GOVERNMENTAL STRUCTURE, TRUSTEE SELECTION AND

PUBLIC UNIVERSITY PRICES AND SPENDING:

MULTIPLE MEANS TO SIMILAR ENDS

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Abstract

Scholars have devoted much attention in recent years to the possible effects of institutions on policy implementation, but empirical tests are limited to relatively simple contexts. I estimate the effects of multiple instruments for exercising political control over public university prices and, hence, spending. I find that public universities in states with statewide coordinating boards or few governing boards, and universities governed by trustees selected by elected state officials or the general public charge significantly lower prices than universities in states with decentralized structures, or governed by trustees chosen by academic stakeholders. The difference in revenues is reflected in spending on activities that directly benefit administrators and faculty, but that may also benefit students. Different hypothetical combinations of institutions yield similar results, which suggests that the particular system adopted by each state depends on the politics of institutional change as well as the intended outcomes.

1.   Introduction

Scholars associated with the 'new institutionalism' have devoted much attention in recent years to the possible effects of institutions on policy implementation. Many scholars argue that structural and procedural provisions governing administrative decision making can be used to institutionalize the preferences of legislative coalitions and give advantages to certain stakeholders (Bawn 1995, 1997; Calvert, McCubbins and Weingast 1989; McCubbins 1985; McCubbins, Noll and Weingast 1987, 1989; Moe 1990), although others have questioned whether these results obtain in practice (Balla 1998; Spence 1997). Some studies explicitly recognize that there may be multiple ways to design institutions so as to achieve a given result. For example, Bawn (1997) models *ex post* oversight and *ex ante* statutory constraints as substitute instruments for controlling administrative agents. While few of these studies address the method by which the implementing agents are selected, Calvert, McCubbins

and Weingast (1989) recognize that the influence different principals have over the selection of agents may also affect the policies ultimately implemented.[1]

Empirical studies of the effects of institutions on policy implementation are limited to relatively simple contexts, however, and generally do not provide a comparison of different instruments for control, or an assessment of the extent to which different instruments may be complements or substitutes. This is at least partly due to the difficulty in obtaining a suitable data set. On the one hand, studying the effects of institutions across federal agencies is very difficult due to the great disparity in agency missions and outputs.[2] On the other hand, there is relatively little variance in the methods used to select federal administrative agents. As a result, most studies of federal agencies focus on factors such as the identity of the president who appoints agency heads (Moe 1985; Wood and Waterman 1991), the makeup of the congressional oversight committee (Weingast and Moran 1983), or the use of budget allocations to signal Congress' approval or displeasure (Carpenter 1996).

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[1] The phrase "structure and process" associated with the work of McCubbins, Noll and Weingast (1987, 1989) has come to describe the full set of institutional arrangements that might be used to exert control over administrative discretion. McCubbins (1985) describes several different kinds of structural provisions, including those that determine the overall institutional setting in which an agency operates, those that specify the scope of delegated authority, and those that specify the instruments that may be used to implement policy. In addition, legislatures may impose procedures that limit the policies to be considered, the information that must be obtained, and the preference aggregation rules for arriving at decisions. My data in this paper are limited to differences in the institutional settings in which public university prices and spending are determined, and the methods for selecting university trustees. A related line of research compares different organizations depending on whether they are public bureaucracies, private firms, or quasi-autonomous, state-owned enterprises (e.g. Chubb and Moe 1988; Horn 1995; Koppell 2000; Weisbrod 1998). Public universities in the United States are most analogous to state-owned enterprises, and I concentrate in this paper on differences *within* this sector.

[2] Longitudinal studies of a single agency can test the effects of a change in structure or administrative procedure, but such cases are relatively rare (e.g., Durant, Legge and Moussios 1998; Ringquist 1995; Spence 1999). Some agencies have multiple subunits that may provide opportunities to test the effects of governmental structures and administrative procedures. Sabatier, Loomis and McCarthy (1995) study the *perceived* differences in the influence of national and regional offices relative to district offices in the U.S. Forest Service, but do not find evidence that these differences help to explain output levels at different national forests.

Existing studies that compare institutional arrangements for policy implementation across states also tend to focus on only one dimension at a time. For example, Teske (1991) focuses on the capacity of state regulatory agencies to process information; Eykamp (1995) considers whether public research universities with constitutional autonomy differ from those subject to statutory controls; Toma (1990) examines the effects of more or less centralized board structures for public universities; and a number of studies focus on procedures for selecting state regulatory commissioners or education board members (Boyes and McDowell 1989; Fields, Klein and Sfiridis 1997; McCormick, Moore and Yandle 1994; Toma 1983). These studies provide insights into the effects of varying one instrument for control independent of all others, but they do not allow us to compare the magnitudes of the effects of different instruments, nor do they allow us to compare the effects of different combinations of instruments.

In this paper, I ask whether the prices charged students to attend public universities and, hence, public university spending are affected by the institutional setting in which relevant decisions are made and the methods used to select governing board trustees. Although political scientists have heretofore devoted little attention to public universities,[3] there are at least three good reasons to study them. First, the large number of public universities engaged in similar activities and the variation in institutional arrangements for governance provide a rich context that allows us to determine empirically which instruments have the greatest impact and the consequences of different combinations of instruments. Second, testing propositions generated by research on traditional government bureaucracies and regulatory agencies against data for quasi-autonomous organizations such as public universities allows us to consider the extent to whether these are truly general propositions. Third, governance of public universities is a salient policy issue in many states, but there is no consensus regarding the relative merits of political control vs. autonomy (Albright 1999; Bowen, *et al.* 1997;

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[3] See Lohmann (2000), however, for a recent paper on the internal governance of research universities.

Jones, Ewell and McGuinness 1998; MacTaggart and Associates 1996, 1998; Richardson, *et al.* 1998). There is thus a need for empirical work that identifies the specific elements of different systems that lead to control or autonomy, and measures the magnitudes of any effects.

I begin by arguing that institutional arrangements should matter because they affect the ability of different actors having different preferences to influence decisions about public university prices and budgets. With respect to public universities, elected state officials will generally prefer lower prices and smaller budgets than will campus administrators and faculty. Elected officials should have greater influence over university prices and spending when the capacity for oversight is greater, when the total cost of monitoring the university system and influencing trustee decisions is lower, and when the preferences of public university trustees are closer to those of elected officials. Considerations of capacity and costs imply that public university prices should be lower in states having a statewide coordinating board that reviews pricing and budget decisions prior to implementation, or have relatively few university governing boards. The extent to which public university trustees share the preferences of state government officials or campus administrators and faculty should depend on the method by which they are selected. Thus, prices should be lower at universities where a high percentage of university trustees are appointed by elected officials or chosen through popular election. In systems where these conditions are absent, prices should be higher, and the additional revenue should be spent on activities that most directly benefit university administrators and faculty.

I test these propositions by estimating equations for net tuition and fee revenue and spending on instruction, student services, academic support, institutional support, and plant operations and maintenance at 407 public university campuses in 47 states. I find that statewide coordinating boards responsible for oversight of the public university system, the number of governing boards in a state, and methods for selecting trustees each have significant, independent effects on net tuition and fee revenue in the expected direction. The difference in revenue is reflected most consistently in spending on student instruction (which includes most faculty salaries), but also in spending on student services and

academic and institutional support. I then calculate the joint effects of different combinations of instruments by comparing predicted values for hypothetical systems. The difference in net tuition and fee revenue between realistic, hypothetical combinations of structure and trustee selection for a state with 15 public university campuses is on the order of $1000-1400 per student. Roughly two-fifths of the additional revenue is allocated to instruction, with the rest spread among student services and academic and institutional support.

My finding that different combinations of governmental structure and trustee selection produce similar results has implications for models of institutional design. Most theoretical discussions of institutional design implicitly or explicitly assume that Congress or some other legislative body is creating a new agency from scratch. In the case of public universities, however, most state governance systems were created in the 1960s and 1970s to increase political control over an existing set of quasi-autonomous organizations (Lewis and Maruna 1996; McGuinness 1997). Since multiple institutional arrangements can produce similar outcomes, it is likely that the particular system adopted in each instance depends on the political costs and benefits of enacting change, as well as substantive policy objectives.

