

Impacts of performance-based accountability on institutional performance in the U.S.

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Abstract In the 1990s, most US states adopted new forms of performance-based accountability, e.g., performance-based budgeting, funding, or reporting. This study analyzed changes in institutional performance following the adoption of these new accountability standards. We measured institutional performance by representative education and research indicators—graduation rates and levels of federal research funding. We collected data from 1997 to 2007 and used a hierarchical linear modeling growth curve analysis. The main finding was that states which adopted performance-based accountability did not see a noticeable increase in institutional performance. In addition, we highlighted a critical policy issue—whether state and institutional factors contribute most to institutional performance in higher education.

Keywords Policy impact · Performance · Accountability · Graduation rate · Research fund · Program effects

Introduction

The new accountability which emerged in the 1990s had a dual focus—enhancing institutional autonomy and performance. The emergence of the new accountability had both historical and theoretical bases. For instance, higher education scholars have long argued that higher education institutions will enhance institutional performance if they are autonomous (e.g., Carnegie Foundation for the Advancement of Teaching 1982; Clark 1983; Himanen et al. 2009; Volkwein 1987). Policymakers began to lessen regulations and empower campus leaders in the 1990s. On the other hand, state policymakers began to view higher education institutions as a tool of state policy because a majority of high school graduates began to enroll in college (Alexander 2000; Heller 2003). Thus, accountability became a major policy focus of the 1990s. These two contradictory trends—institutional autonomy and accountability—merged into the new accountability of the mid-1990s.

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As McLendon et al. (2006) argued, “the rhetoric of the new accountability movement in higher education has called for a refocusing on outcomes of campus activities rather than traditional focus on input or process (p. 1).” The new accountability was “performance-based” rather than based on resource inputs, administrative processes, or fiscal audits. This performance-based design linked budget allocations with institutional performance as a means of motivating universities. The reality, though, was that states simply required institutions to report their performance to the public (hereafter, “performance reporting”), to directly link institutional performance with budget allocation (hereafter, “performance funding”), or to indirectly link with performance (hereafter, “performance budgeting”) (Burke and Minassians 2003). States expected to enhance both institutional autonomy and accountability at the same time through this performance-based accountability. The new accountability became rapidly diffused among states in the mid-1990s, and most states had one or more forms of performance-based accountability by the early 2000s. The new accountability is currently widely adopted in higher education management worldwide, especially as a mechanism for allocating operational and or research funds to higher education institutions.

Did this rapid growth of performance-based accountability contribute to institutional performance? Some studies address this question. Martinez and Nilson (2006) looked at South Dakota’s performance funding and found that state accountability contributed to institutional performance to some extent. Volkwein and Tandberg (2008), however, determined that state accountability did not contribute to state grades in *Measuring Up* 2002, 2004, and 2006. Huisman and Currie (2004) conducted comparative case studies on the new accountability and found that performance-based accountability was not successful in enhancing institutional performance. The results of these studies may be disappointing to state policy makers.

This research led us to explore the broader issues underlying the effects of policy interventions on institutional performance. Can state policy affect institutional performance? If it does, to what extent does state policy make a difference? These questions are asked not simply in relation to the effect of performance-based reforms. More broadly, the question is about the effects of governmental policy on institutional performance. If state policy can only marginally affect institutional performance then governmental involvement in higher education might not produce the expected positive results, and might even produce negative results.

Relatively few studies have focused on the impact of policy reform as compared to policymaking or policy implementation. Growing global economic competition has caused state and federal governments to be deeply involved in redesigning governance and developing reform policies. These reform efforts were based on an assumption that reform policy will contribute to performance in education. Policy researchers emphasize that governmental policy efforts might accomplish their goals if the policy is well designed and implemented.

Various organizational theories attempt to explain the effects of policy reforms. For instance, resource dependence theory explains *why and how* governmental policy can change higher education institutions. A theoretical perspective such as neo-institutionalism explains *why and how* governmental policy often failed to attain its goals (Rowan 2006). These two contradictory theories have been used to rationalize higher education reforms or to explain failures of reform policies. For instance, Barnetson and Cutright (2000) proposed resource dependence theory as the theoretical basis of performance-based accountability while Huisman and Currie (2004), and Rowan (2006) used neo-institutional theory to explain the weak effects of performance-based reforms. Both theories

complement each other and explain multiple dimensions of reform policy. Considering how complicated the policy environment is, both contradictory approaches may have the potential to explain the reality of higher education reforms.

Policy theory has expanded our knowledge about the failure or success of education reforms. Among policy theories, the bottom-up approach has been used to support policymaking and implementations in a wide range of education arenas (e.g., Elmore 1980; McLendon 2003; Volkwein and Malik 1997). The bottom-up approach emphasizes the participation of site administrators or stakeholders because their participation enables reflection on site-specific conditions, and thus site-based policy will contribute to the success of policy. So far, however, the bottom-up approach has had limited utility in explaining performance-based reforms. In their event history analysis, for instance, McLendon et al. (2006) identified centrality of higher education governance affected the *adoption* of performance-based accountability. Volkwein and Tandberg (2008), however, reported that state governance characteristics did not make differences in the *growth* of state performance.

Based on this higher education reform policy research, the primary goals of this study were to analyze the extent that state policy brings *changes* in institutional performance, and to evaluate the impacts of the new accountability on institutional performance. To accomplish these goals, three specific research questions were generated. First, how much of the growth of institutional performance can be attributed to state policy? Second, did state accountability contribute to the growth of institutional performance? Third, did different policy approaches (i.e., top-down or bottom-up approach) lead to different results in the growth of institutional performance?

Literature

This literature review is in three sections. First, we briefly introduced how the accountability has been approached differently depending on the accountability focus. Second, we overviewed literature on the impacts of performance-based reforms on institutional performance. Third, we discussed the measures of institutional performance and their determinants as theoretical basis of this study.

