +
 Medicaid, −
 Student Aged Pop. (18–24), −
 Population Below PELL, +
 Unemployment Rate, + |

Appendix A (continued)

	Authors	Year	Citation	Dependent variable(s) (RE: state support)[b]	Dependent source	Time period and empirical approach	Sample	Significant independent variables (+/−)
28.	Tandberg, D. A.	2010	Tandberg, D. A. (2010). Politics, interest groups and state funding of public higher education. *Research in Higher Education, 51*(5), 416–450	State expenditure on higher education as a % of total state expenditures	NASBO	1986–2004 Panel data, fixed effects	50 States	Private Enrollment FTE, + Tuition Avg 4 year, − Citizen Ideology (Berry Data), + Democratic Governor, − Interest Group Density, − Legislative Professionalism, + Legislative Unity, − Political Culture, + Gross State Product, −
29.	Tandberg, D. A. & Ness, Eric	2011	Tandberg, D. A. & Ness, E. (2011). State capital expenditures for higher education: "Where the real politics happens." *Journal of Education Finance, 36*(4), 394–423	Natural log of state capital expenditures	NASBO	1988–2004 Panel data	50 States	Giving, + State uses Formula Funding, + Tuition Avg 4 year, − Electoral Competition, + HE Governance Structure, − Gubernatorial Budget Powers, − HE Interest Ratio, + Legislative Professionalism, + Political Culture, + Voter Turn Out, − Student Aged Pop. (18–24), −

#	Author	Year	Citation	Dependent variable	Source	Method	Sample	Findings
30.	Toutkoushian, R. K., & Hollis, P.	1998	Toutkoushian, R. K., & Hollis, P. (1998). Using panel data to examine legislative demand for higher education. *Education Economics, 6(2),* 141–157	Natural log of Level of appropriations for higher education in each state	Halstead data (State Profiles: Financing Public Higher Education)	1982–1996 Panel data, OLS, 2SLS, fixed effects	50 States	Mean Faculty Compensation, +; Median Household Income, +; Unemployment Rate, –
31.	Weerts, D. J., & Ronca, J. M.	2008	Weerts, D. J., & Ronca, J. M. (2008). *Determinants of state appropriations for higher education from 1985–2005: An organizational theory analysis.* Madison, WI: Wisconsin Center for the Advanced of Postsecondary Education	First difference of the natural log of total restricted plus unrestricted state appropriations converted to 2004 dollars	US Bureau of Labor Statistics, IPEDS	1985–2004 Panel data, random effects	50 States, 1,000 institutions	Carnegie Classification, –; # of Pub Inst. in State, +; Republican Governor, +; Voter Turn Out, +; Appropriations to K-12, –; Court Reform State, –; Health Spending, –; Personal Income per Capita, –; Student Aged Pop. (18–24), –; Unemployment Rate, –

[a]Findings in regard to significance and direction reflect the results for each variable from what appeared to be the final or most inclusive model in each of the associated studies

[b]Only the dependent variable(s) measuring state support of higher education are included here. Many studies also include measures of other phenomena as additional dependent variables; however, they are not included here

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