Section 2 of this paper identifies important actors and their preferences, describes the differences in governmental structures and trustee selection across states, and derives hypotheses about their effects on prices and spending. Section 3 presents the empirical analysis. I first estimate models of tuition and fee revenue and spending on different functions for given levels of state funding. I then describe the results of additional analyses that explore possible objections or extensions to my model, and use my results to explore the effects of different, hypothetical combinations of institutions. Section 4 summarizes my findings and points the way to further research.

2.   Governmental Structure, Trustee Selection and Public Universities

2.1   Actors and preferences

Although qualitative descriptions of state governance of public universities often emphasize the

complexity of different systems (Bowen *et al.* 1997; McGuinness 1997), the major variations in institutional arrangements across and within states can be captured by a relatively small number of variables. A typical structure for governing public universities may be thought of as a hierarchy with a single supervisor or set of supervisors who must oversee one or more decision-making bodies. Each decision-making body makes one or more decisions, and each decision affects a particular set of stakeholders having preferences different from the supervisor's, as well as the ability to influence the relevant decision-making body due to asymmetric information or some other reason. Assuming that the supervisor has many other duties and only limited resources available for supervision, the extent to which decisions reflect his preferences rather than those of the affected constituency will depend on the amount of resources available, the total costs of monitoring the system and influencing decisions, the preferences of the decision makers themselves, and the access to decision makers enjoyed by affected stakeholders.

In the case of public university prices and spending, state government executives and legislators act as supervisors. They set overall policy toward higher education, decide on state government funding for universities, and monitor the operation of the public university system. In so doing, they speak not only for themselves, but also for the voters to whom they are ultimately accountable. Trustees serving on university governing boards are the relevant decision makers. They set tuition rates and student fees and adopt public university budgets. Campus administrators and faculty are the affected stakeholders whose preferences may differ from elected state officials. For reasons given in the next subsection, I consider the statewide coordinating boards that exist in some states to be means of expanding elected officials' capacity to supervise, rather than an additional, intervening level of hierarchy.[4]

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[4] For other kinds of decisions in higher education, campus administrators or faculty may be the implementing agents, with members of various boards serving simultaneously as both principals and agents embedded within a multi-level hierarchy.

With regard to preferences, logic and anecdotal evidence suggest that elected officials prefer lower public university prices and smaller budgets than do administrators and faculty. Administrators and faculty benefit from maximizing their own economic returns and prestige (Cohen and Noll 1998; James 1990), which suggests that they seek to maximize budgets by raising prices to the point where the marginal revenue from further increases is zero (see Niskanen 1971). The induced preferences of elected officials should reflect public concerns about rising tuition and student fees, as well as allegations that universities lack fiscal discipline (see Laing 1995).[5] In fact, several states have adopted statutory or constitutional language expressing a desire to maintain low prices,[6] legislators in several states have sought to limit the percentage increase in tuition and fees in recent years (Albright 1999), and proposals to relax state government control over public universities are consistently met with claims that this will result in higher tuition rates (E.g. Ackerman 1996; Schmidt 1996; Sullivan 1994). In contrast, no state has a law setting minimum tuition or fees, nor have any proposals to deregulate public universities been met by claims that universities will deprive themselves of resources by charging too little.

Absent institutions that facilitate elected state officials' ability to exert influence, decisions made by governing boards may tend toward the preferred positions of administrators (Lewis and Maruna

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[5] Of course, administrators need not have the same preferences as faculty, and at least some of the former may place a positive value on maintaining low prices in order to achieve certain social goals, or to further their own career ambitions. On average, however, I expect administrators and faculty to place more weight on having adequate resources and less weight on keeping prices low than do elected state officials.

[6] New York law states that tuition rates should be set to maximize access to higher education, whereas Wyoming stipulates that tuition should be "as nearly free as possible." N.Y. C.L.S. Educ. § 351; Wyo. Stat. § 21-17-105. Similarly, the Arizona constitution states that instruction in the university system for state residents should be "as nearly free as possible." A.R.S. Const. Art. 11 § 6. Florida caps resident undergraduate tuition and fees at one-fourth the cost of undergraduate programs. Fla. Stat. § 240.209(3)(e). Idaho, Louisiana, Missouri, Nevada, and Ohio require that tuition must be free for resident undergraduate students, but fees may be charged for noninstructional activities. Idaho Code § 33-3717; La. Rev. Stat. § 17.3026; R.S. Mo. § 172.360; Nev. Rev. Stat. Ann. § 396.540; Ohio Rev. Code Ann. §§ 3345.01, 3345.05.

1996). There are a number of reasons for this. First, as explained in the next subsection, some governing board trustees are selected through processes that make them accountable to academic stakeholders rather than elected state officials or voters. Second, governing board trustees have a fiduciary duty to make decisions that are in the best long-term interest of the university, as well as consistent with state policy (McGuinness 1997). Third, trustees may need to rely on university administrators for important information, which presents administrators with an opportunity to influence decisions in the desired direction (Niskanen 1971). Fourth, the combination of tenure and decentralized decision making in universities means that many decisions affecting university budgets are the *de facto* result of faculty initiatives (Cohen and Noll 1998). Finally, elected officials cannot influence the decisions of trustees without taking scarce time and effort away from their other duties, and it may not be possible to construct a coalition capable of overturning decisions on tuition and budgets once they are made (Bawn 1997; McCubbins, Noll and Weingast 1989).

2.2   The effects of governmental structure and trustee selection

Given preferences, governmental structure should matter if it affects supervisors' oversight capacity, the cost of monitoring and influencing decision makers, or the ability of affected stakeholders to gain access to decision makers. I hypothesize that oversight capacity varies according to whether each state has a statewide coordinating board with regulatory authority over the entire public university system. In 1994, coordinating boards existed in 21 states. Most of these boards were established in the 1960s and 1970s for the purpose of "rationalizing" state public university systems and ensuring that individual campuses fulfill their specific missions (Lewis and Maruna 1996; McGuinness 1997). Some of them are responsible for adopting a consolidated budget for all public universities in the state, whereas others have the power to review and comment on budgets proposed by individual governing boards before those decisions become final.[7] None of them have a fiduciary duty toward any particular

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[7] States with coordinating boards as of 1994 included AL, AR, CO, CT, IL, IN, KY, LA, MA, MD, MO, NE, NJ, NY, OH, OK, SC, TN, TX, VA, and WA. Boards in AL, AR, CT, IL, MD, NJ, OH, OK, and SC adopted consolidated budgets (Education Commission of the States 1994).

university or campus, and either the governor or the legislature appoints all of the members of these boards (Education Commission of the States 1994). I therefore expect that members of coordinating boards have preferences similar to those of elected state officials. All else being equal, prices and spending in states with coordinating boards should be lower than in states that lack them.

The costs to elected officials or coordinating boards of monitoring and influencing governing boards should increase with the number of governing boards (decision makers) and the number of campuses governed (decisions made), but the full effects of the latter variable are not clear. In 1994 twenty states had just one governing board with responsibility for all public university campuses, while the number of governing boards in other states ranged from two to fourteen (Education Commission of the States 1994).[8] I expect that prices and spending will be higher in states with many governing boards. The number of campuses governed ranges from one for many boards to 32 for the Board of Trustees of the State University of New York. Although the costs of monitoring and influencing decisions should increase with the number of campuses governed, the ability of administrators at a given campus to gain access to the relevant governing board should decrease when they have to compete with administrators from other campuses. Moreover, governing boards responsible for multiple campuses tend to have more staff,[9] which provides them with their own capacity to resist attempts at influence or capture (Teske 1991). While the effect on prices is thus unclear, the number of campuses governed might affect the university's production function, since certain services and facilities can be shared across campuses. Spending on these functions should be lower, on average, at campuses governed by multi-campus boards.[10]

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[8] States with only one governing board included AK, AZ, FL, GA, HI, IA, ID, KS, MS, MT, NC, ND, NH, NV, OR, RI, SD, UT, WI, and WY (Education Commission of the States 1994).