Changing faces of public accountability

Accountability has been emphasized in the US higher education since the 1990s when states began to stress institutional performance and began to link institutional performance to budget allocations (Alexander 2000). Accountability, however, was not a new challenge in the 1990s. As Brooks (2005) noted, accountability in higher education can be traced to college reputation ranking studies conducted as early as 1920s. Recent accountability efforts date back to the student assessment movement in the 1980s (Neal 1995; Ruppert 1995). The new accountability emphasis on institutional performance emerged in the early 1990s. These multiple faces of accountability have been discussed by Romzek (2000) in her classification of public accountability. She identified four types (hierarchical, legal, political, and professional) and classified them by two dimensions of accountability relationships: source of control (internal vs. external dimension) and degree of autonomy (low vs. high).

Huisman and Currie (2004) argued that two of Romzek's types—political and professional accountability—are broadly applicable to higher education. Although both

emphasize autonomy, political accountability focuses on responsiveness to the concerns of external interest groups while professional accountability emphasizes an organization's internal standards. According to this typology, conventional accountability in higher education focuses on professional accountability; however, this emphasis has been changing since the mid-1990s as external constituents (e.g., parents, businessmen, state governing boards, legislatures etc.) became deeply involved in higher education accountability. More recently, accountability has been shifting from professional to political dimensions (Huisman and Currie 2004). Political accountability has been systemized by simultaneously transforming governance systems and by adopting new budget allocation mechanisms.

Several studies show that higher education governance began to be decentralized in the 1990s (McLendon 2003; McLendon et al. 2007). At the same time, budget allocations were changed from the conventional formulae to performance based approaches (Layzell and Caruthers 1995; Christal 1998). In the US, the emergence of the new accountability was accelerated by the Government Performance and Results Act of 1993 (US Public Law 103-62), by the emerging knowledge-based economy, and by the economic recession and budget cutbacks of the 1990s (Alexander 2000). In addition, state politics and higher education governance also affected the adoption of performance-based accountability. McLendon et al. (2006) studied state reforms and found that legislative party strength and higher education governance influenced the adoption of the new accountability. Burke and Minassians (2003) reported that state legislatures and/or governors are primary actors in adopting performance-based accountability in 21 of the 26 states studied.

Although Tennessee experimented with new accountability from 1979, the trend has become prominent since the mid-1990s. Layzell and Caruthers (1995) found that nine of 18 states adopted performance-funding and/or budgeting in the early 1990s. A state Higher Education Executive Office's survey found that 23 states adopted either performance funding and/or performance budgeting schemes by the mid 1990s (Christal 1998). In 2003, Burke and Minassians (2003) reported that 44 states had adopted a form of accountability, performance reporting, budgeting, and/or funding. The rapid growth of performance-based accountability demonstrates that new accountability has been broadly applied in the US higher education.

Nevertheless, states differed in the details of how they applied the strategy. In the 1980s and early 1990s, the new accountability was couched as "performance reporting" which informs policymakers and/or the publics about institutional performance according to predetermined indicators (Serban 1998). States began to link institutional performance to budget allocation in the mid-1990s and early 2000s, applying "performance budgeting" or "performance funding" strategies. Burke and Minassians' 2003 survey found a decline in performance budgeting and performance funding, but an increase in performance reporting in many states. These changing shifts in the new accountability maybe from each state's evaluation of the strategy's effects or the changing environment of higher education (e.g., budget strains in the early 2000's) (Burke and Minassians 2003). Alternatively, the changes may reflect the life cycle of academic management strategy as Birnbaum (2000) discussed in his article on academic management trends.

Impacts of new accountability

Do these policy innovations bring changes in higher education performance? If so, how much change is fostered by adopting new initiatives? A growing number of studies conceptualize higher education as an "organization" and use organizational theory in studying

higher education policy. Resource dependence theory and neo-institutionalism examine organizational *stability* and *change* from different ways (e.g., Gornitzka 1999; Oliver 1997; Csizmadia et al. 2007).¹ Both contribute to our knowledge of the dynamics between an organization and its environment. In either case, the new accountability has some impact on universities. Depending on the type of reforms, the new initiatives have affected institutional management, performance, and culture.

Brennan and Shah (2000) categorize the new higher education initiatives as impact through *rewards*, *changing policies* or *structures* at the institutional level, and impact through *changing cultures*.² Impact through reward refers to the influence of new initiatives on institutional funding, reputation, influence, and so on. Impact through changing policies and structure explains how universities tend to change their organizations and internal policies in response to external initiatives. In addition, the new accountability impacts existing academic cultures to some extent. As Brennan and Shah see it, the new accountability was expected to have effects on institutional performance in general through these four channels.

Relatively few studies have evaluated the impact caused by performance-based reforms in higher education. Several studies have tested these effects using different research methodologies at different levels. Hearn et al. (2006) evaluated a type of performance-based budget reform, incentive-based planning and budgeting program at the University of Minnesota, and concluded that the new initiative had some effect on budget allocation. They, however, were unsure of whether the reform contributed to institutional efficiency. Martinez and Nilson (2006) evaluated a new accountability initiative in South Dakota and found that the new accountability contributed to improving institutional performance measured against five academic goals—resident student enrollment, student enrollment in economic growth programs, academic improvement, collaboration, and attracting external funding.

National and international comparisons of the impact of the new accountability are somewhat informative. Volkwein and Tandberg (2008) evaluated the new accountability on state report cards nationwide using *Measuring Up* data and found that the new accountability did not have an effect on state report cards. Using nationwide data from 1997 to 2001, Shin and Milton (2004) identified that the new accountability did not contribute to institutional performance. In their study of four OECD countries (US, UK, Holland, and Norway), Huisman and Currie (2004) found that the new accountability had weak or no impact on institutional performance, and concluded that the new accountability is largely political rhetoric.

