In Pursuit of Revenue and Prestige: the Adoption and Production of Master's Degrees by U.S. Colleges and Universities

by

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Abstract

I propose a research program on the pursuit of enrollments from desired student populations. Non-prestigious institutions grow enrollments because excess enrollment capacity undermines organizational survival. Prestigious institutions maintain selective enrollments because prestige depends on the academic profile of undergraduate enrollments. Both types of institutions have an incentive to expand master's degree programs. For non-prestigious institutions, master's degree programs increase total enrollments while diversifying customer base. For prestigious institutions, revenues from master's degrees subsidize the pursuit of prestige in undergraduate education.

Chapter 3 analyzes the adoption and production of master's degrees. I derive hypotheses from human capital theory, resource dependence theory, and literature on the pursuit of prestige. I test hypotheses on a panel of institutions from 1975 to 2009. I find that the production of master's degrees increases in response to declines in alternative revenues (e.g., endowment). Liberal arts colleges respond to declines in their core constituency of freshmen enrollments by adopting interdisciplinary, professional master's degrees (e.g., business) but not technical degree programs requiring significant prerequisites (e.g., engineering).

Chapter 4 investigates "mission drift" in liberal arts colleges. I define mission drift as the abandonment of the liberal arts college "template" in favor of the comprehensive university template. I argue that liberal arts colleges become universities

to increase enrollments and diversify their customer base. Becoming a university is defined as deleting the word "college" and adding "university" to the organizational name. I develop a framework to study the causes of becoming a university by drawing on market, institutional, and social network factors. I test hypotheses on a panel of all liberal arts colleges from 1975 to 2009.

I find that the probability of becoming a university increases when socially proximate institutions have previously become universities. Strong non-tuition revenues and strong market position decrease the probability of becoming a university, while declines in freshmen enrollments and prior adoption of professional master's degrees increase the probability. The results for Chapters 3 and 4 complement one another: liberal arts colleges adopt master's degrees to grow enrollments and diversify customer base (Chapter 3); liberal arts colleges become universities to expand master's degree production (Chapter 4).

Chapter 1 :

Introduction

This introductory chapter argues that the pursuit of enrollments from desired student populations is an important impetus for organizational change in postsecondary education. Section one develops this argument by reviewing historical literature which argues that the institutionalization of the modern American university was largely the result of organizational changes designed to generate enrollments amidst weak student demand (Collins, 1979; Veysey, 1965). Analyses of different institutional types, in more recent epochs, also view concerns about enrollments as a primary cause of organizational change (Brint & Karabel, 1989; Kraatz & Zajac, 1996). Drawing from these empirical studies and on contemporary descriptive statistics, I propose a research program about organizational change motivated by the pursuit of enrollments.

Section two argues that the field of organizational studies is particularly suited to the study organizational change in postsecondary education. Critics have argued that theories imported from other disciplines often fail to provide insights about the unique problems of higher education (Peterson, 1985). In recent years, however, the field of organizational studies has transitioned from a focus on paradigm-driven research to a focus on problem driven-research (Davis & Marquis, 2005). Problem-driven research uses theory to develop insights about cases. In problem-driven research, the concept of the "organizational field" helps researchers pay close attention to the unique context of the empirical case, thereby enabling scholars of organizations to develop important insights about higher education.

Finally, section three sketches the organizational field relevant to a research program on the pursuit of enrollments by postsecondary institutions. After describing the field, I motivate two empirical studies within this research program. Chapter 2 discusses the data used in these empirical studies. Chapter 3 analyzes the adoption and production of master's degrees. Chapter 4 analyzes the causes and effects of mission drift in liberal arts colleges. Finally, Chapter 5 summarizes the results of Chapters 3 and 4 and discusses implications for research and practice.

A History of Organizational Change and Enrollments

Emergence of the Modern University

This section places the pursuit of enrollments in historical perspective. In particular, I discuss the emergence of the modern American university as an effort by institutional leaders to generate sufficient enrollments for organizational survival.