[9] The simple correlation between the number of campuses governed by governing boards in my data set and staff size is .369. This correlation is significant at $p < .001$.

[10] There are other ways in which institutions for governing universities differ. Some public

The decisions made by governing boards should also depend on the preferences of the trustees themselves, which should vary depending on the stakeholders to whom they are ultimately accountable (Boyes and McDowell 1989; Calvert, McCubbins and Weingast 1989). Nationwide, over 80 percent of the trustees on public university governing boards are selected by elected officials or popular election, and many boards also include state government officials who serve *ex officio*. I refer to these as "external" trustees. While many governing boards are composed entirely of such external trustees, others include university administrators, representatives of alumni groups, representatives of faculty or student government, or trustees selected by other trustees (Education Commission of the States 1994). At the extreme, the University of Pittsburgh and Temple University each have 39 trustees, including 3 *ex officio* state government officials, 4 trustees selected by the Governor, 4 by the Speaker of the House, 4 by the Senate President *pro tempore*, and 24 appointed by other members of the governing board or elected by alumni (24 Pa. Stat. §§ 2510-4, 2510-204). Trustees selected by elected officials or by through popular election are likely to place greater weight on low prices relative to large budgets than are trustees selected by internal, "academic" stakeholders.

Many scholars argue that an alternative to hierarchical control is to adopt administrative procedures that mandate participation by affected interest groups, or at least allow interest groups to

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universities have protected status under the state constitution, and Eykamp (1995) argues that research universities with constitutional autonomy supply higher quality outcomes. Eykamp's coding depends on court interpretations of each state constitution, however, and my preliminary analysis did not indicate any independent effects for constitutional status. Statewide coordinating boards also vary in their authority over budgets, and some states have statutory provisions that set substantive goals or limits on resident tuition. I comment on these variations further in section 3.5. Toma (1990) uses total campuses divided by total governing boards in each state as her measure of centralization. She argues that governing boards in more centralized states are captured by university educators seeking to avoid market pressures, and claims support from her finding that the ratio of tuition revenue to appropriations is lower in these states. Although my results confirm that tuition is lower in states with more centralized structures after controlling for state and local government revenues, my reasoning differs significantly from Toma's, and I do not find any effect from the number of campuses governed *per se*. Note that the number of campuses governed by each board is typically *not* the same for all governing boards in a state.

monitor the decisions of implementing agents and alert elected officials of the need for action (Banks and Weingast 1992; Bawn 1995; Epstein and O'Halloran 1995; Hopenhayn and Lohmann 1996; McCubbins, Noll and Weingast 1987, 1989; McCubbins and Schwartz 1984). Balla (1998) and Spence (1997) argue, however, that such procedures do not give advantages to particular interests unless they are accompanied by substantive standards. In the case of public universities, students and prospective students and their parents do not possess special expertise regarding university finances or the consequences of budget decisions that would allow them to influence governing boards, and data on the extent to which individual governing boards are subject to "sunshine laws" or other provisions that allow for public participation are lacking.[11] My analysis therefore concentrates on top-down, hierarchical structures and trustee selection methods.

Of course, elected state officials may also influence public university prices and spending by the amount of state government funding they provide to each university. State government funding in turn depends on available tax revenue, state political interests, and the specific mix of activities at each campus (Lowry n.d.). Lowry estimates a system of four equations for state government funding, net tuition and fee revenue, spending on academic research, and spending on public service to nonacademic constituencies at 428 public university campuses. He finds that the coefficient on state government funding in the net tuition and fee equation is negative and significant, whereas the coefficient on net tuition and fee revenue in the state government funding equation is essentially zero.

The analysis that follows therefore takes state and local government funding for public universities as exogenous, and tests the following hypotheses:

H1: Holding state and local government funding constant, net revenue from tuition

and fees is lower at universities located in states that have a statewide coordinating

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[11] Cleveland (1985, p. 6) states that roughly half the public university campuses in the country are subject to some form of open meeting law, but coverage varies within as well as across states due to constitutional autonomy and specific court decisions. I report in section 3.5 on the results from including a state-level measure of "openness" in my basic model.

board.

H2: Holding state and local government funding constant, net revenue from tuition
and fees is lower at universities located in states that have fewer governing boards.

H3: Holding state and local government funding constant, net revenue from tuition
and fees is lower at universities governed by trustees selected by state government
officials or through popular election.

Lowry (n.d.) provides some preliminary evidence of a connection between political control and public university prices. Controlling for state government funding, net tuition and fee revenue is higher in states where public universities score higher on an index of autonomy constructed from survey responses that takes on the same value for all universities located in the same state.[12] In this paper, I replace this index of autonomy with measures of specific instruments for political control that vary within as well as across states, and extend the analysis to include spending on a variety of educational and general activities.

My other dependent variables are spending on instruction, student services, academic support, institutional support, and operation and maintenance of physical plant. See the Appendix for definitions. Assuming administrators and faculty are motivated at least in part by self-interest, public universities with more autonomy from political control should spend the additional revenue from higher prices on activities that benefit administrators and faculty. Spending on instruction and academic support clearly meets this criterion, as most faculty salaries are included in instruction expenditures, and academic support for research and other activities contributes to faculty members' prestige and future earnings. Administrators' compensation is often based on faculty compensation, and many administrators also share a desire for academic prestige (Cohen and Noll 1998). Administrators should

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[12] The index of autonomy is based on a survey of administrators at 122 public universities regarding 26 possible restrictions on financial and personnel transactions (Volkwein and Malik 1997).

also benefit directly from spending on institutional support. Increased spending on student services may allow a public university to compete more effectively for high quality students, who contribute indirectly to prestige and other benefits from teaching and research (James 1990). Administrators and faculty do not stand to benefit directly from spending on operation and maintenance of plant, however, so I do not expect these expenditures to vary with my key institutional variables. I hypothesize the following:

H4: Holding state and local government funding constant, spending on instruction, student services, academic support, and institutional support is lower at universities located in states that have a statewide coordinating board.

H5: Holding state and local government funding constant, spending on instruction, student services, academic support, and institutional support is lower are universities in states that have fewer governing boards.

H6: Holding state and local government funding constant, spending on instruction, student services, academic support, and institutional support is lower at universities governed by trustees selected by state government officials or through popular election.

In addition, student services and academic support are functions that can be shared across campuses. Spending on these activities may also be lower at campuses governed by multi-campus boards, although the underlying reason is based on economics rather than governance.

3. Empirical Analysis

3.1. Model specification

To test Hypotheses 1-6, I estimated equations for net tuition and fee revenue and spending on five functional categories using data for 407 public university campuses for fiscal year 1995. Summary statistics are shown in Table 1. Note that net tuition and fee revenue is not a choice variable. Rather, governing boards set gross tuition rates and fees, and determine how much student aid to offer from

institutional resources. Individual students then decide whether to enroll at each university, and net tuition and fee revenue is the product of the net prices per student and enrollments. I estimate a reduced-form equation that suppresses these underlying decisions.

[Table 1 about here]

My equation for net tuition and fee revenue is:

$$Y1 = 0 + 1*X1 + 2*X2 + 3*X3 + 4*X4 + 5*X5 + 6*X6 + 1$$

where:

i = vectors of coefficients to be estimated, i = 0, ..., 6.

Y1 = natural log of gross tuition and fee revenue minus institutional financial aid.

X1 = vector of enrollments, measured by the natural logs of the numbers of full-time equivalent[13] undergraduate and graduate and professional students and the percentage of undergraduates who are nonresidents.

X2 = vector of qualitative attributes affecting campus mission or student demand, including land-grant status, medical school, law school, and academic reputation.

X3 = input costs, measured by the natural log of the local cost of living.

X4 = alternative unrestricted revenues, measured by the natural log of state and local government funding.