Evaluative studies which reported relatively weak effects on institutional performance might support the view of neo-institutionalism. This conclusion, however, might be over simplistic because the results of each study vary according to the types of new

¹ Resource dependence theory explains why and how higher education responds to the external environment. Neo-institutionalism, on the other hand, explains why and how higher education maintains its value, belief, and culture, and thus explains the stability of higher education. Both these organizational theories provide insights into the impacts of performance-based reforms as well as organizational change from different perspectives.

² Brennan and Shah (2000) proposed the impact mechanism to explain the impacts of quality assurance on higher education institutions. The impact mechanism is introduced in this article for discussing the impacts of policy initiatives on institutional performance because the model explains the impacts of reform policy in general.

accountability adopted and their policy adoption approach. In the US context, for example, states with performance-based accountability adopted different types of programs. Twenty-one states adopted either performance budgeting or funding programs while seven states adopted both performance budgeting and funding programs in 2003 (Burke and Minassians 2003). Academic research on the new accountability often does not take into consideration the diversity of the new accountability (e.g., Volkwein and Tandberg 2008). This study explored how different types of accountability programs have differential effects on institutional performance as well as examines the effect of new accountability on institutional performance in general.

Another arena of investigation looked at centrality of policy adoption at the state level. Higher education scholars and institutional leaders subscribe to the notion that decentralized policy adoption contributes to institutional performance as well as to autonomy. The centrality of policy adoption was represented by whether new accountability was mandated, and whether performance indicators were prescribed by state legislation. State legislation mandated new accountability and prescribed performance indicators in five states; state legislation either mandated or prescribed in 12 states; and state neither mandated nor prescribed in 12 states (Burke and Minassians 2003). This study explored how different levels of the centrality in policy adoption have differential effects on institutional performance.

Measure of institutional performance and its determinants

Institutional performance can be evaluated by two main functions of universities—teaching and research. In performance-based accountability, teaching (or education) performance is measured by diverse indicators such as graduation rates, graduates' satisfaction of their college education, student transfer rates, licensure test scores etc. Among these indicators, graduation rates is the most widely adopted performance indicator (Christal 1998; Ruppert 1995; Burke and Minassians 2002). In evaluating teaching performance, the use of the graduation rates as the performance measure has practical benefits. First, each university is mandated to report graduation rates by the Students Right to Know Act of 1991. Secondly, the data on graduation rates is publicly available from IPEDS from the year of 1997.

Research performance is often measured by the number of publications, the number of citations, and the amount of externally financed research funds. Among the three measures, research publications and external research funds are often used in academic research (Baird 1991; Dunder and Lewis 1998; Fairweather 2002; Porter and Toutkoushian 2006; Porter and Umbach 2001). External research funding is the most widely adopted performance indicator in performance-based accountability (Burke and Minassians 2002; Christal 1998; Ruppert 1995).

The literature on graduation rates and research quality identified several factors that influence graduation rates and federal research funding at institutions of higher education. Higher education studies reported the factors affecting student graduation and/or persistence: college costs (tuition and fees), financial aid, student's college experience, quality of instruction, student's academic ability, student's demographics, and institutional supports (faculty to student ratio, expenditure for instruction, dorm facility etc.) (e.g., Archibald and Feldman 2008; Gansemer-Topf and Schuh 2006; Ryan 2004; Scott et al. 2006). In reality, however, the determinants of graduation rates depend on the purposes and the designs of the research.

Literature on research productivity has found institutional characteristics affecting institutional research performance. These factors are institutional missions (Gander 1999; Perry et al. 2000; Porter and Toutkoushian 2006; Volkwein and Sweitzer 2006), existence of a medical school or hospital (Gander 1999; Porter and Toutkoushian 2006), and size of faculty, graduate programs/students, and administrative staff (Baird 1991; Dunder and Lewis 1998; Fox and Mohapatra 2007; Grunig 1997; Jordan et al. 1989; Porter and Toutkoushian 2006; Volkwein and Sweitzer 2006).

Method

Population

The population used in this study is American public four-or-more year institutions. Public institutions were chosen because state accountability measures only targeted public universities. In order to retain comparability, we included only research universities, master universities, and liberal arts colleges based on the Carnegie 2000 Classification. According to the Integrated Postsecondary Education Data System (IPEDS) of the US National Center for Education Statistics (NCES), there were 500 such higher education institutions. Among the 500 institutions, we included 467 institutions.³ Our institutional performance analysis included two measures—student graduation rates and federally financed research funding. We independently analyzed each measure. We used all 467 institutions for the graduation rate, but research performance analysis to the 166 research universities. Of the 166 public research universities, 123 had complete research funding information necessary for our analysis.

Variables

Dependent variables

We operationalized institutional performance using two main functions of universities—teaching and research. Student graduation rates were used as the measure of teaching performance. Graduation rate was defined as the proportion of college entering students who have graduated within 6 years as defined in the Integrated Postsecondary Education Data System (IPEDS). Research productivity was measured by external research funding. We included only federal contracts and grants here and excluded external research fund received from the other sources (e.g., from state and local sources, foundations, etc.). Federal funding is more competitive than state and local funding and is based on a rigorous peer review processes.⁴

³ The excluded 33 institutions are mostly branch campuses though they have institutional identification in NCES database, and did not report data on institutional performance and/or data on the independent variables considered in this study.

⁴ Many federal contracts and grants are awarded over a multi-year period. Using multi-year figures would result in apparent instability in funding, because the institution would appear to be awarded the total dollar amount in one year, but nothing in the next years. Since the available data do not specify length of grant period, a more accurate annual measure would be the expenditures of federal grant monies—not the funding itself. Thus, research performance in this study is federally funded research expenditures.