Veysey (1965) traces the birth of the American university to the aftermath of the Civil War, a dismal period for higher education. Colleges relied predominantly on tuition funding, but declining enrollments were forcing many colleges to close their doors (Brown, 1995). In the aftermath of Jacksonian populism, the public viewed higher education as an institution for propertied elite. The professions had become increasingly estranged from colleges; lawyers and doctors were produced through apprenticeship and for-profit training institutions (Larson, 1977). The period of industrial capitalism had begun, but the business community generally deemed college as unnecessary, and worse, as harmful; steel magnate Andrew Carnegie said, "'the future captain of industry is hotly engaged in the school of experience, obtaining the very knowledge required for his future triumphs….College education is fatal to success in that domain'" (Veysey, 1965, pp. 13-14).

Set against these adverse market conditions, Veysey (1965) describes the emergence of the modern American university as the "institutionalization project" (DiMaggio, 1988) of elite college presidents. The nascent concept of the American university was based on the German university, representing ideals of academic freedom, rigorous research, and the objectivity of modern science. Veysey (1965) writes that, "during the early years of the American university movement, until about 1890, academic efforts burgeoned largely in spite of the public….It was observed, for instance, that Johns Hopkins [University] 'came into existence unasked for and uncared for; and so must first create a demand and then supply it'" (p. 16). The institutional entrepreneurs engaged in a multi-pronged strategy to incite demand for the American university.

Recasting higher education as preparation for the "real world." Knowing that the modern research university would appear too esoteric, college leaders began marketing higher education as preparation for the "real world." Even as industrial capitalism began to flourish, college enrollments had stagnated because upwardly mobile young men were choosing to enter the world of commerce immediately rather than attend college first. Public sentiment was that "the boy who went directly from the public school to the countinghouse had a four-year start on the college man, and never lost his advantage" (Wyllie, 1952, p. 297).

In response, Veysey (1965) writes, college leaders engaged in a prolonged public relations campaign aimed at convincing business leaders and prospective students that college prepares men for successful careers in commerce:

> The entire university movement, declared President David Starr Jordan of Stanford, 'is toward reality and practicality.' No separation should exist between the scholar and the man; knowledge should be judged by its 'ability to harmonize the forces of life.' Useless learning, like riddles, was to be adjudged diverting but unimportant. 'The college years are no longer conceived of as a period set apart from life," argued a professor at New York University in 1890. 'The college has ceased to be a cloister and has become a workshop.' (Veysey, 1965, p. 61)

Curricular reform matched this rhetoric of practicality (Bastedo, 2005). Nineteenth century enrollments stagnated in part because of student dissatisfaction with the curriculum, which was described as tedious and irrelevant (Thelin, 2004). The elective system was first instituted in 1850 by Brown University. Enrollments at Brown increased by 40% as a result (Bastedo, 2005). Veysey (1965) argues that "once any one respectable institution moved in a new direction, others found themselves under a powerful compulsion to follow suit. The changes, if they meant anything, were bound to attract more students. Colleges which lagged behind…had to face the threat of eventual starvation" (p. 11). By 1900 the prescribed colonial curriculum of Latin, Greek, logic, grammar and rhetoric was being replaced by the modern day system of majors and electives.

Annexing the professions. Universities increased both status and enrollments by annexing the education of professionals (Collins, 1979; Larson, 1977). During the nineteenth century, training for medicine, law, and engineering usually occurred via apprenticeship or trade school. Careers in medicine and law were relatively prestigious, presenting a problem for the university; individuals could attain high status without attending higher education (the same was true for careers in business). It should not be surprising then, that demand for the baccalaureate was low. University based professional training, exemplified by the Johns Hopkins Medical School, presented a solution to this problem:

> Following the pioneering example of the Johns Hopkins University in 1876, the modern American university brought professional schools into its structure and organized them with sequencing and connection with academic units. Over time this meant that some universities also added entrance requirements – for example, one had to have completed two years of undergraduate study before being admitted to professional school. The Johns Hopkins University set a high standard when it required medical school applicants to have completed a bachelor's degree. The result was a sequential curriculum, a hierarchy of instruction and certification whose capstone was the Ph.D. (Thelin, 2004, p. 129)

By bringing professional schools within the university, the university could increase enrollments by making the baccalaureate a prerequisite for entrance into the professional school.

