Do Faculty Matter? Effects of Faculty Participation in University Decisions

Kathleen A. Carroll*, Lisa M. Dickson* and Jane E. Ruseski**

Abstract

This paper models faculty participation in university decision-making and the effects on enrollment, academic quality and non-academic quality. The model predicts that faculty participation positively affects student enrollment and investments in academic quality. Without faculty involvement in decision-making, universities may choose to overinvest in non-academic quality (e.g. athletics, recreational activities) relative to academic quality. If academic quality provides positive externalities as the economic literature indicates, then faculty involvement in decision-making is socially preferred to having decisions made only by university administrators.

Keywords: higher education, faculty governance, university decision making, incentives, nonprofit organization, public organization, organizational behavior

JEL classification: *D23,D73, I23,L31, L38*

---

*Department of Economics, University of Maryland, Baltimore County (UMBC), 1000 Hilltop Circle, Baltimore, MD 21250, email: carroll@umbc.edu, ldickson@umbc.edu, respectively.
**Bureau of Business and Economic Research, College of Business and Economics, West Virginia University, P.O. Box 6527, Morgantown, WV 26505, email: jeruseski@mail.wvu.edu.
The authors thank participants at the 87th Annual WEAI Conference, July 2012, the Public Choice Society Meeting, March 2010, and the AAUP Conference on Shared Governance, November 2010, for most helpful comments.

1. INTRODUCTION

Public and private nonprofit universities have experienced budget problems from both increases in costs as well as reductions in revenues from state appropriations, endowment values and donations (Baum and Payeak, 2011; Deming *et al*, 2011; Washburn, 2005; Zumeta, 1996). Universities also face rising pressure from legislators, parents, and students to reduce costs. These situations make it increasingly important to understand how universities allocate scarce resources. Most models of university decision-making focus on the effects of external stakeholders such as the board of regents on university outcomes.[1] Lowry (2004) notes a lack of research on the effects of internal stakeholders (such as faculty) on university decision-making.[2] Our study fills this void and examines how faculty involvement in university decision-making affects enrollment, academic quality and non-academic quality.

Models of university decision-making typically assume that the university maximizes a single institutional objective, such as the reputation of the university. That the university includes several different participants with individual objective functions, however, generally is not considered. Garvin (1980) develops a formal model that incorporates multiple participants but with a single objective. His model is based on consensus goals of both the administration and the faculty as the decision makers. In his model the administration and the faculty are representative and homogeneous with respect to the individuals who make up their respective groups, and are utility maximizers. The representative administration and faculty reach a consensus that the important mission, or objective, of the university is institutional prestige. Prestige reflects the quality of students and faculty, and promotes the interests and

---

[1] There is a literature on shared governance with respect to external boards, such as through board composition and representation, but this literature does not consider internal decision making in the university (see, for example, Toma (1986, 1990), Zumeta (1996), Hermalin (2004), Heller (2004) and Hamilton (2004)).

[2] The university resource allocation decisions involve multiple stakeholders and participants directly or indirectly (see, for example, Morphew (1999), Davenport *et al* (2000), Birnbaum (2004), Pfeffer and Salancik, (2003), Lowry, (2004), Hamilton, (2004), and Hermalin, (2004)). Stakeholders include the administration, faculty, students and staff. However, studies tend to agree that the most important stakeholders are the administration and the faculty for resource allocation decisions.

therefore the utility of both the administration and the faculty. His model shows a quantity-quality tradeoff. Garvin also acknowledges that while a possible outcome could be profit maximizing, institutional characteristics lead to the possibility of income or revenue maximization as an institutional objective.

Tuckman and Chang (1990) and James (1990) counter Garvin's approach in one important respect. They note that while faculty and administrators have the major decision input roles they may have conflicting rather than consensus goals.[3] This is consistent with Kaplan (2004b) who empirically examines the effects of shared governance, where faculty can influence university decisions. This analysis, as in his study of survey data (2004a), highlights faculty concern with workloads and pay, which may be in conflict with the goals of the administration. His research also indicates that faculty members are strongly concerned with academic quality. The administration, while valuing academic quality, focuses more on revenue considerations, particularly in times of fiscal constraint.

We extend this research in two ways. First, like Garvin, our study focuses on faculty and administrators as the decision makers. We differ from Garvin in that we explicitly consider the differing goals of each participant group. Building on Tuckman and Chang (1990) and James (1990), we develop objective functions for administrators and faculty. Second, we analyze decision outcomes in a university with and without faculty involvement. Our model evaluates these outcomes with and without breakeven and quality constraints for their social efficiency and policy implications.[4]

Specifically, the model predicts the effects on enrollment, investment in academic or nonacademic quality, and sponsored funding. We also consider the fact that tight financial constraints tend to limit faculty involvement in governance (e,g, Morphew, 1999). We find that decisions made by the administration alone can result in overinvestment of nonacademic quality and increase undergraduate

---

[3] For some discussion of differences in objectives in public and private nonprofit univerisites see Tuckman and Chang, 1990; Collis, 2004; Dudestadt, 2004; Birnbaum, 2004; Ehrenberg et al, 2004; Kaplan, 2004a; and Lohmann, 2004b. The literature on for-profit universities generally does not explicitly consider faculty goals.

[4] A breakeven constraint is noted in James (1990).

enrollments and price. Our model predicts that faculty participation leads to lower levels of nonacademic quality and higher levels of graduate enrollment, academic quality and sponsored funding.

We develop the model in section 2 and examine its theoretical predictions in section 3. Policy implications are developed in section 4. Section 5 presents some concluding remarks.

2. A MODEL OF DECISION MAKING IN INSTITUTIONS OF HIGHER EDUCATION

A. Variables and functions

The decision makers in our model are university administrators (AD) and faculty (F). Each of these participant groups has its own objective function that reflects the roles of students, institutional quality, and sponsored funds.[5] In our model university enrollment (E) may consist of two possible student types: undergraduates (E_{UG}) and graduates (E_G). Total enrollment is equal to the sum of these two types $E = E_{UG} + E_G$. Enrollment is assumed to depend on price (P) and institutional quality (Q), so that $E = E(P, Q)$. The price for each student is tuition + fees + other costs – financial aid, where other costs may include residential and/or transportation costs, books and supplies, etc. Tuition, other costs, and financial aid may be determined outside of the university itself. For example, the university board or state legislatures may directly set or explicitly affect the level of tuition. The amount of federal financial aid offered to students may be set both internally (from university budgets) and externally (from government and private scholarships, grants, and loans). Within any exogenously determined constraints set by coordinating boards or state legislators, universities have only limited ability to affect price. We consider the price for undergraduate (P_{UG}) and graduate students (P_G) to be exogenous.[6]

---

[5] We recognize that within each participant group there may be different preferences and objectives. As with previous models we employ a representative objective function for each decision participant group. Our purpose here is to see what, if any, effect results from explicitly considering a set of administration and faculty preferences in the decisions as distinct from those of the institution as a whole.