Program variables

We also measured years since adopting the accountability. It was important to identify the states that had had the reforms for long enough to detect an impact on research performance. The states with new accountability programs (hereafter, “PBF programs”) were broken down to three types: *PB&PF states* are the states that have both performance budgeting and funding programs (12 states); *PB states* are the states that have only performance budgeting programs (22 states); and *PF states* are the states that have only performance funding programs (9 states). In the coding scheme, the states without the program (7 states) were considered as a comparison group. Definitions and the number of states and institutions are summarized in Table 1.⁵

Another consideration in this study is the centrality of policy adoption. We coded the policy adoption as a continuous variable from low centralized to highly centralized: states with neither mandated programs nor prescribed indicators were coded as “0”; states with mandated programs or prescribed indicators were coded as “1”; states with mandated programs with prescribed indicators were coded as “2”.

Covariates

In our causal models, covariates were used to control for other factors that have been theoretically and empirically proven to have effects on institutional performance. Covariates at the institution level were selected based on literature. Terms and descriptive statistics of covariates are shown in Table 1. As the state level covariates for graduation rates were state financial support, state economic condition, and student qualification factors. State support for higher education is measured by state appropriation per capita and change in state appropriation during last 10 years. The state economic condition is measured by the state unemployment rate; and student preparation for higher education is measured by average ACT/SAT scores aggregated at state level. As the state covariates for research funding, meanwhile, we mainly focused on state economic factors, but did not include state average ACT/SAT scores in the model. Definitions and descriptive statistics of state level covariates are reported in Table 1.

Data sources

The data on graduation rates were taken from the Integrated Postsecondary Education Data System (IPEDS) database at the National Center for Education Statistics (NCES). Data on the total amount of externally financed research funding was pulled from the WebCaspar databases of the National Science Foundation (NSF). Data on the adoption of new accountability programs by each state are available in annual surveys conducted by Burke and associates in the years from 1997 to 2003 (Burke and Minassians 2003). Although we analyze institutional performance over 11 years from 1997 to 2007, the data on the program adoption only covers seven of these 11 years. This is because Burke and Minassian’s annual survey provides data only from 1997 to 2003. Data on covariates were taken from

⁵ We included only performance funding and budgeting programs, and excluded performance reporting because most of states adopted performance reporting (in Burke and Minassians’ survey, 46 states adopted performance reporting in 2003) and there is not enough variance to compare the program effects between the states with and without the program.

Table 1 Definitions and descriptive statistics of covariates

| Performance measure | Variable | Definition | Mean | SD |
|---|---|---|---|---------|
| Institution level Graduation rate (467 cases) | Faculty-student ratio (average of 2000–2002) | (Under graduate + graduate student)/(full-time faculty) | 16.91 | 4.01 |
| | Instructional exp. per student (average of 2000–2002) | Instructional expenditure/(Under graduate + graduate student) | 7446.78 | 3334.24 |
| | Incoming student's achievement (average of 2000–2002) | Average of SAT scores. (ACT score is transformed to SAT score using college board transformation table) | 1031.41 | 97.8 |
| | Dorm facility (2002) | Available dorm beds for students | 2626.04 | 2290.52 |
| | In-state tuition (average of 2000–2002) | In-state tuition and fees | 3617.37 | 1313.51 |
| | Total full-time faculty (average of 2000–2002) | Total full-time faculty | 1330.1 | 809.46 |
| | Number of PhD awarded per year (average of 2000–2002) | Number of PhD awarded by institution | 201.5 | 176.46 |
| | Having hospital (2002) | If a university has hospital, coded "1"; if not, coded "0" | 0.20 | 0.40 |
| | Faculty salary (average of 2000–2002) | Average salary of full-time faculty (nine month contract)(\$) | 61178.18 | 6967.35 |
| | State level (50 states) | State incoming student's achievement | Average of incoming student SAT/ACT score (2001–2004) | 1032.67 |
| State appropriation to higher education per capita | | State appropriation to higher education/state population (average of the Measuring UP 2000–2006)(\$) | 224.77 | 57.08 |
| State appropriation change for 10 years | | State appropriation change for last 10 years (average of the Measuring Up 2000–2006) (%) | 48.88 | 20.21 |
| State unemployment rate | | State unemployment rate (average of 2000–2007) (%) | 4.72 | 0.9 |

Among the four covariates, state incoming student's achievement was included only in the model for graduation rate

the IPEDS and *Measuring Up* state report card (National Center for Public Policy and Higher Education 2006). The data on state unemployment was culled from the US Bureau of Labor. These data sources provide longitudinal data and thus enabled us to estimate the growth of institutional performance over time.

Analytical method

Because this study explored longitudinal changes in institutional performance, we analyzed the data using Hierarchical Linear Modeling (HLM) growth analysis which has been applied in different research settings in analyzing growth (e.g., Bryk and Raudenbush 1992; Hser et al. 2001; Shin 2009). We developed preliminary models of institutional graduation rate and research funding, then included covariates and program variables in the final models to evaluate reform effects. In the final models, the program variables were included as the predictors of the growth rate in institutional performance, i.e., the effects of performance-based reforms on the changes in institutional performance. The basic models of this analysis are given below. Each equation was estimated twice, once with graduation rate as the dependent variable, and once with the amount of federal research fund as the dependent variable:

Level-1: growth trajectory of institutional performance

$$Y_{ij} = \pi_{0ij} + \pi_{1ij} \times a_{ij} + e_{ij}$$

Level-2: between institutions

$$\pi_{0ij} = B_{00j} + r_{0ij}$$

$$\pi_{1ij} = B_{10j} + r_{1ij}$$

Level-3: between states

$$B_{00j} = r_{000} + u_{00j}$$

$$B_{10j} = r_{100} + u_{10j}$$

Where

Y_{ij} is the institutional performance at time t for institution i in the state j ;

π_{0ij} is the institutional performance of institution i in the state j in 1997;

π_{1ij} is the change in institutional performance (growth rate) of institution i in state j during the period 1997 through 2007;

a_{ij} is the year of institutional performance, in which each year coded as 1997 = 0, 1998 = 1, 1999 = 2, 2000 = 3, 2001 = 4, 2002 = 5, 2003 = 6, 2004 = 7, 2005 = 8, 2006 = 9, 2007 = 10. These codes can be any series of continuous integers;

β_{00j} is the mean institutional performance of state j in 1997;

β_{10j} is the mean of institutional performance change of state j 1997 through 2007;

r_{000} is the mean of institutional performance of all the states in 1997;

r_{100} is the mean of institutional performance change of all the states 1997 through 2007;

e_{it} , r_{0ij} and r_{1ij} , and u_{00j} and u_{10j} represent random effects at each level assumed to be normally distributed, with a mean of zero and equal variance.