X5 = vector of state-level factors affecting student demand, measured by the natural logs of per capita income and the percentage of 18-year olds beginning college in Fall, 1994.

X6 = vector of institutional variables, including the natural log of state legislature staff per member, a dummy variable for state coordinating board, and the natural logs of the number of governing boards in each state, the number of campuses governed by each board, and the percentage of trustees selected by "external" stakeholders.

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[13] The number of full-time equivalent students equals the number of full-time students plus one-third the number of part-time students.

1 =   residual, with mean equal to zero.

Turning first to my institutional variables, my hypothesis is that public university prices and spending depend on the capacity of state government officials to oversee the university system, and the costs of monitoring and influence. In order to control for the legislature's capacity to perform these functions absent any specific governmental structure, I include the natural log of total state legislature staff divided by members of the legislature in each state. Governmental structures for public universities are measured by a dummy variable for statewide coordinating board; the natural log of the number of governing boards in each state; and the natural log of the number of campuses governed by the relevant governing board. Trustee selection procedures are measured by the natural log of the percentage of trustees on the relevant governing board who are state government officials serving *ex officio* or are selected by the governor, legislature, or popular election.[14] Following the reasoning above, I expect that the coefficient for statewide coordinating board will be *negative*, the coefficient for the number of governing boards will be *positive,* and the coefficient for percent external trustees will be *negative*. The number of campuses governed by each board should have no effect on net tuition and fee revenue.

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[14] I also classify the five members of the governing board for the City University of New York who are appointed by the Mayor of New York as "external" trustees. A majority of the members on the boards for the Universities of Alabama and Delaware are chosen by other board members, subject to confirmation by a majority of the state Senate. If a nominee is rejected in Alabama, the Senate chooses the replacement, whereas the board chooses the replacement in Delaware. Code of Ala. § 16-47-30; 14 Del. Code § 5105. I classified board members in both cases as chosen by elected officials, since they can be defeated by the state Senate. It is arguable that the board members for the University of Delaware should be classified as chosen by other members. When I reclassify them this way, the effect of my trustee selection variable on tuition and fee revenues increases slightly. A few university governing boards include nonvoting student representatives. While current students would benefit from low prices, they also would benefit from larger budgets, so I do not classify these representatives as external trustees. Since Education Commission for the States (1994) does not provide details on *ex officio* board members, I consulted the actual statutes in force in 1994 to determine which stakeholders were represented. In so doing, I discovered a few cases where the board composition set forth in the statute differs from that shown in the *Handbook.* In these cases, I used the figures in the statutes. Data on board compositions and statutory citations for cases with discrepancies are available from the author on request.

Turning now to my other control variables, net tuition and fee revenue should increase with enrollments, and the percentage of undergraduates who are not state residents. The latter variable accounts for the fact that every public university charges higher tuition and fees to students who are not state residents. To the extent that land-grant institutions adopt a more populist approach to higher education, they may charge lower tuition. Tuition and fee revenue should increase as a function of qualitative attributes that make a campus more attractive or increase the value of a diploma. These include the existence of a medical school or law school, and the university's academic reputation. I measure academic reputation by each university's percentile ranking in U.S. News and World Report's *America's Best Colleges* (1994). U.S. News & World Report publishes rankings for "national" universities, and "regional" universities in four separate regions.[15] I converted ordinal rankings into percentiles scaled from zero to one, and then combined the four regions. I use separate reputation variables for national and regional universities, along with an intercept shift for regional universities.

Given that public universities do not face perfectly competitive markets, prices may also reflect exogenous differences in input costs. My measure of input costs is a geographic cost of living index developed by Research Associates of Washington (1992). Research Associates of Washington calculates a cost of living index for several hundred cities, as well as each state. I use the index value for the city where each university is located if one is available; otherwise, I use the state index value.[16]

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[15]   U.S. News & World Report does not publish the actual criteria for designating a university as "national" or "regional," but describes national universities as institutions that are "more selective ... [and] place a high priority on research and award large numbers of Ph.D.'s" (1994, p. 9). The Carnegie Foundation classifies all but one of the 126 national universities in my data set as Research or Doctoral universities for the Advancement of Teaching (the exception is Tennessee Tech). None of the 281 regional universities are classified as Research universities; 16 are Doctoral universities, 232 are Comprehensive universities, and 33 are Baccalaureate institutions. My data do not include any institutions classified by U.S. News as liberal arts colleges or specialized institutions.

[16]   In a few cases, I use a proxy where local data are lacking but the cost of living clearly differs from the state as a whole. I use the consumption goods index for Miami, Florida. I assign College Park, Maryland and Fairfax, Virginia the same index value as Silver Spring, Maryland, and Denton, Texas the same value as Dallas. For the borough of Manhattan, I use an index value of 135, which is slightly

Finally, net tuition and fee revenue should be higher at universities with less state and local government funding (Lowry n.d.), and should also depend on state characteristics affecting demand for higher education. If higher education is a normal good, demand should be greater in states with higher per capita income. Demand should also be higher in states where a college diploma is particularly valued, either for cultural reasons or because of state labor markets (Hoenack and Pierro 1990). I include the percentage of 18-year olds in each state who were freshmen anywhere in fall 1994 as a proxy for tastes regarding higher education.

I estimate separate equations for spending on instruction, student services, academic support, institutional support, and operation and maintenance of plant. For each category, I estimate the following equation:

$$Y_j = \text{ß}0_j + \text{ß}1_j*Z1 + \text{ß}2_j*Z2 + \text{ß}3_j*Z3 + \beta4_j*Y1 + \text{ß}5_j*X6 + \text{ }j$$

where:

$Y_j =$ natural log of spending on category j, j = 2, ..., 6.

$\text{ß}_{ij} =$ vectors of coefficients to be estimated, i = 0, ..., 5.

$Z1 =$ vector of enrollments, measured by the natural logs of undergraduate and graduate and professional students.

$Z2 =$ vector of qualitative attributes affecting resource allocation (medical school, law school, land-grant status).

$Z3 =$ vector of revenues from sources other than net tuition and fees, measured by natural logs of state and local government funding, federal grants and contracts, and private gifts, grants and contracts.

$X6 =$ vector of the same institutional variables used in the net tuition and fee equation.

$j =$ residual, with mean zero.

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higher than the value of 133 reported for San Francisco.

In order to correctly measure the full impact of institutions on spending, I must consider both direct and indirect effects (Weisbrod 1998). The direct effects are measured by the coefficients in the spending equations. The indirect effects operate through net tuition and fee revenue, with greater revenue expected to lead to greater spending. Thus, the total effect of each of my institutional variables on spending category j is measured by $(\beta 4_j * 6 + \beta 5_{\ j}) * X6$. I expect that spending on instruction, student services, academic support, and institutional support is higher at universities with greater autonomy from political control. The total effect on spending on operation and maintenance of plant should be negligible.

Turning to my control variables, spending on instruction and academic and institutional support should increase with enrollments and qualitative attributes such as medical and law schools. Holding revenue constant, spending on student services and plant operations and maintenance may actually decrease with enrollments, as universities face a tradeoff imposed by budgetary constraints between activities that contribute directly to academic outputs in the short run, and those that do not.[17] Spending on all activities should increase with total revenue, although revenue from some sources may have no effect on particular activities. Federal and private revenues are largely restricted to activities such as research and public service (Lowry n.d.), but success in acquiring restricted revenues may lead to greater spending on support functions. For example, a research project funded by federal and private grants may require additional academic and institutional support services.