[6] Lowry (2001) has price endogenous but enrollment exogenous; Hoenack and Pierro (1990) and Clotfelter (1976) have price exogenous but enrollment endogenous.

Quality (Q) in our model is composed of two components: academic (Q_A) and nonacademic quality (Q_N); $Q = (Q_A, Q_N)$.[7] Academic quality refers to the scope and rigor of program offerings as well as faculty qualifications. Nonacademic quality refers to such things as the strength of athletic teams, the availability of amenities for student life, and residential facilities. Undergraduates seek a broad college experience while graduate students are more career and academically oriented. We assume that undergraduate enrollment responds to its price and both academic and nonacademic quality: $E_{UG} = E_{UG}(P_{UG}, Q)$. Graduate student enrollment responds to its price and the level of academic quality: $E_G = E_G(P_G, Q_A)$.

Sponsored funds (S) are revenues that may come from the government, private companies and/or private individuals. Universities pursue these funds for academic research and programs, nonacademic programs, and capital projects. The ability to obtain sponsored funding for the institution is thus affected by both the academic and nonacademic quality of the institution: $S = S(Q)$.

In our model, university revenue for all institutional forms is obtained through enrollment of all student types and through sponsored funds. Thus, revenue is also an indirect function of quality. The revenue function is given as

$$R = R\left[P_{UG} \cdot E_{UG}\left(P_{UG}, Q\right), P_G \cdot E_G\left(P_G, Q_A\right), S(Q)\right] \tag{1}$$

where P_{UG} and P_G are given.

Cost is a direct function of enrollment, quality, and sponsored funding. This reflects costs of faculty, staff, and other inputs. Cost also is indirectly related to quality because quality affects both enrollment and sponsored funds. The total cost function is stated as

$$C = C\left[E_{UG}\left(P_{UG}, Q\right), E_G\left(P_G, Q_A\right), S(Q), Q\right]. \tag{2}$$

---

[7] We assume here that Q_A and Q_N are independent. Although we recognize that there may be some complementarity between these, we note that the organization of the university itself reflects the separate nature of these two forms of quality. Generally, issues that relate to academic quality fall within the purview of the chief academic officer, typically the Provost, while issues relating to operational facilities, etc., are overseen by other administration officials.

Our model assumes homogeneous educational services per enrollment type and a minimum required quality of educational service $(\overline{Q})$, such as that required for accreditation. We assume diminishing marginal revenue and diminishing marginal utility (U) with constant or increasing cost. Thus, for any function $R[\cdot]$, $F[\cdot]$, $C[\cdot]$, $R_\delta^{'} > 0$, $F_\delta^{'} > 0$, $C_\delta^{'} > 0$ and $R_\delta^{''} \leq 0$, $F_\delta^{''} \leq 0$, and $C_\delta^{''} \geq 0$, where prime notation denotes first derivatives, double prime notation denotes second derivatives and the subscript $\delta = E, Q, S$. We assume an imperfectly competitive market for the services of higher education, so that an individual institution has some market power and faces a downward sloping demand curve.

B. University internal decision model

University administrators (the president and provosts) are the decision makers. In models of public and nonprofit universities, administrators may be characterized by different objective functions. For example, Garvin (1980) assume that they maximize utility, which derives from increased income, reputation, and social standing. These sources of satisfaction depend on the size and/or prestige of the institution, which turn on its success in achieving its education and research mission and its public profile. Zemsky, Wegner and Massy (2005) assert that (traditional) universities seek "to maximize mission attainment," which they define as the production of high quality education, research and public service (p. 59). Coates and Humphreys (2002) and Coates, Humphreys and Vachris (2004) empirically demonstrated the preferences of university administrators for prestige and revenue by examining the relationship between their tenure in office and changes in academic programs. Revenue maximization is a way for the public or nonprofit organization to achieve goals for output, quality, prestige, and reputation. It has the additional advantage of measurability (see, for example, Niskanen, 1971). Accordingly, we model the administration's objective as revenue maximization, with the objective function as in (1), above.

In a university with shared governance, the faculty senate acts as an advisory group to the administration. The faculty senate represents the full diverse faculty as a whole and provides at some

universities influence on academic aspects of the university, including course and program offerings. Through a faculty senate, faculty preferences may affect the choices made by the administration. Taking the faculty senate's role as a representative body, we develop a representative faculty utility function. In traditional research universities faculty are assumed to obtain utility from income and academic reputation and prestige, primarily through publishable research (see Hamermesh and Pfann (2012) for evidence on this). These are assumed to be positively related to graduate students who provide teaching and research assistance, academic quality that promotes this enrollment, and sponsored funding and other sources of research support (Gurmu *et al*, 2012).[8] The faculty utility function, *F*, is given as

$$F = F\left[E_G\left(P_G, Q_A\right), Q_A, S(Q)\right]. \tag{3}$$

All universities face an institutional breakeven constraint and minimum quality constraints.[9] Universities, even if nonprofit, cannot in the long run operate at a loss. In the short run operating at a loss may be possible, that is, the breakeven constraint could be nonbinding. Similarly, universities may operate with programs that in the short run do not meet accreditation requirements, so that the quality constraints could be nonbinding. Assuming that class sizes can be increased and facilities uses altered over time, no long run capacity constraint is imposed. The two constraints (breakeven and minimum quality) are stated as:

$$R[\cdot] \geq C[\cdot] \text{ or } R[\cdot] - C[\cdot] - k_1 \geq 0,$$

$$Q_A \geq \overline{Q_A} \text{ or } Q_A - \overline{Q}_A - k_2 = 0,$$

[8] We recognize that some institutions of higher education focus exclusively on undergraduate education and that faculty at these institutions also engage in research that contributes to their income, academic reputation, and prestige. The variable of graduate enrollment in these cases thus becomes irrelevant. However, academic quality and sponsored funding are relevant to the quality of the undergraduate students they teach. This contributes to the prestige of the faculty at these institutions as well as to their academic reputation and possibly, their income. Thus our faculty utility function allows for this.