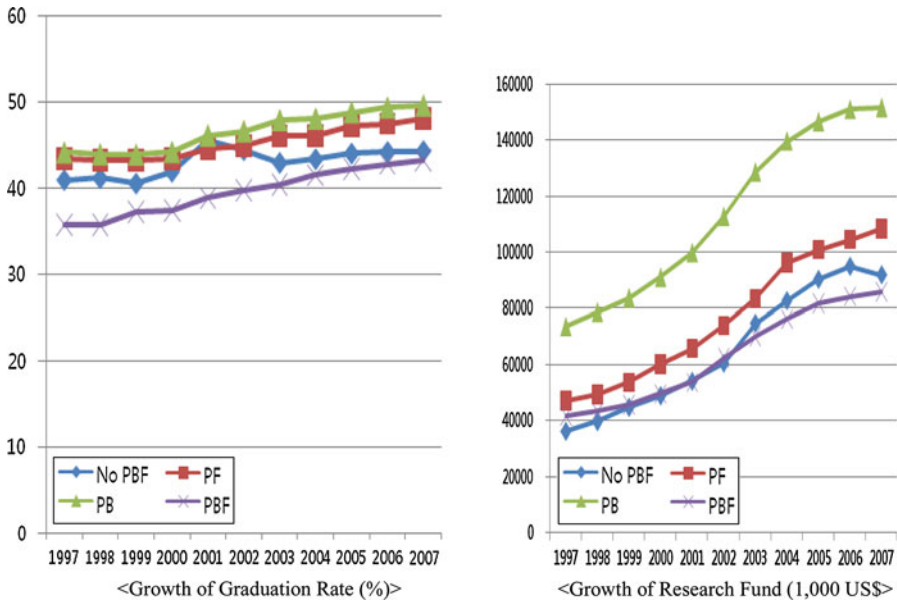


Fig. 1 Growth of Graduation Rate and Research Fund. *Note:* The states without any of PB or PF programs during the 11 years were coded as “no PBF”; states with only PF programs one- or more years during the 11 years were “PF”; states with only PB programs one- or more years during the 11 years were coded as “PB”; and states with both PB and PF programs one or more years during the 11 years were coded as “PBF”

Findings and discussions

Descriptive statistics

Figure 1 shows that rates and the amounts of external research funding increased during from 1997 to 2007. The growth in graduation rates, however, is relatively slower than that of external research funding. In addition, the graduation rates of the institutions in states with the new accountability did not differ from those in states without the programs. External research funding in states with performance budgeting (PB) programs grows faster than institutions in states without such programs. These descriptive statistics provide a simple snapshot whereas statistical analysis will show whether there are differences between the states with and without the performance-based accountability.

Proportion of variance accounted for by states and institutions

The variance by states should represent the maximum potential that states can improve through policy initiatives. In reality, however, states can change only within much more limited ranges because a considerable proportion of state variance is accounted for outside the model—by state demographics and economic conditions that states might not easily control. To date, this aspect has not been sufficiently discussed. With the development of sophisticated analytical methods such as multilevel analysis, statistical software can provide an understanding of the variance accounted for by each level i.e., state level and institution level in this study.

Analysis of variance using HLM analyses was conducted separately for graduation rates and levels of research funding. As Table 2 shows, 76% of the total variance in graduation

Table 2 Proportion of variance accounted for by each level

| Performance measures | Total variance | Variance decomposition | | |
|----------------------|----------------|------------------------|-------------------|----------------|
| | | Level-1 | Institution-level | State-level |
| Graduation rate | 242.96 | 20.30 (8.36%) | 185.15 (76.21%) | 37.51 (15.43%) |
| Research funding | 10954.57 | 1345.52 (12.28%) | 9000.63 (82.16%) | 608.42 (5.55%) |

rates was accounted for by institutions and 15% was accounted for by states. Thus, state demographics and economic characteristics, state higher education governance, and state policy factors including performance-based reforms together account for 15% of total graduation rate variance. By comparison, only 6% of research funding variance is accounted for at the state level and 82% of the variance was accounted for by institution level. This may be because research universities rely on the federal government for their research funding and are thus responsive to federal funding policy but are less sensitive to state accountability. Thus, we have concluded that state accountability affects more on graduation rates, but less on research funding.

This finding suggests that states might improve graduation rates by policy interventions, but states are less able to improve institutional research performance.⁶ This has implications for researchers and policymakers because policy might bring about more changes in institutional performance in some cases but less in others. The empirical results and their implications should be further discussed in-depth in policy research because states are influential actors in some sort of policy but not in other policies.

Program effects on graduation rates

Effects of PBF programs on the growth of graduation rates were evaluated through two steps: first, the HLM growth model was specified, then, program related variables of interest were included to test the program effects.

Model specification

To specify HLM growth models, an initial step was to identify whether there was significant variance between institutions and between states in graduation rates. If there was significant variance in graduation rates among institutions and states, a three-level analysis would explain variance across states. In the analysis of variance (ANOVA), we found that there was significant difference in the graduation rates between institutions and between states. Thus, an HLM three-level analysis was applied to graduation rates. Specifically, level-1 was modeled to predict institutional graduation growth rates. The main predictor was time which was set to zero in 1997. Then, institution-level predictors were included at level-2 to explain level-1 random coefficients. At level-3, state level predictors were included in the model to explain level-2 random coefficients by adding state level variables.