3.2.   Methodological concerns

In estimating my equations, I need to account for two complications. First, expected revenue from net tuition and fees appears as an independent variable in my spending equations, and residuals for

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[17] There is no identity linking the revenues on the right-hand side of my specification to total spending on educational and general activities. In fact, the sum of the revenues on the right-hand side exceeds the sum of spending on instruction, student services, academic support, institutional support, and operations and maintenance for all but 19 of my 407 cases, and the median surplus as a percentage of spending is 14.7 percent.

my spending equations may well be correlated. Second, it is highly unlikely that decisions made by a single governing board regarding prices and spending at multiple campuses are truly independent. I therefore estimated my model using three-stage least squares, and then recalculated the standard errors using White/Huber robust estimators with observations clustered by governing board.[18]

I must also be concerned with whether public university governmental structure and trustee selection methods are truly exogenous, as it may be that both institutions and outcomes are the result of underlying interests and resources. Historically, the primary concern during the 1960s and early 1970s when many state governance structures were created was to rationalize program offerings and avoid redundancy rather than limit student tuition and fees (Lewis and Maruna 1996; McGuinness 1997). Nonetheless, in cases where a state has modified its system recently, institutions may be functions of current interests, while outcomes may be at least partly functions of prior institutions. I therefore omit Massachusetts, Nebraska, and West Virginia from my sample, because each of these states modified its system in significant ways between 1986 and 1994 (Education Commission of the States 1994).[19] This ensures that my institutional variables have remained stable for several years prior to the pricing and spending decisions I analyze. I return to the issue of endogenous institutions after

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[18] The model was estimated using Stata version 6.0, using the "reg3" and "_robust" commands. The Breusch-Pagan test for independent equations rejected the null hypothesis of uncorrelated residuals at $p < .001$. A potential problem with three-stage least squares is that, if one equation is misspecified, it can affect the entire system (Johnston and DiNardo 1997). There is little difference between the results shown here and those obtained by estimating the system of equations using two-stage least squares. In contrast, the standard errors become considerably smaller if I assume that each campus is an independent observation, rather than clustering observations by governing board.

[19] Massachusetts established a new statewide coordinating board in 1991. The Nebraska state constitution was amended to significantly increase the power of the statewide coordinating board, effective January 1, 1992. West Virginia replaced its consolidated Board of Regents with separate governing boards for the University System of West Virginia and the State College System in 1989 (Education Commission of the States 1994). Illinois, Minnesota, and New Jersey all adopted significant changes that took effect in 1995. Since my data are for fiscal year 1995, however, I assume that these changes did not have any influence.

presenting my main results.

3.3   Estimation results

The results of my estimations are shown in Table 2. Results are estimated using data for all public universities except those in Massachusetts, Nebraska, West Virginia, or the District of Columbia, for which complete data are available, and which are classified as national or regional universities by U.S. News & World Report (1994).[20]   There are a total of 407 cases, and 169 independent clusters.

The results in Table 2 strongly support Hypotheses 1-3. Every coefficient in the net tuition and fee revenue equation either has the expected sign or is less than its standard error, and most coefficients are significant at conventional levels. In particular, the results for my institutional variables meet expectations. The coefficient on state legislature monitoring capacity is negative and significant at $p <$ .05.[21] The dummy variable for statewide coordinating board is negative, the coefficient on the number

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[20] The most prominent public universities not in my data set are Rutgers University and the University of the District of Columbia. Rutgers has three separate campuses in New Brunswick, Newark and Camden, New Jersey, but financial data are available only in the aggregate. The University of the District of Columbia is omitted due to the unique political status of the District. Data for Cornell University are for the statutory colleges only, except for academic reputation and dummy variables for medical school and law school. All campus-level data except for academic reputation and percent nonresident undergraduates are from the Integrated Postsecondary Education Data System (National Center for Education Statistics 1995). Data for percent nonresident undergraduates are from U.S. News & World Report (1996) if available, and U.S. News & World Report (1995) otherwise. Two out of 407 cases report zero nonresident students. I use the natural log of one for these cases. Governance variables are coded from Education Commission of the States (1994). State-level demand variables are calculated using data from the U.S. Department of Commerce (1996), the U.S. Bureau of the Census (1994, July 1), and the National Center for Education Statistics (1996). State legislature staff is from the National Conference of State Legislatures (2000).

[21] Sabloff (1997) argues that more professional legislatures are prone to placing greater restrictions on public university autonomy. Squire (1992) constructs an index of state legislature professionalism using member pay, staff members per legislator, and total days in session. If I use Squire's index of professionalism rather than staff resources alone, the coefficient is essentially zero and much less than its standard error. I also tried normalizing total staff members by state government employees and state government expenditures. In both cases the coefficient was negative and about 1.5 times its standard error, while my other results were barely affected. My

of governing boards is positive, the coefficient on external trustees is negative, and all are significant at
p < .01. Thus, net tuition and fee revenue is lower at public universities subject to more centralized
control or governed by external trustees, and each of these instruments has an independent effect. The
coefficient on the number of campuses governed by each board is positive, but only 1.2 times its
standard error. The evidence therefore does not suggest that this measure of centralization has a
statistically significant effect on net tuition and fees.

[Table 2 about here]

Holding revenue constant, spending on instruction increases with enrollments, while spending
on institutional support and operation and maintenance of plant decreases.[22] Spending on instruction
and academic support is higher at campuses with medical schools, and spending on academic support is
also higher at campuses with law schools. Holding enrollments constant, spending on all categories
increases with both state and local government revenue and expected net tuition and fees. Spending on
instruction and academic and institutional support increases with federal grants and contracts, and
spending on instruction and academic support also increases with private gifts, grants and contracts.

Table 3 shows the total (direct and indirect) effects of my key institutional variables on each
dependent variable, with standard errors in parentheses. There are no indirect effects on net tuition and
fee revenue, so the top row of Table 3 shows the same coefficients and standard errors as in Table 2.
The other rows show the total estimated effects on the spending variables. Since this is a nonlinear
combination of stochastic variables, standard errors are calculated using simulations.[23]

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results do not change if I use the average of 1988 and 1996 legislative staff per member rather
than 1996 only.

[22] The elasticities of spending with respect to enrollments in Table 2 may appear to be small, but they
measure direct effects only, with revenues held constant. Both net tuition and fee revenues and state
and local government revenues increase with enrollments (Lowry n.d.), and increases in each of these
revenue streams leads to increased spending in all categories shown.

[23] Simulations were performed using Gauss version 3.5. I made 10,000 random draws of each
coefficient using the point estimates and the full variance-covariance matrix for each equation in

[Table 3 about here]

Table 3 shows that my results generally provide support for Hypotheses 4-6 as well. Spending on instruction, student services and academic support is lower at campuses in states with statewide coordinating boards, while spending on instruction increases with the number of governing boards. Spending on instruction, student services and institutional support decreases with the percentage of trustees selected by elected officials or the general public. The most consistent results are those for spending on instruction, which is the activity that is most directly tied to the short-run self-interest of faculty. Results for student services and academic and institutional support are less consistent, but in general spending on these functions also decreases with external political control. In addition, spending on student services is lower at campuses governed by multi-campus boards. None of the governmental structure variables have a significant effect on spending on operation and maintenance of plant, although it appears that external trustees may be less inclined to spend on such functions than those selected by academic stakeholders.

3.4   Are Governmental Structures and Trustee Selection Methods Exogenous?

Ideally, I would like to account for the possible endogeneity of institutions by specifying a set of structural equations that explain the relevant institutional arrangements for each university. The appropriate instrumental variables are not obvious, however, and the task is made more difficult by the fact that my institutional variables include both dichotomous and continuous measures that vary both across states (the use of coordinating boards and the number of governing boards) and within states (campuses per governing board and trustee selection procedures).

I therefore explored the issue of endogenous institutions using a purely statistical approach. I estimated a two-stage least squares model for the net tuition and fee equation only, treating state coordinating boards, the number of governing boards, and the method of selecting trustees as

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Table 2. I then calculated the quantity $(\beta 4_j * 6 + \beta 5_{\ j})$ for each random draw. The results shown in Table 3 are the mean and standard deviation of these estimates.

endogenous. Instrumental variables included all of the other explanatory variables from the net tuition and fee equation, plus concentration indices for research spending and graduate and professional enrollment across campuses in a state (states dominated by a single flagship campus tend to have fewer boards and are less likely to have coordinating boards), the natural logs of statewide public university enrollment and statewide private university enrollment, and fixed effects dummy variables for census divisions. The R^2's of the first-stage instrumental variable equations were .584 for coordinating boards, .772 for governing boards, and .447 for trustee selection. The coefficients (and their standard errors) for these variables in the second-stage equation were -.170 (.099), .209 (.106), and -.676 (.155), respectively. All of these coefficients are in the expected direction, and the coefficients for governing boards and external trustees are significant at $p < .05$ and $p < .01$, respectively. The coefficient for statewide coordinating boards is significant at $p < .10$, despite the fact that the first-stage instrumental variables equation uses a linear probability model for a dichotomous variable.