[9] Externally imposed breakeven or quality constraints may originate as a result of market or macroeconomic conditions or political conditions, such as by state legislatures. Private contributors, academic accreditation requirements, or other sources, such as NCAA requirements, may be external sources of constraints.

$Q_N \geq \overline{Q_N}$ or $Q_N - \overline{Q}_N - k_3 = 0$, and

$k_i \geq 0$,

where i = 1, 2, and 3. (4)

The education literature indicates that faculty participation in university decision-making varies across universities and over time. The variation in faculty involvement across universities may be due to varying levels of support from the administration, the fiscal environment, as well as technological change (see, for example, Morphew, 1999; Miller, 2001; CHEPA, 2003; Kaplan, 2004a; Lohmann, 2004a, and Birnbaum, 2004). Our model captures this variability through the parameter, α, applied to the objective functions of the administration and faculty, where $\alpha = 1$ reflects administration control and $\alpha = 0$ reflects faculty decisions.[10] The optimization problem that allows for faculty participation is stated as:

$$\max [\, \alpha U_{AD} + (1-\alpha)F \,] = \max\{ \alpha R[P_{UG} \cdot E_{UG}(P_{UG}, Q), P_G \cdot E_G(P_G, Q_A), S(Q)] + (1-\alpha)F[E_G(P_G, Q_A), S(Q), Q_A]\}, \quad (5)$$

where $0 \leq \alpha \leq 1$.

The corresponding Lagrangian to be maximized is (5) subject to constraints (4):

$$\begin{aligned}\max \psi(E_{UG}, E_G, Q_A, Q_N, S) = \max \{ & \alpha R[P_{UG} \cdot E_{UG}(P_{UG}, Q), P_G \cdot E_G(P_G, Q_A), S(Q)] \\ & + (1-\alpha)F[E_G(P_G, Q_A), Q_A, S(Q)] \\ & + \lambda_1[R(P_{UG} \cdot E_{UG}(P_{UG}, Q), P_G \cdot E_G(P_G, Q_A), S(Q)) \\ & - C(E_{UG}(P_{UG}, Q), E_G(P_G, Q_A), S(Q_j), Q) - k_1] \\ & + \lambda_2(Q_A - \overline{Q_A} - k_2) + \lambda_3(Q_N - \overline{Q_N} - k_3) \}\end{aligned} \quad (6)$$

[10] $\alpha = 1$ is consistent with Hammond (2004, p. 106), which does not allow for faculty participation through shared governance, but instead has the role of faculty as "employees" or "subordinates," that is, agents who carry out the policies of the administration.

where λ_1, λ_2 and λ_3 are Lagrange multipliers. The first order conditions of the model are:

$$\frac{\partial \psi}{\partial E_{UG}} = \alpha R'_{E_{UG}} + \lambda_1 (R'_{E_{UG}} - C'_{E_{UG}}) = 0 \tag{6a}$$

$$\frac{\partial \psi}{\partial E_G} = \alpha R'_{E_G} + (1-\alpha) F'_{E_G} + \lambda_1 (R'_{E_G} - C'_{E_G}) = 0 \tag{6b}$$

$$\begin{aligned}\frac{\partial \psi}{\partial Q_A} = {} & \alpha (R'_{E_{UG}} E'_{UG Q_A} + R'_{E_G} E'_{G Q_A} + R'_S S'_{Q_A}) + (1-\alpha)(F'_{E_G} E'_{G Q_A} + F'_{Q_A} + F'_S S'_{Q_A}) \\ & + \lambda_1 \left(R'_{E_{UG}} E'_{UG Q_A} + R'_{E_G} E'_{G Q_A} + R'_S S'_{Q_A} - C'_{E_{UG}} E'_{UG Q_A} - C'_{E_G} E'_{G Q_A} - C'_S S'_{Q_A} - C'_{Q_A} \right) \\ & + \lambda_2 = 0 \end{aligned} \tag{6c}$$

$$\begin{aligned}\frac{\partial \psi}{\partial Q_N} = {} & \alpha (R'_{E_{UG}} E'_{UG Q_N} + R'_S S'_{Q_N}) + (1-\alpha) F'_S S'_{Q_N} \\ & + \lambda_1 \left(R'_{E_{UG}} E'_{UG Q_N} + R'_S S'_{Q_N} - C'_{E_{UG}} E'_{UG Q_N} - C'_S S'_{Q_N} - C'_{Q_N} \right) + \lambda_3 = 0 \end{aligned} \tag{6d}$$

$$\frac{\partial \psi}{\partial S} = \alpha R'_S + (1-\alpha) F'_S + \lambda_1 \left(R'_S - C'_S \right) = 0 \tag{6e}$$

The first order conditions yield behavioral predictions for different levels of the constraints. We derive predictions in each case for two scenarios: binding fiscal and quality constraints and non-binding fiscal and quality constraints. Predictions of the model for enrollment, the quality variables, and sponsored funding are summarized in Table 1. Proofs of derivations may be obtained from the authors upon request.

3. PREDICTIONS OF THE MODEL

In a number of cases our model predicts profit-maximizing levels of enrollment (*E*), quality (*Q*), and sponsored funding (*S*). In other cases, however, the model predicts levels above profit maximizing,

which maximize administration revenue or faculty utility. While we examine only private nonprofit and public universities, the predictions of profit maximizing levels raises the issue of efficiency of organizational form. Enrollment, quality, and sponsored funding are important to society as well as to the university. We evaluate whether the profit maximizing levels maximize social benefits and the policy implications for when they might differ below in section 4.

A. Enrollment (E_{UG}, E_G)

Our model predicts that faculty participation affects enrollments (both E_{UG} and E_G). When the administration is in full control and faculty are given little or no role (α = 1), both E_{UG} and E_G will maximize university revenue when the breakeven constraint is nonbinding. Both enrollment types will maximize profit when the breakeven constraint is binding (that is, for any $\lambda_1 \neq 0$). When faculty fully participate and faculty preferences overwhelm revenue considerations (α = 0), then different levels of both E_{UG} and E_G result. Under a binding breakeven constraint with a nonnegative value of λ_1, faculty participation yields the profit-maximizing level of E_{UG}. This may be due to faculty anticipating that profit could be used to promote faculty interests. However, when the university must break even (λ_1 = 1), E_G will be above the level that would maximize institutional profit, but will approach the profit maximizing level as we approach the breakeven constraint. This may be due to available reserves becoming depleted.