Through the model specification processes, intercepts (π_0) and growth rates (π_1) were retained in level-1. Then, institutional mission, in-state tuition, incoming student's academic achievement (which was measured by the standardized score of SAT and/or ACT score), and dorm facility of the institution were retained at level-2. The other predictors were not

⁶ The results were identical when we measured research performance by the number of research publications, an alternative measure of research performance (the results were not reported in this paper).

significant and were thus discarded in the model. Finally, level-3 predictors were included and tested at level-3. As Table 3 shows, total variance was decreased by adding predictors at each level. Finally, then, 59% of the variance has been explained by the model.

Testing of program effects

As shown in Table 3, years of program adoption (in model 1) did not have an effect on the growth of graduation rates (coefficient = 0.014). This finding implies that the new accountability did not contribute to the growth of graduation rates. We specified different types of accountability in order to analyze possible effects accounted for by different types of new accountability. Different types of programs were given dummy codes. The reference group was the states without performance-based accountability systems. Thus, the coefficients represent the difference in the growth of graduation rates between the reference group and each type of accountability.

As model 2 in Table 3 shows, the states which have both PB and PF programs (coefficient = 0.32, $p < 0.05$), the states which have PB programs (coefficient = 0.29, $p < 0.05$), and the states which have PF programs (coefficient = 0.26, $p < 0.10$) have higher growth in graduation rates than the states without any type of performance-based accountability. The inclusion of new accountability types, however, did not contribute to the explained variance. The total variance explained was not improved though the inclusion of PBF program types (from 144.47 to 144.47). Thus, the size of effects of the new accountability was small (near zero) though the coefficient is statistically significant.

To test for the difference of growth of graduation rates between different types of policy adoptions, we modeled 29 states for which governance-related information were available. This model enabled us to test different types of governance-related characteristics on the growth of graduation rates. As model 3 in Table 3 shows, however, the governance centrality was not significant. Thus, the centrality of program adoption did not make a difference in the growth of graduation rates. Therefore, we concluded that state governance-related characteristics in adopting the new accountability did not affect the growth of graduation rate across states.

Program effects on research fund

To test the effects of the new accountability reforms on the growth of research funding, the model specification process has been conducted in the same way as for graduation rates. Based on the final model, the effects of the new accountability reform were tested by adding program variables in the final model.

Model specification

The growth trajectory of research funding was close to polynomial as shown in Fig. 1. We included and tested polynomial terms in the models, but only the growth rate (π_1) was significant. Thus, the level-1 model included an intercept (π_0) and growth rates (π_1). Then, level-2 predictors were included and tested in the model. Through this process, having a hospital, the number of the Ph.D.s awarded, and the ratio of faculty to staff were retained because these variables were identified as having significant effects on the amount of research funding. In addition, PBF program variables and centrality of policy adoption were included at level-3 to test program effects and to test policy adoption characteristics. As the model 1 in Table 4 shows, 90% of the total variance in research funding was explained by the final model.

Table 3 Program effects for graduation rate

| Variables | Final model | | Model 1 (program effects) | | Model 2 (effects by types) | | Model 3 (centrality) | |
|--|-------------|--------|---------------------------|--------|----------------------------|--------|----------------------|-------|
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| <i>Initial status (π_0)</i> | | | | | | | | |
| Intercept (β_{00}) | | | | | | | | |
| Average | 41.875*** | 0.884 | 41.881*** | 0.883 | 41.894*** | 0.885 | 40.506*** | 1.057 |
| SAT/ACT | 0.005 | 0.022 | 0.005 | 0.022 | 0.005 | 0.022 | 0.008 | 0.031 |
| Appropriation per capita | 0.002 | 0.016 | 0.001 | 0.016 | 0.002 | 0.016 | 0.005 | 0.021 |
| State appropriation change | -2.164 | 4.356 | -2.105 | 4.354 | -2.307 | 4.259 | -2.274 | 4.714 |
| Unemployment rate | -0.724 | 0.939 | -0.721 | 0.975 | -0.749 | 0.94 | 0.542 | 1.133 |
| Mission (β_{01}) | -2.842*** | 0.974 | -2.835*** | 0.975 | -2.761 | 0.976 | -1.806 | 1.259 |
| Tuition (β_{02}) | 0.002*** | 0.0004 | 0.002*** | 0.0004 | 0.002*** | 0.0004 | 0.002*** | 0.001 |
| SAT & ACT (β_{03}) | 0.066*** | 0.005 | 0.065*** | 0.005 | 0.065*** | 0.005 | 0.063*** | 0.007 |
| Dorm facility (β_{04}) | 0.003*** | 0.0002 | 0.003*** | 0.0002 | 0.003*** | 0.0002 | 0.003*** | 0.003 |
| <i>Growth rate (π_1)</i> | | | | | | | | |
| Intercept (β_{10}) | | | | | | | | |
| Average | 0.668*** | 0.038 | 0.664*** | 0.038 | 0.397 | 0.133 | 0.682*** | 0.052 |
| SAT/ACT | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | -0.002 | 0.001 |
| Appropriation per capita | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.003** | 0.001 |
| Appropriation change | 0.478** | 0.206 | 0.444** | 0.209 | 0.376 | 0.209 | 0.181 | 0.201 |
| Unemployment rate | -0.049 | 0.046 | -0.055 | 0.046 | -0.061 | 0.046 | -0.085* | 0.049 |
| PBF years | | | 0.014 | 0.016 | | | | |
| PB & PF | | | | | 0.317** | 0.148 | | |
| PB | | | | | 0.290** | 0.14 | | |
| PF | | | | | 0.264* | 0.154 | | |
| Centrality | | | | | | | 0.071 | 0.047 |