Another way to look for the exogenous effects of institutions is to examine short run changes in the dependent variable. Given my log-log specification, including a lagged dependent variable is equivalent to estimating the percentage change in the dependent variable. When I include a variable for the natural log of net tuition and fee revenues in Fiscal Year 1992 in my revenue equation, I find that the percentage change in net tuition and fee revenues between FY92 and FY95 is lower at universities in states with coordinating boards ($|t| = 2.20$), and higher in states with many governing boards ($|t| = 3.52$). The coefficient on the percentage of external trustees is negative, but less than its standard error. Although a complete analysis of short term changes is best left for another paper, this suggests that net tuition and fee revenues increased at a faster rate over this three-year period in states with more decentralized structures.

On the whole, these results seem reassuring. The results for the number of governing boards are particularly strong, and the fact that net tuition and fee revenues did not increase at a faster *rate* during 1992-1995 at universities with more external trustees does not necessarily imply that price *levels*

are not higher at these same universities.

3.5   Alternative Specifications

My specification uses just four variables to characterize the governmental structure and trustee selection methods for each university, but there may be additional distinctions that could be made, and public universities operate within a broader context of state institutions and substantive policies. Even with a large number of cases, however, it is difficult to test every permutation of institutions and context that might arise. I therefore investigated a number of alternative specifications one at a time to determine whether my basic model can be improved.

I first sought to determine whether the model can be improved by using additional measures of governmental structures. I added a variable to test whether the effect of a statewide coordinating board depends on whether it adopts a consolidated budget for all public universities in the state, or only has authority to review university budgets and make recommendations (Education Commission for the States 1994). The only dependent variable for which the difference is significant at $p < .05$ is spending on instruction, which is slightly lower in states where the coordinating board manages a consolidated budget. McGuinness (1997) suggests that a qualitative difference exists between states with a single, "consolidated" governing board and those with multiple governing boards but no coordinating board. When I add a dummy variable for states with a single governing board to my net tuition and fee equation, however, the coefficient is insignificant, while the coefficient on the natural log of the number of governing boards remains positive and significant.

If legislative staff resources matter, what about staff resources for coordinating and governing boards? When I add a variable for the natural log of statewide coordinating board staff per campus, the coefficient on the intercept shift for coordinating boards is essentially zero while the coefficient on staff size is negative and significant. The coefficient on state legislature staff remains negative but is only 1.2 times its standard error, while the effects of the number of governing boards and external trustees are robust. More than half the governing boards in my data set do not have their own staff

(Education Commission of the States 1994), and the expected effect of governing board staff on net tuition and fee revenue is ambiguous. When I add an intercept shift for boards that have staff along with the natural log of the number of staff members per campus governed, the coefficient for the intercept shift is positive, while the coefficient on the number of staff is negative, and my other results are not affected. Even if coordinating and governing boards are exogenous with respect to public university prices and spending decisions, however, board staff resources may not be, whereas state legislature staff resources almost certainly are. While one could make a case for including coordinating board staff, I opted to retain the model in Table 2.

I also considered whether a meaningful distinction exists between external trustees appointed by the governor or state legislature, and those chosen by popular election. When I reestimate my model using separate variables for the natural logs of the percent trustees selected by popular election vs. other external trustees (with intercept shifts to account for cases where the relevant percentage is zero), both coefficients are negative and significant, but the difference is not significant at conventional levels ($|t| = 1.07$). If I use the untransformed percentages, both coefficients are negative and significant, and the effect of trustees selected by popular election is significantly smaller (less negative) than the effect if other external trustees ($|t| = 2.27$). The answer therefore appears to depend on the functional form specified, although at most the difference is in the magnitude of the effect.

I noted earlier that several states have enacted substantive policies expressing a preference for low tuition, at least for resident undergraduates, and it may be argued that these policies are important in addition to, or instead of, governmental structure and trustee selection procedures. In addition, state legislatures in Texas and Washington set resident tuition rates directly.[24] I added a dummy variable to my net tuition and fee equation for states where the legislature sets resident undergraduate tuition rates directly, or where the legislature has adopted a substantive provision designed to constrain resident

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[24] Tex. Educ. Code § 54.051; Rev. Code Wash. § 28B.15.067. States adopting policies toward tuition are identified in note 6.

undergraduate tuition. The coefficient was actually positive. When I dropped the institutional variables from my equation the coefficient on the policy dummy variable was negative, but less than its standard error.

I also noted that reliable data on the extent to which decision making by governing boards is subject to public scrutiny and participation are lacking. Cleveland (1985) states that roughly 50 percent of public university campuses in the country are subject to some kind of sunshine law, but he does not provide the information necessary to code a variable that captures this variation. He does provide a state-level index of "openness" based on the number of different kinds of provisions in each state's sunshine law for public agencies generally. State scores range from a maximum of 22 out of 25 possible provisions for Tennessee to a minimum of 5 for Pennsylvania (Cleveland 1985, p. 38). I divided each state's score by 25, and included this index in my model. The coefficient in the net tuition and fee equation is negative and 1.69 times its standard error, suggesting that public university prices may be lower in states where the proceedings of public agencies are generally more open to scrutiny. However, the data used to construct this index may be dated, and it is not clear how well it applies to public universities *per se*. Moreover, the results for statewide coordinating board, number of governing boards, and percent external trustees change very little. I therefore decided to omit this variable from my final model.

It may also be argued that culture, ideology, or political competition have effects on public university prices and spending, independent of institutions. Note first that the percentage of 18-year olds beginning college should capture differences in the "taste" for higher education across states, and my results indicate that where demand is greater, prices are higher. Second, other studies indicate that political interests and partisan preferences affect net tuition and fee revenue indirectly through their effects on state and local government funding for higher education (Lowry n.d.; Cohen and Noll 1998; Goldin and Katz 1999; Hoenack and Pierro 1990). Third, in order to test for a direct relationship between political ideology and public university prices, I included a variety of measures developed by

Berry, *et al.* (1998) in my net tuition and fee revenue equation.[25] I included citizen ideology and government ideology for 1993, as well as the average of each variable for 1984-1993 and 1989-1993. None of the coefficients exceeded their standard errors. Finally, I tried two different measures of state electoral competition during the 1980s (Holbrook and Van Dunk 1993). Each coefficient was positive, but neither was more than 1.1 times its standard error.

3.6   Illustrative scenarios

The magnitude of the effect of a statewide coordinating board can be read directly from Table 3, since the coefficient measures the percentage difference in the dependent variable due to the presence of a coordinating board. Public universities in states with coordinating boards are predicted to have 15.5 percent fewer net tuition and fee revenue and spend 7.5 percent less on instruction, 23.1 percent less on student services and 21.6 percent less on academic support than comparable universities in states that lack such a board. The coefficients on the other variables measure elasticities, so the marginal effect is contingent on the value of both the dependent and the independent variables. In addition, different elements of governmental structure do not actually vary independent of one another. None of the states that have only one governing board have a statewide coordinating board with regulatory authority, and for any given number of campuses, an increase in the number of governing boards translates directly into a decrease in the mean number of campuses per board.

I therefore calculated the predicted levels of my dependent variables under a variety of realistic scenarios. The results are shown in Table 4. In order to make the numbers more intuitive, they are presented in terms of dollars per student, based on an enrollment of 7746 full-time equivalent students. All scenarios hold state and local government funding equal to $5554 per student. These enrollment and funding figures were obtained by taking the antilog of the mean of the natural log of each variable.