Credentials become currency for social mobility. Elite college presidents created the modern American university at a time when enrollment decline was causing many colleges to close. College leaders developed several strategies to incite demand for the university: marketing college as preparation for the real world, reforming the curricula to be more practical, and annexing the professions. Additional strategies, not discussed for reasons of scope, included widening the pipeline of K-12 students (Reese, 2005) and convincing industrialists that higher education was worthy destination for charitable donations (Thelin, 2004). These strategies worked. Total enrollments grew from 52,000 in 1870, to 116,000 in 1880, to 157,00 in 1890, to 238,00 in 1900, to 598,00 in 1920, and to 1,101,000 in 1930 (NCES, 2011, Table 196).

Why did these strategies work? According to the credentialism literature, higher education enrollments increased because educational credentials had become institutionalized as the currency for social mobility (Brown, 1995; Collins, 1979; Larson, 1977). Once the university annexed the training of professionals, individuals desiring to become lawyers or doctors were forced to first earn a baccalaureate degree. After convincing corporate managers of the utility of college trained labor (Brown, 1995), the baccalaureate also became requisite for careers in business:

> Another factor contributing to the new enthusiasm for higher learning after 1900 was the widespread recognition that opportunities were less plentiful than in the years immediately following the Civil War….As competition for top positions became more severe, employers raised standards of qualification. Gradually college degrees became prerequisite to placement and promotion on the managerial level. (Wyllie, 1952, p. 299)

In this summary of the history of higher education, I argue that changes in organizational behavior were motivated by the goal of growing enrollments. Early American colleges and universities were almost entirely tuition dependent. Declining enrollments threatened organizational survival. Colleges responded by dramatically changing their curricula, by targeting a new customer base – the future business man – and by adding graduate training.

Enrollments in Contemporary Higher Education

Analyses of more recent epochs also argue that organizational change in higher education is motivated by enrollments. For example, Brint and Karabel (1989) argue that community colleges originally focused on the "academic mission" of lower-level (i.e. freshman and sophomore) undergraduate coursework. However, community college enrollments related to the academic mission declined once universities realized they could increase tuition-related revenue by no longer diverting students to community colleges for lower-level coursework. In response, community colleges invented the "vocational mission" to generate the enrollments necessary for survival (Brint & Karabel, 1989).

Recent changes in the external environment have compelled contemporary public universities to change behaviors in pursuit of more enrollments. The mid-twentieth century ushered in a "golden age" (Thelin, 2004) of higher education, in which the enrollment capacity of public higher education increased dramatically and public institutions could usually count on generous state appropriations. Since the 1980s, however, many public institutions have experienced declining or increasingly volatile state appropriations (Doyle & Delaney, 2009). As state appropriations become uncertain, public institutions increasingly generate revenue from tuition (Wellman & AIR, 2009).

Three changes in the external environment also caused enrollment problems in liberal arts colleges: first, a decline in the traditional college age population (NCES, 2011, Table 15); second, growing enrollment capacity of public institutions; and, third, a change in student preferences towards practical curricula (Turner & Bowen, 1990). Kraatz and Zajac (1996) show that, in response to these adverse market conditions, liberal arts colleges adopted professional baccalaureate degrees to generate enrollments.

I argue that enrollment anxiety increasingly dominates contemporary organizational decision-making. Figure 1.1 shows revenue trends for institutions classified by the 1976 Carnegie Classification as research, doctoral, comprehensive, liberal arts, or associates institutions.[1] Figure 1.1(a) shows that median state revenues have declined dramatically as a proportion of total current revenues for public institutions. The declining proportion is partly due to declining state appropriations, but

[1] Author's calculations. All figures are based on 2010 dollars.

mostly due to increases in total revenues. Clearly, public institutions increasingly seek revenue growth from sources other than state revenues.

Figure 1.1(b) shows that median *gross* tuition (including tuition discounts) has increased as a percentage of total revenues for both public institutions and private institutions. Note that the total revenues of private institutions are very sensitive to the stock market. Figure 1.1(c) shows median net tuition revenue as a percentage of total current revenues. The median private institution generally generates at least 50% of its total current revenue from tuition. Over time, net tuition revenue has increased as a percentage of total revenue for public institutions as well. Furthermore, government appropriations for public institutions are largely based on enrollments, implying that enrollment related revenue represents the majority of revenue for most public institutions. Finally, Figure 1.1(d) shows that median *net* tuition revenue has increased dramatically since 1987.