Table 3 continued

| Variables | Final model | | Model 1 (program effects) | | Model 2 (effects by types) | | Model 3 (centrality) | |
|------------------------|----------------|--------|---------------------------|--------|----------------------------|--------|----------------------|--------|
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| SAT (β_{11}) | 0.001*** | 0.0003 | 0.001*** | 0.0003 | 0.001*** | 0.0003 | 0.001*** | 0.0004 |
| Cases | 467 | | 467 | | 467 | | 312 | |
| Total variance | 242.96 | | 242.96 | | 242.96 | | 232.65 | |
| Explained variance (%) | 144.47 (59.46) | | 144.50 (59.47) | | 144.47 (59.46) | | 136.97 (58.87) | |

* <0.10, ** <0.05, *** <0.01

Table 4 Program effects for research funding

| Variables | Final model | | Model 1 (program effects) | | Model 2 (effects by types) | | Model 3 (centrality) | |
|--|-----------------|--------|---------------------------|--------|----------------------------|----------|----------------------|--------|
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| <i>Initial status (π_0)</i> | | | | | | | | |
| Intercept (β_{00}) | | | | | | | | |
| Average | 45.707*** | 3.582 | 45.743*** | 3.572 | 45.649*** | 3.563 | 47.748*** | 4.605 |
| Appropriation per capita | 0.068 | 0.066 | 0.068 | 0.067 | 0.065 | 0.067 | 0.114 | 0.094 |
| Appropriation change | -26.986 | 17.536 | -26.979 | 17.482 | -26.841 | 17.448 | -22.942 | 19.557 |
| Unemployment rate | 4.337 | 3.868 | 4.332 | 3.854 | 4.494 | 3.847 | 5.631 | 5.247 |
| Hospital (β_{01}) | 33.306*** | 7.876 | 33.265*** | 7.867 | 32.911*** | 7.874 | 43.030 | 10.033 |
| PhD awarding (β_{02}) | 0.247*** | 0.018 | 0.247*** | 0.018 | 0.246*** | 0.018 | 0.233*** | 0.021 |
| Faculty-staff ratio (β_{03}) | 10.192** | 5.136 | 10.109*** | 5.121 | 10.511** | 5.098 | 6.235 | 6.294 |
| <i>Growth rate (π_1)</i> | | | | | | | | |
| Intercept (β_{10}) | | | | | | | | |
| Average | 6.017*** | 0.559 | 5.974*** | 0.567 | 8.218*** | 1.215*** | 5.493*** | 0.973 |
| Appropriation per capita | -0.002 | 0.010 | -0.001 | 0.010 | -0.001 | 0.010 | -0.003 | 0.017 |
| Appropriation change | -2.644 | 2.749 | -2.908 | 2.791 | -0.837 | 2.784 | -2.120 | 3.507 |
| Unemployment rate | 0.374 | 0.613 | 0.334 | 0.620 | 0.401 | 0.614 | 0.423 | 0.935 |
| PBF years | | | 0.091 | 0.152 | | | | |
| PB & PF | | | | | -2.799** | 1.350 | | |
| PB | | | | | -2.719** | 1.286 | | |
| PF | | | | | -1.611 | 1.420 | | |
| Centrality | | | | | | | 0.841 | 0.629 |
| Hospital (β_{11}) | 7.258*** | 1.137 | 7.353*** | 1.144 | 7.255*** | 1.135 | 8.895*** | 1.542 |
| PhD awarding (β_{12}) | 0.026*** | 0.003 | 0.026*** | 0.003 | 0.027*** | 0.003 | 0.025*** | 0.003 |
| Cases | 123 | | 123 | | 123 | | 76 | |
| Total variance | 10954.57 | | 10954.57 | | 10954.57 | | 12168.68 | |
| Explained variance (%) | 9830.88 (89.74) | | 9832.74 (89.76) | | 9836.49 (89.79) | | 11050.60 (90.81) | |

* <0.10, ** <0.05, *** <0.01

Testing of program effects

To test the program effects, number of years since adopting performance based accountability was included in the model (model 1 in Table 4). As shown in Table 4, the effect was not significant (coefficient = 0.09). To test the effects of different types of PBF programs on the growth of research funding, types of performance-based accountability were included. As Table 4 shows, the states with both PB and PF programs (coefficient = -2.79 ; $p < 0.05$), and the states with PB programs alone (coefficient = -2.71 ; $p < 0.05$) grew slower than the states without the programs. The inclusion of the types of new accountability did not, however, contribute to the explained variance (from 9,830 to 9,836). This implies that the effects of the new accountability are negligible (near zero) though the coefficient is statistically significant. We conclude, therefore, that the states with PBF program are not different from the states which do not have performance-based accountability even though the coefficients are statistically significant. In other words, the performance-based accountability did not contribute to the growth of research funding.

The degree of centrality in decision-making was included at level-3 to test the differences in growth rates between the different types of adoption strategies. As model 3 in Table 4 shows, the centrality of program adoption does not account for the growth in research funding among institutions. This shows that differences in policy adoption did not have an effect on the growth of research funding.

Discussions

This study produced two main findings. First, the state characteristics we included account for very little institutional performance. For instance, institution-level graduation rates were different across states, but the variance accounted for by state characteristics was very small. On the other hand, institutional characteristics account for most of the differences in graduation rates and in levels of external research funding. Second, performance-based accountability did not bring changes in institutional performance. This was true whether states adopted regardless of how long the accountability was in place, whether both PB and PF programs, or either PB or PF program were adopted, and whether states adopted the policy centralized or decentralized control.

Given the findings, to what extent can state involvement benefit higher education institutions? States have enacted reforms aimed at higher education governance and/or new policy adoption. Some state policies might not be successful in achieving their goals, however, because the anticipated changes in universities rarely result. This study indicates that state actions account for only 15% of the variance in graduation rates and about 6% in research funding. Instead, institutional performance appears to be explained by institutional characteristics. Policymakers might best ask whether institutional performance is best changed through policy tools or by facilitating the capability of universities.

Brennan and Shah (2000) suggest useful categories of policy impact mechanisms: impacts through rewards, changing policies or structures, or changing cultures. According to Brennan and Shah, the ineffectiveness might be caused by the lack of one or multiple components of the impact mechanisms. Alternatively, the ineffectiveness of the performance-based accountability can be interpreted using resource dependence and neo-institutionalism theories.