The effect of faculty on graduate enrollment (E_G) depends on the strength of the breakeven constraint. When the breakeven constraint becomes increasingly binding, E_G approaches the profit maximizing level. Faculty may prefer this lower level of E_G if it means that they could have more time to conduct research or to pursue sponsored funding for research. When this constraint is binding (λ_1 = 1), any marginal increase in profit will increase total faculty utility. As with the result for profit-maximizing undergraduate enrollment, this suggests that faculty expect to benefit from any profit generated in these circumstances.

B. Quality (Q_A, Q_N)

Faculty participation affects both academic and nonacademic quality. When the administration is in full control and faculty are given little or no role ($\alpha = 1$), both Q_A and Q_N maximize institutional revenue only if the relevant quality constraint is nonbinding (that is, $\lambda_2 = 0$ and $\lambda_3 = 0$). Academic quality always maximizes institutional revenue independent of the breakeven constraint. Nonacademic quality only maximizes revenue if the breakeven constraint also is nonbinding. For Q_N, if the breakeven constraint is binding but the quality constraint is not, then nonacademic quality will be the profit maximizing level. When both the breakeven and quality constraints are binding, then both Q_A and Q_N will be between the profit maximizing and revenue maximizing levels.

The effect of faculty on both types of quality is similar when faculty participation takes on a significant role ($\alpha = 0$) under conditions of a binding breakeven constraint. When the breakeven constraint is tightly binding, utility maximizing levels of quality for will be profit maximizing only if the relevant quality constraint is nonbinding. When both the breakeven constraint and the quality constraints are nonbinding, faculty involvement leads to a level that is between the profit- maximizing level and the revenue maximizing level. Faculty may prefer less than revenue maximizing Q_A if they prefer to limit some aspect of Q_A, such as emphasis on undergraduate programs at the expense of graduate programs. This holds for both types of quality; however there is some difference in the magnitude of these effects for academic and nonacademic quality. Other things equal, faculty preferences would move Q_A closer to the revenue maximizing level and Q_N closer to the profit maximizing level.

With administration decision control and little or no faculty participation ($\alpha = 1$), our model predicts underinvestment in both Q_A and Q_N under deficit conditions along with a nonbinding quality constraint. In this case, the deficit condition may drive Q_A or Q_N from a revenue-maximizing level to the profit maximizing level which is the minimum acceptable standard. Alternatively under these same constraint scenarios, when faculty are making the decisions ($\alpha = 0$), investment in either Q_A or Q_N maximizes university revenue rather than profit. In deficit situations, to satisfy their own preferences faculty choose an outcome that is consistent with the preferences of the administration.

Faculty and the administration value nonacademic quality (Q_N) differently. Faculty value Q_N less than Q_A. They regard Q_N primarily as a means to increase sponsored funding for their research. For administrators, however, Q_N is as important as Q_A. For this reason, administrators may tend to overinvest in Q_N relative to Q_A. Recent criticism suggests that universities are spending large amounts of money on dormitories, athletic centers, technology, and other facilities or amenities (e.g., Hacker and Dreifus, 2010; Selingo, 2013). These expenditures increase college tuition and may attract students and revenue. However, they may not increase academic quality. It is possible that the administration may focus on Q_N as a way to appeal to alumni or corporate sponsors as Washburn (2005) and Auletta (2012) suggest. Our results also show that faculty participation in university decision making may reduce inefficient overinvestment in nonacademic quality (Q_N) by the administration. We examine the policy implications of these results below in Section 4.

The foregoing results reflect total levels of academic and nonacademic quality. However, the model incorporates direct and indirect components of these quality variables and their related costs. Some investments in quality directly affect the reputation and prestige of the university through the level of research activities, program offerings, and facilities. These reflect the interests of both administration and faculty. Examples of direct costs of quality include investments in faculty and research facilities, and infrastructure such as technology, roofing, increased energy efficiency measures. These are investments that affect the educational experience and amount of research, and improve the campus life and environment. However, these may go unnoticed by either potential students or donors, and therefore would not directly increase either enrollment or sponsored funding.

Some investments in quality have indirect effects because they increase enrollment or sponsored funding. Examples of these investments include plush furnishings in dormitories or libraries and highly equipped athletic and recreational facilities. These types of investments in visible aspects of quality draw the attention of both prospective students and potential donors. These investments result in indirect costs of quality.

Considering these two components separately generates some interesting implications. The model imposes a constraint on *total levels* of academic and nonacademic quality; these are defined as the minimum standards required for accreditation. This implies that when a university just meets that constraint for total Q_A or Q_N the separate components individually would be below that level or standard. Under the conditions where budgets must be balanced and the cost of quality has both direct and indirect components, then our model suggests that those direct forms of quality that do not increase enrollment or sponsored funding may be traded off for investment in indirect forms of Q_A and Q_N that do. This outcome is likely a response to tight fiscal constraints: taking measures, such as greater investment in quality that generate enrollment and sponsored funding to maximize institutional revenue. This requires that increasing quality for purposes *other than* increasing enrollment and sponsored funding is reduced. For academic quality, for example, there may be tradeoffs across programs or specific courses. Alternatively, this could serve as a basis for a larger number of online rather than in-person face-to-face course offerings or greater use of adjunct rather than full-time faculty. Investments in nonacademic quality would likely face tradeoffs as well, particularly in favor of those promoting enrollment (which serves as a source of revenue) rather than those that do not (which may be just as costly, if not more, such as individual faculty offices). This could also occur for components of quality that would promote sponsored funding.

D. Sponsored funding (S)

In our model sponsored funding is an important source of revenue for public and nonprofit universities. The implications for sponsored funding parallel those of graduate enrollment. Sponsored funding is at the profit maximizing level with a binding breakeven constraint either with full administration control ($\alpha = 1$), or alternatively, with faculty decision making ($\alpha = 0$) and where faculty are able to maximize their utility ($F_S' = 0$). Sponsored funding is above this at the revenue maximizing level under two scenarios. One is with no faculty involvement ($\alpha = 1$) and a nonbinding breakeven constraint ($\lambda_1 = 0$). In the other scenario, faculty make the decisions ($\alpha = 0$), the breakeven constraint is binding ($\lambda_1 = 1$) and faculty are unable to maximize their utility ($F_S' > 0$). Thus, high levels of

investment in sponsored funding (S) may be a response by the administration, and possibly by faculty due to pressure from the administration, to solve a deficit problem.