The trends in Figure 1.1 imply that both public and private institutions are becoming more entrepreneurial in generating enrollment related revenues. The history of higher education implies that institutions are willing to dramatically change their curriculum and their target clientele when revenues become scarce (Brint & Karabel, 1989; Kraatz & Zajac, 1996; Veysey, 1965). While, prestigious institutions generate the majority of their revenue from research, donations, and investments, most institutions rely predominantly on enrollment related funding. Overall, these trends suggest a research program focusing on organizational behavior in pursuit of enrollment related revenues.

Generating enrollments from desired students. The research focus on enrollments can be broadened by recognizing that organizations care not only about enrollment growth, but also about generating enrollments from desired student populations. Winston (1999) argues that institutions pursue prestige by competing with one another for students with the strongest academic profile because organizational prestige is largely dependent on the academic profile of enrolled students.

Scholars have argued that whereas selective institutions use institutional financial aid (e.g., “merit scholarships”) to compete with peer institutions for the most desirable institutions (McPherson & Schapiro, 1998; Winston, 1999), non-selective institutions use institutional financial aid (e.g., tuition discounting) to attract enrollments sufficient for organizational survival (Jones, 2001; Lapovsky, 2001). More recent scholarship, however, finds that non-selective institutions increasingly use institutional financial aid to raise the academic profile of enrolled students (Doyle, 2010; Kraatz, Ventresca, & Deng, 2010). For example, Toma’s (2009) study of 38 Atlanta-based institutions finds that institutions across the prestige continuum attempt to “get to the next level” of prestige. Even community colleges increasingly desire to be “colleges of choice” for students considering four-year institutions rather than “colleges of last resort” for student populations that diminish reputational profile (e.g., welfare recipients, former prisoners, etc.) (Alfred, Shults, Jaquette, & Strickland, 2009).

A research program. Given the historical literature on enrollment growth (Veysey, 1965) and the more contemporary literature on growing enrollments from desired student populations (Doyle, 2010), I propose a general research program focusing on how postsecondary institutions change their behavior to generate enrollments from desirable student populations.

The research program will generate individual research papers by considering three issues that are salient to organizational decision-making. First, what kind of students do institutions desire? Non-selective institutions struggling for survival are not picky; any student that generates enrollment funding will do (Lapovsky, 2001). However, non-selective institutions may seek to diversify their resource base by attracting older students, part-time students, and graduate students.

Moving along the prestige continuum institutions become more selective about attracting particular students, those that generate the most revenue and those that raise academic profile (Winston, 1999). Public institutions may lose money on in-state students due to low tuition ceilings for in-state students (Hearn & McLendon, 2009). Therefore, public institutions may attempt to increase net revenue by recruiting out-of-state students, for whom no tuition ceiling exists (Curs, 2010). Furthermore, students willing to pay out-of-state tuition often have higher academic profiles than in-state students, thereby contributing to organizational prestige. Similarly, both private and public institutions may attempt to raise enrollment revenue and academic prestige by recruiting international students.

The research program generates empirical scholarship, second, by considering the ways organizations change their behavior to generate enrollments from desirable students. Kraatz and Zajac (1996) focus on changes in academic curricula. Brint and Karabel analyze change in organizational mission (Brint & Karabel, 1989). Doyle (2010) analyzes changes in institutional financial aid. Winston (1999) discusses the construction of new facilities. Organizations may also “bring the mountain to Mohammed” by building campuses in areas with strong market bases, including the construction of campuses abroad. Organizations can develop online curricula to attract students outside of local catchment areas. The expansion of summer programs, in both academic and extracurricular activities, generates enrollments during months of excess enrollment capacity. Finally, postsecondary institutions – especially for-profit institutions – may attempt to diminish the amount of work required per credit hour, thereby encouraging students to take higher course-loads.

Third, the research program assumes that institutions with different characteristics have varying ability to attract desired students. For example, prestigious institutions have a stronger ability to attract students with a strong academic profile because students maximize career and social mobility by attending the most prestigious institutions possible (Frank & Cook, 1995). All non-selective universities may desire to expand professional master’s degree enrollments, but organizations in dense metropolitan areas have access to a strong customer base.

To summarize, the research program on the pursuit of enrollments from desired students can generate individual research papers by considering (a) what students are desirable for what institutions, (b) how do institutions change their behavior to attract these desired students, and (c) what organizational characteristics provide a competitive advantage in attracting desired students. The research program would result in a collection of individual papers, each analyzing a particular behavioral change. However, each individual paper would contribute to an overall understanding of organizational behavior in postsecondary education.