According to resource dependence perspective, universities selectively and strategically respond to demands impacting their survival and growth. Thus the success of the new

accountability depends on an institution's response to the new accountability. If the financial incentives linked with institutional performance are attractive, universities might incorporate the new accountability into their internal systems; otherwise, universities might not be motivated to change. The financial incentive is the reward in Brennan and Shah's policy impact mechanisms. If the reward associated with the proposed policy changes was not sufficient then higher education institutions might not incorporate institutional changes.

In reality, most of states tied only a very small proportion of their state financial support to institutional performance. In most of states, the budget tied to institutional performance was less than 6% of the total state budget (Christal 1998). Considering that state budget support has been generally been decreasing, the small support remaining (6% in some cases) might not be enough to motivate universities to substantially institutionalize the new accountability. Bridges (1999) found that the Colorado universities still allocated funding based on traditional criteria even though the state had adopted a performance-based funding program. Also, Brokers (1998) found that Arkansas funding from 1995 to 1997 had actually been allocated based on enrollment growth, despite the PBF program. As both case studies show, the new accountability was not enforced with respect to a revised budget allocation formula.

As neo-institutionalism theorizes, universities or faculties in higher education institutions might not accommodate the new changes if the changes do not align with their norms and beliefs. Faculty might not like being evaluated by others because the new accountability appeared to shift power from academic professions to political stakeholders as Huisman and Currie (2004) and Gornitzka (1999) have argued. This is a disincentive for academics to be responsive to the new accountability standards. Under this situation, policymakers cannot expect to change institutional cultures though such institutions adopted formal rules to demonstrate to policymakers that they are complying with policy changes. If this is the case, universities, especially research universities where the main funding source is federal, will be less responsive to state reforms than will other types of higher education institutions. The research universities that we analyzed have longer traditions, are relatively autonomous, and place substantial emphasis on academic freedoms and institutional autonomy than other institutions.

Even states did not fully implement the new accountability. Romzek (2000) argued that recent accountability has tended to shift emphasis from input/through-put to outcome/output, but this shift did not eliminate a more conventional procedural regulation. Romzek stated that "if management reform rhetoric emphasizes employee discretion and autonomy, but performance reviews emphasize rules and processes, then employees will emphasize rules and process in their work efforts" (p. 39). Under the new accountability, on the other hand, "governments allow more autonomy to higher education institutions but control them through quality assurance and/or funding allocation mechanisms" (p. 9) as Shin and Harman (2009) conceptualized as the decentralized centralization of higher education governance. Thus, very little was changed to implement new institutional accountability. Leslie and Berdahl (2008) who studied governance innovation in Virginia found that Virginia sustained substantive regulation even during the adoption of new accountability. The state itself might not be prepared to implement the new accountability even though it initiated the managerial reforms.

The role of governance factors is worth questioning. Recent higher education research has found that state governance characteristics influence the adoption of policy innovation and state accountability reforms (Hearn and Griswold 1994; McLendon et al. 2006). Our finding shows that no matter whether a state adopted a top-down or bottom-up approach, institutional performance was not affected by the different types of reform approaches. A similar result was reported by Volkwein and Tandberg (2008) where state governance or regulatory practice did not affect state performance in *Measuring Up* state report cards.

This raises the question of why different types of policy adoption strategy did not result in differences in institutional performance even though policy researchers claimed that a bottom-up approach brings better results than does a top-down approach.

What is the effect of performance-based accountability on institutional performance in the public sector? Although performance-based accountability has been applied in many countries, empirical studies have found that the initiatives were not so successful. This lack of effectiveness has been reported in international comparisons as well as in nationwide studies. As we noted in the literature, the new accountability was not successful in the US context (e.g., Shin and Milton 2004; Volkwein and Tandberg 2008). Comparative studies also found that the new accountability did not contribute to institutional performance (e.g., Huisman and Currie 2004; Himanen et al. 2009). For example, in their recent comparative study of five countries (Australia, Finland, the Netherlands, Norway, and the UK) Himanen and associates (2009) found that the performance-based funding policy did not contribute to research productivity.

This empirical evidence raises a fundamental question about the effectiveness of performance-based accountability. Hood and Peters (2004) proposed paradoxes to explain why performance-based accountability often failed to accomplish its goals in the public sector. According to Hood and Peters, the new accountability was unsuccessful because certain prerequisite conditions did not exist. First of all, institutional leaders were not empowered even though the new accountability is directed at institutional leader responsibility. Second, process controls over institutions were often retained even though deregulation is considered a requisite condition of performance-based accountability. Presumably these paradoxes exist in performance-based accountability in higher education.

Conclusion

Although the new accountability was not effective in changing institutional performance as measured by graduation rates and research funding, this ineffectiveness may not be fully attributable to higher education institutions and their faculty. Rather, states might fail to fully put in place the components of the new accountability reforms. Alternatively the new initiatives may not have included support for systems that are necessary to bring about the targeted changes. As a result, faculty did not improve their teaching and research performance.

This study found that a range of state factors can account for a small proportion of institutional performance. If so, then state policy might not bring about changes in institutional practice. This issue has not been dealt with in previous policy studies. Our results suggest that if there is not enough institutional flexibility, policy involvement is likely weakened. Policy makers garner more success by changing the factors that are known to be highly correlated with institutional performance. Adopting a form of performance-based accountability may not contribute to institutional performance if the new accountability is not well grounded in institutional practices.

Notwithstanding these important findings, this study has limitations in that it was grounded on the US public higher education. In the US, states often initiate higher education policy. This allows for a research design that policy initiatives can be considered as a variable. This may not be the case in all countries. Second, although we analyzed two representative indicators in teaching and research, both indicators measure only quantity of performance and may not be reflective of changes in the quality of institutional performance.

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