E. Overall effects

Our findings suggest that when there are budget difficulties, one response of the administration may be to increase its investment in sponsored funding (S) to solve a deficit problem. In addition, there may be pressure on faculty from the administration to seek outside funds as well. A causal relationship between deficit situations and enrollment and quality is less clear. Similar to sponsored funding, increased enrollment, particularly graduate enrollment, and increased investment in quality may be a strategy to increase revenues as a way to close a deficit. This could be the case if university revenues are in some way tied to enrollment levels, for example, or if the increased quality is a means to increase sponsored funding as a revenue source. Our findings explain situations where university administrators put increasing pressure on faculty to seek external funding and to increase graduate enrollment with its associated higher revenues. Alternatively, it is possible that higher investment in both enrollment and quality may be a source of the deficit situation rather than a strategy to reduce it. We address some of the policy implications related to this possibility below. In this case, though, faculty participation that reduces overinvestment in nonacademic quality may help to resolve budget problems.

Faculty influence on graduate enrollment and sponsored funding suggests that these may provide revenue sources that could offset revenue shortfalls, possibly through relatively higher graduate tuition and the use of sponsored funding to underwrite some increased graduate enrollment. Alternatively, solving a budget problem could be achieved through graduate enrollment that may reduce institutional cost by using graduate students as teaching assistants to reduce costs of undergraduate teaching.[11] Institutional quality also may be increased in part due to faculty effects on graduate enrollment and sponsored funding for research.

4. POLICY IMPLICATIONS

[11] While we recognize this point, explicit examination here of the effects on either cost or quality of different levels of educational inputs is beyond the scope of this paper.

Our model yields implications of faculty involvement in university decisions for both internal university policy and public policy. As noted in Section 3, even though the administration's objective is to maximize revenue, profit maximizing levels of enrollment, quality and sponsored funding may occur in a number of cases. Our results show that a binding breakeven constraint is necessary but not sufficient for these outcomes.

Profit maximizing levels of these variables may not maximize net social benefits from higher education. Benefits of education to individuals and to society beyond the university have been documented (Wolfe and Haveman, 2002). These include lower levels of crime, higher levels of health, and greater civic participation (Lochner, 2011). Higher education is also associated with increased economic growth (Hanushek and Kimko, 2000). De Silva and McComb (2012) show that proximity to research universities promotes start-ups of high-tech firms. Given these effects of education, the profit-maximizing levels may not be socially efficient as they may be too low given the non-market effects and externalities associated with education. We examine implications of faculty participation in university decisions for socially efficient outcomes and for organizational form below.

A. Choice variables

Enrollment

The predictions of our model are consistent with the implication that faculty involvement in decisions can increase net social benefits of higher education. In all but two cases enrollments (either E_{UG} or E_G) are at the profit maximizing levels. Given documented positive external benefits to society from higher education, profit maximizing enrollments may be too low except in the two cases that predict revenue-maximizing enrollments. Both E_{UG} and E_G rise above the profit maximizing levels with complete administration control; however, this requires operation under deficit conditions so it can be a short run outcome only. When faculty participate, however, E_G rises above the profit maximizing level and the university is not required to run at a deficit. This suggests that faculty participation may increase net social benefits by expanding graduate education without requiring deficit operation by the university. Where faculty involvement in decisions promotes social preferences and efficiency, it may be especially

important to have both university and public policies that encourage greater faculty participation and control in decisions.

Quality

Our results show that faculty participation increases social efficiency in resource allocation within the university if there are positive externalities associated with academic quality relative to nonacademic quality. The model predicts that under sole administration decision control there is overinvestment in nonacademic quality relative to academic quality, but that this is reversed with faculty participation. First, nonacademic quality is more socially desirable to those who value university services (i.e., students and sponsors). If so, investment in nonacademic quality should be promoted and incentives could be put in place to do so, such as matching grants, for example.

The other possibility is that the nonacademic quality fulfills the objectives of the administration but is less socially desirable. This would reflect a situation where resources are diverted from society's preferences to those of administrators to enhance revenue. This also would be consistent with Lindsay's (1976) theory that focusing on so-called visible attributes of providing a service is a strategy for increasing revenue and budgets. In this case, investment in these nonacademic quality should not be promoted. Tax or subsidy policies could be targeted to limit these applications. Often it is these investments in nonacademic quality that are blamed for increasing the cost of higher education and for diverting resources from academic quality. This coupled with concerns about the increasing levels of student debt have added urgency to the need to control the cost of higher education (Martin and Lehren, 2012; Selingo, 2013). Indeed, President Obama met with college presidents on this issue to highlight its importance and colleges are starting to respond (Lewin, 2011, Martin, 2012). If higher levels of academic quality are more socially preferred, then policies that would result in incentives for university administrators to shift resources from (visible) nonacademic quality to academic quality should be considered.

Our results on the effects of faculty involvement in university decisions with respect to quality are, therefore, twofold. We find that in periods of tight financial constraints and a binding quality

constraint administration decision making results in overinvestment in total academic quality relative to the profit maximizing level but underinvestment in those forms of Q_A that increase enrollment and sponsored funding. This suggests that costs of greater academic quality may outweigh revenue effects. The administration may seek alternative ways to increase enrollment and sponsored funds to increase revenue, particularly if tuition subsidies are enrollment based. In this case faculty participation works in two ways. It may increase or maintain overinvestment in total academic quality; it also may correct underinvestment by the administration in forms of Q_A. Thus, faculty involvement results in the reallocation of resources away from Q_N and toward Q_A. Where there are positive externalities associated with academic quality so that Q_A is considered to be more socially valuable than Q_N, then policies to promote faculty participation in university decisions would be socially optimal, even though they also promote private utility maximizing goals for faculty.

Alternatively, when there are some deficits permitted and a binding quality constraint faculty decision control can lead to increased investment in academic quality to maximize both faculty utility and university revenue. This suggests some consistency between faculty and administration goals. Policies could be developed to encourage faculty involvement in these situations, particularly with positive externalities in academic quality where the profit maximizing level is below the socially optimal level. Alternative policies to alter incentives would be warranted in two circumstances, however. One is when faculty preferences for academic quality are stronger than social preferences and therefore their decisions result in overinvestment. The other is when the administration drives overinvestment in academic quality and their push for revenues exceeds the socially efficient level of academic quality.