Organizational Studies

I argue that organizational studies can make unique contributions to a research program on the pursuit of enrollments by institutions. Whereas the field of micro-organizational studies often focuses on interactions between people inside organizations, I focus on the field of macro-organizational studies, which typically uses organizations as the unit of analysis. Macro-organizational is interdisciplinary field, but draws primarily from sociology (Scott & Davis, 2006). Higher education researchers often use frameworks from economics to study institutional behavior (Cheslock & Gianneschi, 2008; Curs & Dar, 2010; McPherson & Schapiro, 1993). Like economics, many literatures within organizational studies view actors as goal-oriented "maximizers." However, I will argue that organizational studies can develop unique insights about postsecondary organizational behavior by viewing organizational behavior in relationship to the behavior of other relevant actors.

Theories of Higher Education Organizations

Peterson (1985) reviews the state of organizational theory in the field of higher education research. Peterson (1985) laments the trend towards "fragmentation," in which researchers borrow theories from other disciplines, based on other contexts,

> It is ironic that in postsecondary education, which many argue is unique,… so much reliance is placed on borrowing models. (p. 6)…..We need to emphasize further theory "development" to find better ways to understand postsecondary education's uniqueness…. There is also a need to encourage theory and research "synthesis" to clarify the theories and constructs, to examine more critically the applicability of the borrowed models, and to see what has been learned conceptually. (p. 11)

These criticisms of organizational research in higher education remain relevant today; by attempting to fit messy higher education cases into neat organizational theories, scholars often fail to develop insights about the case. However, whereas Peterson (1985) advocates the development of home-grown theories of higher education, I argue that recent developments in organizational studies are particularly suited to making contributions to the field of higher education research.

Recent Changes in Organizational Studies

The last decade of organizational studies has witnessed a decline in paradigm driven research and an increase in problem driven research based on the "organizational field" (Davis & Marquis, 2005). In paradigm driven work, scholars use cases to adjudicate between competing theoretical perspectives (e.g., Kraatz & Zajac, 1996) or to identify the properties of a theory (e.g., DiMaggio, 1991; Phillips & Zuckerman, 2001). In problem driven work, scholars use theory to develop insights about a real world problem (e.g., Sanders & Tuschke, 2007), but the mechanisms that have causal power in the empirical case do not necessarily exert the same force in other contexts (McAdam, Tarrow, & Tilly, 2001).

The decline of paradigm driven work. Organizational theory was dominated by paradigm driven work from the 1970s – which saw the birth of resource dependence theory, new institutional theory, organizational ecology, and transaction cost economics – until the end of the 20th Century.

In paradigm driven work, the goal of adjudicating between alternative theories – the "horse race" – can be problematic. First, pitting two theoretical perspectives is difficult when both perspectives predict the same response. For example both resource dependence (Pfeffer & Salancik, 1978) and institutional theory (Edelman, 1992) predict symbolic adoption. Second, pitting two theoretical perspectives is problematic when the perspectives explain different phenomena (Davis, 2010). For example transaction cost economics explains make-or-buy decisions (Williamson, 1987) whereas population ecology explains why organizations find it difficult to change (Hannan & Freeman, 1984). Third, theoretical perspectives become internally inconsistent as they grow to encompass more problems, for example when neo-institutional theory began to incorporate agency (DiMaggio, 1988). Internal inconsistency makes it difficult to develop a single hypothesis that represents an entire theoretical perspective in the horse race against another perspective.

A more common goal of paradigm-driven research is to identify scope conditions within a single theoretical tradition (e.g., Meyer & Scott, 1983) or to propose extensions to a single theoretical tradition (e.g., DiMaggio, 1988). Here, the specific research context – the empirical case – is valued for its contribution to general theory. However, this approach to paradigm-driven research is also problematic because it often turns out that supposedly universalistic theories provide good predictions only in certain empirical contexts (Davis, 2010). For example, resource dependence theory predicts that corporations will diversify in order to minimize dependence on any single customer or supplier (Pfeffer & Salancik, 1978). In the 1980s, however, diversification became undesirable as conglomerate corporations became targets for hostile takeovers (Davis, Diekmann, & Tinsley, 1994). The lesson learned is that theories are only predictive in certain contexts, but context changes over time and from one organizational population to another.