[Table 4 about here]

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[25]   Data were obtained from the Inter-University Consortium for Political and Social Research Publication-Related Archive.

The columns labeled Scenarios I, II and III show the predicted results under different governmental structures, holding the natural log of percent external trustees at its sample mean. Scenario I represents a campus in a state with no coordinating board, one governing board, and 15 campuses. This is similar to a large, consolidated system such as Wisconsin, North Carolina, or Georgia. Scenario II represents a campus in a state with a coordinating board, three governing boards, and five campuses per board. This federated structure is a stylized version of the system in states such as Texas, Illinois, Indiana, and Oklahoma. Scenario III represents a campus in a state with no coordinating board and 15 governing boards, each governing a single campus. This is a relatively large, decentralized state system such as Michigan's.

The results show that the magnitude of the effects is substantial, and different combinations of instruments can lead to similar results. The difference between an average university in a consolidated or federated state and one in a decentralized state amounts to a net price increase of $1354-1426 per student (about 52-57 percent), accompanied by increases in spending of $555-676 per student (12-15.5 percent) on instruction, $132-238 per student (18-39 percent) on student services, and $221-349 per student (21-39 percent) on academic support.

The last two columns show results for universities in an "average" state that have 100 and 50 percent, respectively, of their trustees selected by state government officials or through popular election. Allowing internal, academic stakeholders to select one-half of the trustees is predicted to result in a net price increase of $989 per student, or about 37 percent. About $384 per student of this goes toward spending on instruction, with the rest being split between student services, institutional support and plant operation and maintenance. The differences for net tuition and fees, instruction, and student services are all very comparable to the difference between universities in states with centralized or decentralized governmental structures.

Another means by which state governments can influence public university prices and spending is by changing the level of state government funding. The results shown in Table 2 imply that a one

percent difference in state and local government funding across universities leads to only a .141 percent difference in net tuition and fee revenue. This surprisingly low figure is at least partly due to multicollinearity between state and local government funding and several other control variables such as enrollments and academic reputation. If I adjust the natural log of state and local government funding by an amount sufficient to produce a one standard deviation change in state and local government funding per student ($2,620), the predicted value of net tuition and fee revenues per student range from $2,661 when state and local government funding is $8174 per student, to $3,073 when state and local government funding is $2,934 per student. Spending on all categories increases or decreases with state and local government funding, as the direct effects are much greater than the indirect effects operating through net tuition and fee revenues.

Finally, the ability of state legislators to oversee public university boards depends on legislative staff resources as well as university governmental structures. Holding other variables equal to their sample means, net tuition and fees are estimated to be $2613 per student in a state where staff resources are one standard deviation above the mean, compared to $3020 per student in a state where staff resources are one standard deviation below the mean, with virtually all of the difference being reflected in spending on instruction and academic support.

4. Discussion

My results show that prices and spending at quasi-autonomous organizations such as public universities vary with governmental structure and the method of selecting agents in ways that can be predicted using insights based on the study of federal agencies. Controlling for state and local government funding and state legislature staff resources, public universities in institutional settings that enhance control by elected state officials or voters tend to charge lower prices than public universities that have more autonomy, and the predicted difference between hypothetical systems having realistic institutional arrangements is substantial. The difference in revenue is reflected in spending on functions that most directly benefit university administrators and faculty, but that may also benefit students.

Moreover, when I control for states that have substantive policies expressing a preference for low tuition, I find that these policies do not have a significant effect. Institutional arrangements, trustee selection methods and staff resources are what matter.

In terms of concepts that may be applied to any hierarchy, I find that increasing the supervisor's oversight capacity, decreasing the number of decision makers to be supervised, and allowing the supervisor (or others who have substantially the same preferences as the supervisor) to choose more members of the decision making bodies are substitute instruments for increasing the amount of central control. Holding each of these variables constant, the degree of centralized control is not significantly affected by the number of decisions to be made by each board.

Of course, other hierarchies have elements that are not included in public university governance systems, and thus cannot be evaluated using these data. One question not addressed by this paper is whether the number of vertical levels in a hierarchy matters independent of the number of decision makers. Another question concerns the independent effects of governmental structure and procedural requirements for making decisions (see McCubbins 1985). In the case of public universities, statewide coordinating boards both provide increased oversight capacity and mandatory prior review of budgets, but I am unable to test for these effects separately using the data available. Finally, I do not evaluate the effects of "bottom up" monitoring by interest groups. Although a crude, state-level index suggests a possible connection between openness to public scrutiny and lower public university prices, the results are not statistically significant at conventional levels and including this variable does not alter my findings for my more specific measures of institutions.

This does not mean that interest groups are unimportant for the politics of public higher education. University administrators and faculty can be thought of as an interest group concerned with public university prices and spending. Other groups or institutions that may seek to influence public university governing boards on other kinds of decisions include private donors, and purchasers of various services (Cohen and Noll 1998). In addition, previous work has found that state government

funding depends on the age distribution of the state population and the size of the private higher education sector (Lowry n.d.; Goldin and Katz 1999; Hoenack and Pierro 1990).

With respect to current policy debates, it cannot be said from these results that there is one "best" model for public university governance, for two reasons. First, it is not clear that public universities subject to more or less political control are unambiguously better or worse. Rather, they offer different combinations of prices and spending. Since I do not analyze educational outcomes I cannot say what students in high-tuition states get for their money, but increased spending on activities such as instruction, student services and academic support may lead to benefits for many students. Second, different combinations of institutions can lead to very similar results. The results in Table 4 show that, assuming a state has 15 public university campuses, the results are similar regardless if the hypothetical state has "average" trustee selection methods and a single governing board or a coordinating board with regulatory powers and three governing boards, or adopts an "average" structure, with 100 percent of governing board trustees selected by external stakeholders. Similarly, my results imply that results for a university in a state with a completely decentralized structure are comparable to those for a university in a state with an average structure but only 50 percent of governing board trustees selected by external stakeholders.

Finally, my finding that multiple combinations of institutional variables lead to similar results has implications for theories of institutional design. Much of the literature on designing administrative institutions assumes that Congress or some other legislative body is starting from scratch. But if multiple paths lead to similar results, then it is not possible to predict the exact form a new agency will take from the desired outcome. In cases where new governance arrangements are being imposed on a preexisting set of organizations rather than being created from scratch, the choices are more constrained. For example, if elected officials decide they want to exert more political control over a state's public universities, they can superimpose a statewide coordinating board, reduce the number of governing boards for a given number of campuses, or alter the method of selecting trustees. If there

are already multiple research universities in the state, each with its own set of internal stakeholders, superimposing a coordinating board over the existing institutions may be the most politically feasible solution. Perhaps excepting those rare instances when new agencies or organizations have been created from scratch, the governance arrangements created by elected politicians should depend on both the objectives of the enacting coalition, and the political costs and benefits of enacting different schemes.

Appendix

Definitions of Spending Categories

Instruction: Includes expenditures for credit and noncredit activities, departmental research and public service that are not separately budgeted, and academic administration (e.g., academic deans).

Student Services: "Admissions, registrar activities, and activities whose primary purpose is to contribute to students' emotional and physical well-being and to their intellectual, cultural and social development outside the context of the formal instructional program."

Academic Support: "Support services that are an integral part of the institution's primary mission of instruction, research, or public service." Includes libraries and museums.

Institutional Support: "General administrative services, executive direction and planning, legal and fiscal operations, and public relations and development."

Operation and Maintenance of Plant: "Operations established to provide service and maintenance related to campus grounds and facilities used for educational and general purposes."

Source: Broyles (1995).