Sponsored funding

The model predicts little impact of faculty involvement on levels of sponsored funding. The revenue maximizing level occurs only under deficit conditions, and the profit maximizing level occurs with a binding breakeven constraint regardless of faculty participation, with one exception. With a binding breakeven constraint, if faculty have a significant decision role ($\alpha = 0$) and marginal utility with respect to sponsored funds is positive, then sponsored funding is above the profit maximizing level but

does not maximize revenue. This indicates that in tight fiscal conditions faculty participation may increase the level of sponsored funding, but to a level below what the administration would prefer. Since under these same conditions no faculty involvement limits sponsored funding to the profit maximizing level, then this outcome suggests that faculty may seek external funding as a way to promote their long-term research goals. To the extent that research activity generates external social benefits, this outcome suggests that rather than limiting faculty involvement during periods of fiscal restraint, faculty participation should be encouraged by the university administration.

B. Organizational form

Our model assumes that the goals are either maximizing revenue (administration) or utility (faculty) yet even under these assumptions with a breakeven constraint some of the predicted outcomes are consistent with profit maximization. Where a profit maximizing outcome is an appropriate metric, this questions the notion that nonprofit and public organizational forms are inherently inefficient, particularly in times of fiscal restraint.

Two points bear considering, however. One is that divergence from the for-profit form itself may be a source of efficiency. Birnbaum (2004) distinguishes between academic and market institutions, where "academic" refers to traditional private or public educational institutions, while "market" refers to institutions that are for-profit corporations. In the former, scholarship, inquiry, and learning are the focus, whereas in the latter, training and profitability are the focus. He states that speed in decision making, of greater concern in the latter, may be reduced by faculty participation so that any external environmental pressure can serve to limit shared governance. Our findings that in some cases revenue-maximizing decisions underinvest in academic quality and overinvest in nonacademic quality are consistent with his findings. In particular, for-profit institutions of higher education typically employ adjunct faculty. These faculty often have primary positions elsewhere and most certainly put a low, if any, weight on faculty participation in internal decisions on resource allocation. This suggests that investments in academic quality by for-profit institutions may be below the socially optimal level, particularly where positive externalities of education exist.

A second point concerns the possible convergence of nonprofit and public organizational forms and the for-profit form. Some research indicates that nonprofit and public institutions may be converging to more of a for-profit form. Zumeta (1996), Morphew (1999), Washburn (2005) and Auletta (2012) provide some support for this. They show that universities may be moving closer to the for-profit form in response to changes in technology and the fiscal environment. Some studies indicate that convergence may be due to external influences: increasing competition from for-profit institutions or changes in the technology of providing university services, or both (Levy, 1987; Powell and Friedkin, 1987; Munitz, 2000; Rosenau, P. V., 2003; Pusser and Turner, 2004; and Kaplan, 2004a). Carroll and Ruseski (2011) show that the reverse direction of convergence may occur, where for-profits may be becoming more like nonprofits, when internal influences in decision-making are considered. This speaks to the importance of considering the effects of faculty participation in decisions within the university.

Our findings call into question the efficiency rationale for policies that promote homogeneity across organizational form. Internal policies of nonprofit and public university administrations that promote a business or corporate model view students and parents as customers. The focus on increased mass production of educational services may ignore or devalue social benefits of divergence in institutional form. An important public policy issue concerns state and federal subsidies to for-profit institutions of higher education and whether these promote social preferences and efficiency, particularly in the face of rising student debt levels. Our results suggest a potential rationale for differential policies for public and nonprofit universities and for-profit institutions, that is, the traditional versus corporate models.

D. Additional policy issues

Existing research indicates that limits often are placed on faculty participation in university decisions. Lohmann (2004a) notes that administrators have taken on increasing weight in decisions, with faculty having correspondingly less participation. This could result from external forces, such as changes in technology or funding, as Morphew (1999) shows. The Center for Higher Education Policy Analysis (2003) study of survey data also indicates this. Alternatively limits on faculty participation in decisions

may be due to internal influences, such as preferences of the administration, as Miller (2001) and Kaplan (2004a) find. They show that faculty influence is limited to academic, rather than financial, aspects of the university.

Our results indicate that limits on faculty participation can be inefficient. This result is clearly consistent with research on team decision making that indicates better decision outcomes occur with broader participation (De Dreu and West, 2001 and Kocher *et al*., 2006). Our model shows that faculty participation in decisions can affect enrollments, both academic and nonacademic quality, and sponsored funding. These outcomes can have an impact on the costs of higher education and the ability to meet increasing demand. Faculty participation, by diminishing the potential of administrators to increase some forms of nonacademic quality, may either shift the emphasis to academic quality or contribute to reducing costs, both of which can increase net social benefits and are increasingly important public policy issues.

VI. CONCLUSIONS

Decisions on allocating resources in institutions of higher education have both short term and long term effects. An important outcome of our model is that predictions differ under conditions of faculty involvement and under administrative decision making alone. In particular, in tight fiscal periods when the administration and faculty are both constrained in the decision process, participation of faculty in university decisions may affect enrollment, especially graduate enrollment, sponsored funding, and levels of academic and nonacademic quality. These influence faculty research and therefore their income and prestige. Faculty involvement affects more than workload and pay. Their ability to alter enrollments, quality, and sponsored funding have not been demonstrated previously. Even when faculty and the administration may have consistent and shared goals, as has been typically assumed, faculty participation can increase the social efficiency of university resource allocation, particularly in the area of academic quality. The model we develop here provides an approach to examine these impacts of faculty on university decisions.

Table 1. Predictions of the model: faculty participation in university decisions*

Governance Decision Control:		Administration $\alpha = 1$	Faculty $\alpha = 0$
Constraints	Variables		
Breakeven constraint			
Binding breakeven ($\lambda_1 = 1$)			
	Undergrad enrollment	$E_{UG\pi}$	$E_{UG\pi}$
	Graduate enrollment	$E_{G\pi}$	$E_{GR} > E_G > E_{G\pi}$
	Sponsored funding	$S > S_\pi$	$S_R > S > S_\pi$
Quality constraint			
Binding ($\lambda_2 = 1$)	Academic quality	$Q_{AR} > Q_A > Q_{A\pi}$ [1]	$Q_{AR} > Q_{A\pi}$ [1]
Binding ($\lambda_3 = 1$)	Nonacademic quality	$Q_{NR} > Q_N > Q_{N\pi}$ [2]	$Q_{NR} > Q_N > Q_{N\pi}$ [2]
Nonbinding ($\lambda_2 = 0$)	Academic quality	$Q_{AR} > Q_A > Q_{A\pi}$ [1]	$Q_{AR} > Q_A > Q_{A\pi}$ [1]
Nonbinding ($\lambda_3 = 0$)	Nonacademic quality	$Q_{NR} > Q_N > Q_{N\pi}$ [2]	$Q_{NR} > Q_N > Q_{N\pi}$ [2]
Nonbinding breakeven ($\lambda_1 = 0$)			
	Undergrad enrollment	$E_{UGR} > E_{UG\pi}$	----
	Graduate enrollment	$E_{GR} > E_{G\pi}$	$E_{GR} > E_{GF} > E_{G\pi}$
	Sponsored funding	$S_R > S_\pi$	$S_R > S_F > S_\pi$
Quality constraint			
Binding ($\lambda_2 = 1$)	Academic quality	$Q_A = \overline{Q_A}$	$Q_A = \overline{Q_A}$
Binding ($\lambda_3 = 1$)	Nonacademic quality	$Q_A = \overline{Q_A}$	$Q_A = \overline{Q_A}$
Nonbinding ($\lambda_2 = 0$)	Academic quality	$Q_{AR} > Q_{A\pi}$ [3]	$Q_{AF} > Q_{A\pi}$ [3]
Nonbinding ($\lambda_3 = 0$)	Nonacademic quality	$Q_{NR} > Q_{N\pi}$ [4]	$Q_{NF} > Q_{N\pi}$ [4]