Mechanisms in problem-driven work. Problem-driven work takes context seriously by building hypotheses from mechanisms (Bastedo, forthcoming). A mechanism explains *why* two variables have a causal relationship (Hedström & Swedberg, 1998). For example, Pfeffer and Salancik (1978) describe a diversification mechanism; focal organizations relying on a single customer (variable A) will attempt to find alternative customers (variable B) because reliance on a single customer enables that customer to exert control over the focal organization.

Mechanisms that have causal power in one empirical context do not have causal power in another context because mechanisms depend on the presence or absence of other necessary conditions. For example, the threat of hostile takeovers in the 1980s (Davis, et al., 1994) created a context unsuitable for the diversification mechanism in corporate America.

Mechanisms are typically smaller than theories, in that mechanisms typically posit a simple relationship. Therefore, Mechanisms provide an intermediary level of prediction between pure story-telling and grand theorizing (Davis & Marquis, 2005). Whereas entire theories typically do not fit all the aspects of an empirical case, mechanism based theorizing makes predictions about organizational behavior by identifying mechanisms linking specific actors to one another.

The organizational field and problem driven work. Problem-driven work also takes context seriously by designing research around the "organizational field." The field consists of actors – focal organizations, key suppliers, customers, and regulators – relevant to a real world problem (DiMaggio & Powell, 1983; McAdam, et al., 2001). Actors in the field are maximizers, but their behavior is not atomistic; the field encourages researchers to consider the relationships between different actors in the field. As such, the field is conducive to mechanism-based theorizing, which identifies simple mechanisms linking the behavior of one actor to the behavior of another. Finally, scholarship based on the field often views changes in the external environment – for example technological changes, or demographic changes – as particularly important causes of organizational change (Davis, 2005). Once the researcher sketches the organizational field relevant to a particular problem, organizational behavior is the contingent result of goal-oriented actors interacting with one another and reacting to changes in the external environment.

Having discussed recent changes in organizational studies, I revisit the argument (Peterson, 1985) that higher education researchers should develop their own theories rather than borrow theories from other disciplines. This argument was salient when the field of organizational studies was dominated by paradigm-driven research. However, I argue that problem-driven research designs – which sketch the unique organizational field and posit mechanisms linking specific actors to one another – can develop insights about practice. By using theories from organizational studies to develop insights about higher education cases, higher education researchers (a) draw on well-developed literatures supported by robust empirical evidence and (b) become connected with scholars from different fields. In contrast, by developing home-grown theories to study higher education cases, the field of higher education research becomes an isolated island.

Sketching the Organizational Field of Higher Education

I began this chapter reviewing the history of American higher education to develop a research program on the pursuit of enrollments by institutions. Next, I traced recent changes in the field of organizational studies, arguing that problem-driven research based on the organizational field can develop important insights about institutional behavior. In this section I sketch the organizational field relevant to the research program on the pursuit of enrollments. I conclude the chapter by motivating the two specific empirical studies presented in the dissertation.

What Are Institutions Attempting to Maximize

Pursuit of resources. Sketching the organizational field begins by selecting the focal actors of interest and identifying what these actors are trying to maximize. The focal actors of interest are postsecondary institutions. I argue that institutions seek to maximize resources and prestige. The discussion of resources draws from resource dependence theory (Pfeffer & Salancik, 1978). Survival is the most basic goal of any organization and all organizations require a stable flow of resources from the external environment in order to survive (Parsons, 1956). Focal organizations also seek a diversified resource base; reliance on a single resource provider allows that resource provider to control the focal organization and also places the focal organization in a position of vulnerability should that exchange relationship dissolve (Pfeffer & Salancik, 1978). Drawing on these ideas, I argue that institutions will attempt to diversify their revenue streams.

Prestigious universities can generate strong revenues from tuition, donations, investments, and research (Wellman & AIR, 2009). Prestigious liberal arts colleges can generate strong revenues from tuition, donations, and investments. Non-prestigious institutions predominantly depend primarily on enrollment related revenues, specifically tuition or government appropriations that follow enrollments. Although non-prestigious institutions face challenges raising non-tuition revenues, they can diversify their student enrollments by adopting new academic programs, new degree-levels (e.g., master's degrees), new attendance patterns (e.g., night courses), and new modes of instruction (e.g., online education).