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Table 1

Summary Statistics

Variable	Cases with positive values	Mean	Std. Dev.
Ln(Net tuition and fee revenue)	407	16.90	0.96
Ln(Instruction)	407	17.37	0.97
Ln(Student services)	407	15.47	0.85
Ln(Academic support)	407	15.84	1.07
Ln(Institutional support)	407	15.97	0.87
Ln(Operation and maintenance of plant)	407	15.77	0.97
Ln(Undergraduate students)	407	8.82	0.70
Ln(Pct. nonresident undergraduates)	405	2.22	0.94
Ln(Graduate and professional students)	407	6.40	1.91
Land grant university	84	1	----
Medical School	46	1	----
Law school	66	1	----
Academic reputation, national university	126	0.48	0.27
Academic reputation, regional university	281	0.52	0.26
Ln(Cost of living index)	407	4.60	0.08
Ln(State & local government funding)	407	17.58	0.97
Ln(Federal government funding)	407	15.42	1.74
Ln(Private gifts, grants and contracts)	407	14.00	3.04
Ln(State per capita income)	407	9.94	0.13

Table 1 (cont.)

Variable	Cases with positive values	Mean	Std. Dev.
Ln(Pct state 18-year olds beginning college)	407	3.70	0.15
Ln(State legislature staff per member)	407	1.59	0.90
Statewide coordinating board	216	1	----
Ln(Number of governing boards in state)	407	1.19	0.96
Ln(Campuses governed)	407	1.54	1.12
Ln(Pct. external trustees)	407	4.51	0.18

Notes:

Means and standard deviations shown are for cases with positive values only.

Enrollment figures refer to full-time equivalent students, measured as the number of full-time students plus one-third the number of part-time students.

Data are for fiscal year 1995 (academic year 1994-95), except that data on state legislative staff are for 1996, and fiscal year 1994 data are used for percent nonresident undergraduates if fiscal year 1995 data are missing. See note 20 for data sources.

Table 2

Estimation Results

	Ln(Net Tuition and Fee Revenue)	Ln(Instruction Expenditures)
Intercept	3.328 (1.192)	.378 (.758)
Ln(Resident undergraduate enrollment)	.989 (.062)	.057 (.066)
Ln(Percent nonresident undergraduates)	.035 (.011)	----
Ln(Graduate and professional enrollment)	.053 (.016)	.014 (.009)
Land-grant university (0/1)	.017 (.046)	-.050 (.027)
University has a medical school (0/1)	.108 (.050)	.244 (.034)
University has a law school (0/1)	.100 (.045)	-.024 (.027)
Ln(State and local government funding)	-.141 (.065)	.479 (.043)
Academic reputation percentile, national university	.699 (.084)	----
Academic reputation percentile, regional university	.371 (.060)	----
Regional university (0/1)	-.351 (.055)	----
Ln(Cost of living index)	1.132 (.181)	----
Ln(Federal grants and contracts)	-----	.017 (.008)

Table 2 (cont.)

	Ln(Net Tuition and Fee Revenue)	Ln(Instruction Expenditures)
Ln(Private gifts, grants and contracts)	-----	.004 (.002)
Ln(Net tuition and fees)*	-----	.432 (.075)
Ln(Per capita state income)	.749 (.157)	-----
Ln(Percent state 18-year olds beginning college)	.365 (.119)	-----
Ln(State legislature staff Per member)	-.081 (.034)	-.012 (.017)
Statewide coordinating board (0/1)	-.155 (.040)	-.008 (.029)
Ln(Number of governing boards)	.201 (.039)	-.009 (.022)
Ln(Number of campuses governed by board)	.035 (.029)	.020 (.015)
Ln(Percent external trustees)	-.451 (.093)	.077 (.063)
R-squared	.953	.981

Table 2 (cont.)

	Ln(Student Services)	Ln(Academic Support)	Ln(Inst'l Support	Ln(Plant Op'ns & Maint.)
Intercept	1.241 (1.948)	-.786 (1.323)	2.037 (1.426)	-1.779 (1.164)
Ln(Undergraduate enrollment)	-.115 (.162)	.051 (.137	-.158 (.119)	-.315 (.124)
Ln(Graduate and professional enrollment)	-.016 (.022)	.022 (.013)	.003 (.017)	-.012 (.016)
Land-grant university (0/1)	-.012 (.072)	.006 (.057)	-.102 (.049)	-.051 (.047)
University has a medical school (0/1)	-.078 (.078)	.138 (.066)	-.042 (.058)	.030 (.055)
University has a law school (0/1)	-.076 (.067)	.182 (.036	-.009 (.049)	-.077 (.041)
Ln(State and local government funding)	.359 (.085)	.413 (.064)	.501 (.071)	.709 (.069)
Ln(Federal grants and contracts)	-.001 (.028)	.089 (.027)	.062 (.020)	.040 (.020)
Ln(Private gifts, grants and contracts)	-.015 (.007)	.012 (.006)	-.007 (.007)	.004 (.005)
Ln(Net tuition and fees)*	.605 (.146)	.396 (.118)	.398 (.136)	.446 (.130)

Table 2 (cont.)

	Ln(Student Services)	Ln(Academic Support)	Ln(Inst'l Support	Ln(Plant Op'ns & Maint.)
Ln(State legislature staff per Member)	.071 (.047)	-.022 (.036	.096 (.031)	.012 (.030)
Statewide coordinating Board (0/1)	-.136 (.075)	-.153 (.080)	-.011 (.053)	.136 (.054)
Ln(Number of governing boards)	-.141 (.051)	-.044 (.054)	-.026 (.037)	-.063 (.049)
Ln(Number of campuses governed)	-.102 (.033)	-.050 (.026)	.008 (.026)	-.023 (.029)
Ln(Percent external trustees)	-.144 (.209)	.166 (.157)	-.263 (.161)	-.046 (.129)
R-squared	.816	.929	.898	.939

Data are omitted for universities located in Massachusetts, Nebraska, and West Virginia, or the District of Columbia. See text section 3.2.

Coefficients are estimated using three-stage least squares. * indicates endogenous variable

Figures in parentheses are Huber/White robust standard errors computed assuming that observations are clustered by governing board.

Number of cases = 407; Number of clusters = 169.

Table 3

Full Effects of Governmental Structure and Trustee Selection on Prices and Spending

Dependent Variable	Coordi-nating Board	Ln(Gov-erning Boards)	Ln(cam-puses Governed)	Ln(Percent External Trustees)
Ln(Net tuition and fees)	-.155 (.040)	.201 (.039)	.035 (.029)	-.451 (.093)
Ln(Instruction)	-.075 (.031)	.078 (.026)	.035 (.020)	-.119 (.060)
Ln(Student services)	-.231 (.083)	-.018 (.059)	-.081 (.039)	-.415 (.177)
Ln(Academic support)	-.216 (.078)	.037 (.053)	-.037 (.029)	-.011 (.150)
Ln(Institutional support)	-.074 (.058)	.054 (.042)	.023 (.029)	-.441 (.138)
Ln(Plant Operations & maintenance)	.068 (.053)	.026 (.044)	-.008 (.031)	-.248 (.114)

Figures in parentheses are standard errors calculated using simulations. See note 23 for details.

Table 4

Predicted Results for Different Governance Scenarios,

	State Governance Structure			Pct. External Trustees	
	I	II	III	100	50
Total enrollment	7746	7746	7746	7746	7746
State and local government revenues	5554	5554	5554	5554	5554
Net tuition and fees	2497	2569	3923	2689	3678
Instruction	4456	4335	5011	4461	4845
Student services	708	602	840	647	863
Academic support	1009	881	1230	980	987
Institutional support	1119	1077	1220	1072	1455
Plant Operations & Maintenance	848	941	929	893	1061

Enrollment is total number of full-time equivalent (FTE) students, as defined in note 13. Revenue and spending figures are dollars per FTE student.

Scenarios for governmental structures are as follows:

I   No coordinating board; 1 governing board; 15 campuses/board

II   Coordinating board; 3 governing boards; 5 campuses/board

III   No coordinating board; 15 governing boards; 1 campus/board

Effects of different scenarios are estimated by altering the values of the coordinating board dummy variable and the natural logs of the number of governing boards, campuses per board, and percent external trustees. All other independent variables are held equal to their mean values.