*Subscript notation: R: revenue maximizing; F: faculty utility maximizing; π: profit maximizing

[1] In the most likely cost scenario, indirect Q_A (to promote enrollment and sponsored funding) is below optimal.

[2] In the most likely cost scenario, indirect Q_N (to promote enrollment and sponsored funding) is below optimal.

[3] With administration control ($\alpha = 1$) there is too little indirect Q_A; faculty participation corrects this.

[4] With administration control ($\alpha = 1$) there is too much indirect Q_N; faculty participation corrects this.

REFERENCES

Auletta, K. (2004) "Get-Rich U.: Is Stanford Too Close to Silicon Valley?" *The New Yorker*, April 30: 38-47.

Birnbaum, R. (2004) "The End of Shared Governance: Looking Ahead or Looking Back," in *Restructuring Shared Governance in Higher Education*, W. G. Tierney and V. M. Lechuga, eds., New Directions for Higher Education, No. 127, Fall: 5-22.

Carroll, K. A. and Ruseski, J. E. (2011) "Modeling Internal Decision Making Process: An Explanation of Conflicting Empirical Results on Behavior of Nonprofit and For-Profit Hospitals," *Contemporary Economic Policy 29*, #4 (October), 5: 10-23.

Center for Higher Education Policy Analysis (2003) *Challenges for Governance: A National Report*. (Los Angeles: Rossier School of Education, University of Southern California).

Clotfelter C. T. (1976) "Public Spending for Higher Education: An Empirical Test of Two Hypotheses," *Public Finance*, 31 (2): 177-194.

Coates, D. and Humphreys, B. R. (2002). "The Supply of University Enrollments: University Administrators as Utility Maximizing Bureaucrats," *Public Choice*, 110, No. 3-4: 365-92.

Coates, D., Humphreys, B. R. and Vachris, M. A. (2004) "More Evidence that University Administrators Are Utility Maximizing Bureaucrats," *Economics of* Governance 5: 77-101.

Collis, D. (2004) "The Paradox of Scope: A Challenge to the Governance of Higher Education," in *Competing Conceptions of Academic Governance: Negotiating the Perfect Storm*, W. G. Tierney, ed. (Baltimore, MD: The Johns Hopkins University Press): 33-76.

De Dreu, C. K.W., and West, M. A., (2001) "Minority Dissent and Team Innovation: The Importance of Participation in Decision Making," *Journal of Applied Psychology, 86*(6): 1191-1201.

De Silva, D. G. and McComb, R. (2012) "Research Universities and Regional High-Tech Firm Start-up and Exit," *Economic Inquiry*, *50*(1): 112-130.

Dudestadt, J. J. (2004) "Governing the Twenty-first-Century University: A View from the Bridge," in *Competing Conceptions of Academic Governance: Negotiating the Perfect Storm*, W. G. Tierney, ed. (Baltimore, MD: The Johns Hopkins University Press): 137-57.

Ehrenberg, R. G., Klaff, D. B. , Kezsom, A. T. and Nagowski, M. P. (2004) "Collective Bargaining in American Higher Education," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 209-32.

Gaff, J. G. (2007) "What if the Faculty Really Do Assume Responsibility for the Educational Program?" *Liberal Education*. Fall: 6-13.

Garvin, D. (1980) *The Economics of University Behavior*. New York, NY: Academic Press.

Gurmu, S. Black, G. C., and Stephan, P. E. (2010) "The Knowledge Production Function for University Patents," *Economic Inquiry*, *48*(1): 192-213.

Hacker, A. and Dreifus, C. (2010) *Higher Education? How Colleges Are Wasting Our Money and Failing Our Kids - and What We Can Do About It.* New York, NY: Times Books Henry Holt and Company.

Haefele, E. (1970) "Coalitions, Minority Representation, and Vote-trading Probabilities," *Public Choice*, 8: 75-90.

Hamermesh, D. A. and Pfann, G. A. (2012) "Reputation and Earnings: The Roles of Quality and Quantity in Academe," *Economic Inquiry*, *50*(1): 1-16.

Hamilton, B. H., Nickerson, J. A., & Owan, H., (2003) "Team Incentives and Worker Heterogeneity: An Empirical Analysis of the Impact of Teams on Productivity and Participation," *Journal of Political Economy*, *111*(3): 465-97.

Hamilton, N. W. (2004) "Faculty Involvement in System-wide Governance," in *Competing Conceptions of Academic Governance: Negotiating the Perfect Storm*, W. G. Tierney, ed. (Baltimore, MD: The Johns Hopkins University Press): 77-103.

Hammond. T. H. (1986) "Agenda Control, Organizational Structure, and Bureaucratic Politics, *American Journal of Political Science*, 30: 379-420.

Hammond, T. H. (2004) "Herding Cats in University Hierarchies: Formal Structure and Policy Choice in American Research Universities," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 91-138.

Hanushek, E. and Kimko, D. (2000) "Schooling, Labor-Force Quality, and the Growth of Nations," *American Economic Review*, 90, No. 5, 1184-1208.

Heller, D. E. (2004) "State Oversight of Academia," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press):49-67.

Hermalin, B. E. (2004) "Higher Education Boards of Trustees," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 28-48.

Hoenack, S. A. and Pierro, D. J. (1990) An Econometric Model of a Public University's Income and Enrollment," *Journal of Economic Behavior and Organizations*, 14 (3): 403-423.