Pursuit of Prestige. Bowen (1980) describes universities as organizations that make as much money as they can and spend all the money they make on becoming more prestigious. Prestige depends significantly on the academic profile of enrolled students (Bowman & Bastedo, 2009). Therefore, Winston (1999) argues colleges pursue prestige by competing with one another for the best students. Institutions compete for desirable students by spending more on each student than they charge in tuition; they offer a subsidy. That subsidy is comprised of non-tuition revenues, for example donation and investment revenues. Institutions with the largest sources of non-tuition revenue have the highest subsidies and are more successful in competing for the most desirable students, leading to subsequent increases in prestige.

The discussion of resources and prestige shows that these two pursuits cannot be studied in isolation. The pursuit of national prestige requires abnormally strong resources. Further, nationally prestigious institutions have superior resource-generating capabilities relative to non-prestigious institutions.

However, the pursuit of enrollments differs between prestigious and non-prestigious institutions. Prestigious institutions generate the majority of their revenue from non-tuition activities. They are selective about admissions because the goal of admissions is to raise the academic profile of enrolled students, thereby increasing prestige (Bowman & Bastedo, 2009). Non-prestigious institutions generate the majority of their revenue from tuition-related activities, but experience weak student demand; the goal of admissions is to enroll as many students as possible (Jones, 2001).

Actors in the Field

Many actors in the field of higher education are relevant to the pursuit of desired enrollments. My discussion focuses on students, governments, other postsecondary institutions, and external changes to the field.

Students. Students are the core customers for postsecondary institutions. Students attempt to maximize social and career mobility (Labaree, 1997). Competition for social mobility increases when the number of desirable opportunities declines relative to the number of aspirants (Blau, 1994). Colleges and universities are the primary beneficiaries of a system in which social mobility depends on the acquisition of educational credentials (Collins, 1979). However, not all colleges and universities benefit equally from this system. Prestigious institutions enjoy robust student demand because credentials from prestigious institutions send strong "signals" (Spence, 1973) in labor and social markets.

Hershbein (2010) finds that as the proportion of baccalaureate degree holders has increased, so too has the "signaling effect" on wages for bachelor's degrees from prestigious institutions. Similarly, Hoxby (1997, 2009) argues that the growth in undergraduate tuition at selective institutions can be explained by the increasing returns to selective education. Selective institutions also enjoy strong demand for graduate programs, especially from graduates of less selective baccalaureate institutions seeking to "upgrade their alma mater" (New York Times, 2009). In contrast, less selective institutions cannot charge high tuition prices and must engage in aggressive discounting to overcome excess enrollment capacity (Lapovsky, 2001). The discussion of students shows why institutions focus so much energy on becoming more prestigious; prestigious institutions enjoy robust demand even while charging high prices whereas non-prestigious institutions scramble to generate sufficient enrollments to cover fixed costs.

Other colleges and universities. The segmented nature of competition in higher education suggests that the behavior of postsecondary institutions is affected by the behavior of other postsecondary institutions. On one hand, institutions are likely to be very sensitive to behavioral changes by rival institutions (Burt, 1987). For example, the rapid adoption of no-loan tuition policies by elite colleges and universities can be viewed as competitive mimicry (McLendon, Flores, & Park, 2010). On the other hand, the presence of more prestigious institutions constrains the behavior of less prestigious institutions; less prestigious institutions are forced to survive by engaging behaviors that more prestigious institutions avoid for fear of undermining their brand image (Podolny, 1993).

For example, the University of Minnesota has a successful master's in public health program (MPH), which graduated 111 students in 2010.[2] The Twin Cities campus of Argosy University adopted an MPH program in 2010. Whereas the University of Minnesota program may seek to raise its academic profile to compete with nationally prestigious MPH programs, Argosy will likely avoid direct competition with University of Minnesota by focusing on night school for working adults.

[2] Author's calculations.

A particular strength of organizational studies is showing how relationships between organizations affect organizational behavior. These relationships are often quantified as social network ties – tangible communication links connecting different organizations (Kraatz, 1998; Mizruchi, 1992) – and/or as competitive relationships in which the organizations do not interact directly but affect one another through their mutual pursuit of a common customer base (Burt, 1992; Greve, 1996).