James, E. (1990) "Decision Processes and Priorities in Higher Education," Ch. 4 in *The Economics of American Universities: Management, Operations, and Fiscal Environment*," S. E. Hoenack and E. L. Collins, eds. (Albany: State University of NY Press): 77-106.

Johnston, S. W. (2003) "Faculty Governance and Effective Academic Administrative Leadership," *New Directions for Higher Education*, No. 124, Winter: 57-63.

Kaplan, G. E. (2004a). "How Academic Ships Actually Navigate," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 165-208.

Kaplan, G. E. (2004b) "Do Governance Structures Matter?" in *Restructuring Shared Governance in Higher Education*, W. G. Tierney and V. M. Lechuga, eds., New Directions for Higher Education, No. 127, Fall: 23-34.

Keller, G. (2004) "A Growing Quaintness: Traditional Governance in the Markedly New Realm of U.S. Higher Education," in *Competing Conceptions of Academic Governance: Negotiating the Perfect Storm*, W. G. Tierney, ed. (Baltimore, MD: The Johns Hopkins University Press): 158-76.

Kocher, M., Straub, S. & Sutter, M., (2006) "Individual or Team Decision-Making—Causes and Consequences of Self-Selection. *Games and Economic Behavior*, *56*(2): 259-270.

Levy, D. C. (1987). "A Comparison of Private and Public Educational Organizations," in *The Nonprofit Sector: A Research Handbook*, W. W. Powell, ed. (New Haven, CT: Yale University Press): 258-76.

Lewin, T. (2011). "College Leaders Meet With Obama to Discuss Costs and Productivity," *The New York Times*, December 5: http://www.nytimes.com/2011/12/06/education/obama-meets-with-college-leaders-on-rising-costs.htmlLochner, L. (2011) "Non-Production Benefits of Education: Crime, Health and Good Citizenship" *National Bureau of Economic Research Working Paper No. 16722*, Cambridge, MA.

Lindsay, C. M. (1976) "A Theory of Government Enterprise," *Journal of Political Economy*, 84: 1061-77.

Lohmann, S. (2004a) "Can't the University Be More Like Business?" *Economics of Governance*, 5: 9-27.

Lohmann, S. (2004b) "Darwinian Medicine for the University," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 71-90.

Lowry, R. C. (2001) "The Effects of State Political Interests and Campus Outputs on Public University Revenues," *Economics of Education Review*, 20: 105-119.

Lowry, R. C. (2004) "Markets, Governance, and University Priorities: Evidence on Undergraduate Education and Research," *Economics of Governance*, 5: 29-51.

Martin, A. (2012) "Slowly, As Student Debt Rises, Colleges Confront Costs," *The New York Times*, May 14: http://www.nytimes.com/2012/05/15/business/colleges-begin-to-confront-higher-costs-and-students-debt.html?_r=2&hp

Martin, A. and Lehren, A. W. (2012) "Degrees of Debt: Soaring College Costs Hobble a Generation," *The New York Times*, May 13: http://www.nytimes.com/2012/05/13/business/student-loans-weighing-down-a-generation-with-heavy-debt.html

Miller, M. T. (2001) "The College President's perspective on Faculty Involvement in Governance," (U.S. Department of Education, Educational Resources Information Center (ERIC), Washington, DC.)

Morphew, C. C. (1999) "Challenges Facing Shared Governance Within the College," *New Directions for Higher Education*, No. 105, Spring: 71-9.

Munitz, B. (2000) "Changing Landscape: From Cottage Monopoly to Competitive Industry," *Educause Review*, Jan/Feb: 12-18.

Niskanen, W. A. (1971) *Bureaucracy and Representative Government.* (Chicago: Aldine-Atherton, Inc.)

Pfeffer, J., (1990) "Incentives in Organizations: The Importance of Social Relations," In *Organization theory from Chester Barnard to the present and beyond*, O. E. Williamson, ed. (New York: Oxford University Press): 72-97.

Pfeffer, J. and Salancik, G. (2003) *The External Control of Organizations: A Resource Dependence Perspective* (Stanford, CA: Stanford University Press).

Powell, W.W. and Friedkin, R. (1987) "Organizational Change in Nonprofit Organizations," in *The Nonprofit Sector: A Research Handbook*, W. W. Powell, ed. (New Haven, CT: Yale University Press): 180-92.

Pusser, B. and Turner, S. E. (2004) "Nonprofit and For-Profit Governance in Higher Education," in *Governing Academia*, R.G. Ehrenberg, edit. (Ithaca, NY: Cornell University Press): 235-257.

Rosenau, P. V. (2003) "Performance Evaluations of For-Profit and Nonprofit U.S. Hospitals Since 1980," *Nonprofit Management and Leadership* 13(4): 401-23.

Selingo, J. J. (2013) *College (Un)bound: The Future of Higher Education and What it Means for Students* (----: Amazon Publishing/New Harvest).

Toma, E. F. (1986) "State University Boards of Trustees: A Principal-Agent Perspective," *Public Choice*, 49: 155-63.

Toma, E. F. (1990) "Boards of Trustees, Agency Problems, and University Output," *Public Choice*, 67: 1-9.

Tuckman, H. P. and Chang C. F. (1990) "Participant Goals, Institutional Goals, and University Resource Allocation Decisions, Ch. 3 in *The Economics of American Universities: Management, Operations, and Fiscal Environment*, S. E. Hoenack and E. L. Collins, edits (Albany: State University of NY Press).

Washburn, J. (2005) *University, Inc: The Corporate Corruption of Higher Education* (New York: Basic Books).

Wilson, J.D (2004) "Tiebout Competition versus Political Competition on a University Campus," in *Governing Academia*, R.G. Ehrenberg, ed. (Ithaca, NY: Cornell University Press): 139-61.

Wolfe, B. L. and Haveman, R. H. (2002) "Social and nonmarket benefits from education in an advanced economy." In *Education in the 21st century: Meeting the challenges of a changing world,* Y. Kodryzcki (ed.), (Boston, MA: Federal Reserve Bank of Boston): 97-131.

Zemsky, R. Wegner, G. R. and Massy, W. F. (2005) *Remaking the American University: Market-Smart and Mission-Centered* (New Brunswick, NJ: Rutgers University Press).

Zumeta, W. (1996) "Meeting the Demand for Higher Education Without Breaking the Bank: A Framework for the Design of State Higher Education Policies for an Era of Increasing Demand," *Journal of Higher Education*, 67 (4): 367-425.