A robust organizational studies literature categorizes different kinds of relationships between organizations – e.g., strong ties versus weak ties, cohesion versus structural equivalence – and posits mechanisms suggesting the effects of these relationships (Mizruchi, 1994; Strang & Soule, 1998). Therefore, one advantage problem-driven research based on organizational studies literatures is the body of knowledge about how to theorize and measure the relationships between organizations (Kilduff & Brass, 2010).

Governments. Governments affect the behavior of colleges and universities primarily through funding and through regulation. Two important sources of federal funding are Title IV federal funding to students and federal research funds administered through a variety of agencies. From the perspective of colleges and universities, Title IV grants and loans both work like voucher programs; the money follows students wherever the student chooses to enroll. Therefore, the higher education system becomes more "market-like" to the extent that government funding is allocated directly to students and less market-like to the extent that funding is allocated directly to institutions via appropriations (Harbour & Jaquette, 2007). Over time, maximum loan amounts have increased and graduate students and affluent households have become eligible for subsidized loans(Hearn, 1998). These changes increase student access to capital and may provide institutions with an incentive to increase tuition prices and adopt more graduate programs.

States primarily fund public institutions through appropriations. Over the past several decades, state appropriations have stagnated (Kane, Orszag, & Gunter, 2003) and have become increasingly volatile (Doyle & Delaney, 2009). Drawing on resource dependence theory, the decline or increasing volatility of a major funding source compels public institutions to become increasingly entrepreneurial about generating additional tuition revenues. One approach is to increase out-of-state students (Curs, 2010). Another approach is to adopt academic programs that generate high tuition revenues. State regulating agencies often place limits on the percent of out-of-state students (Richardson, Bracco, Callan, & Finney, 1999), set ceilings on tuition prices for in-state students (Richardson, et al., 1999), and strictly regulate academic program adoption in order to minimize “unnecessary duplication” across institutions (Barak, 2007). However, some states (e.g., Colorado) are offering institutions more autonomy about pricing and academic program creation in exchange for less state appropriations (Breneman, 2004; Hearn & McLendon, 2009).

External environment. Though not an actor per se, changes in the external environment have profound effects on organizations (Davis, 2005). Demographic changes affect demand for higher education (Mayhew, 1979). For example, the population of “traditional” college freshman – defined as ages 18 and 19 – declined from a peak of 8.7 million in 1977 to a low of 6.9 million in 1992 before increasing again (NCES, 2010, Table 15). Population decline negatively affected undergraduate enrollments, especially for non-selective institutions, compelling colleges and universities to pursue adult students.

Advances in technology create both opportunities and threats for postsecondary institutions. In particular, the internet engenders dramatic improvements to distance education, allowing even non-selective institutions to compete for geographically disperse clientele. In contrast to "brick and mortar" education (Breneman, 2001), online education has strong economies of scale. Therefore, just as advances in rail travel, communications, and refrigeration enabled corporations to compete on a national scale (Chandler, 1977), online education contributes to increased market share for corporate for-profit providers and specialized curriculum designers that compete in national and global markets.

Empirical Studies

The adoption and production of master's degrees. Having outlined the relevant organizational field, I motivate two empirical studies within the research program on the pursuit of enrollments from desired students.

Chapter 3 analyzes the adoption and production of master's degrees. The annual production of master's degrees increased from 290,000 in 1987 to 670,000 in 2009. I trace the increase in student demand for master's degrees to changes in the supply and demand for college-educated labor (Pappano, 2011). The proportion of 25-29 year-olds with a baccalaureate degree increased from 26% in 1980, to 32% in 2000, to 35% in 2009 (NCES, 2010). By contrast, the Bureau of Labor Statistics (2006) states that only 20% of jobs "required" (according to job-skill requirements) at least a baccalaureate degree in 2004 and projects that 21% jobs will require at least a baccalaureate degree in 2014.

Holding the number of opportunities constant, as general educational achievement rises, there are fewer positions for qualified candidates, leading to more competition for available opportunities (Blau, 1994; Boudon, 1974). Paradoxically, as the growth of college-educated labor outpaces the growth of jobs requiring a college education, individuals have an incentive to obtain master's degrees in order to gain distinction from the growing proportion of baccalaureate degree holders. Therefore, postsecondary institutions can capitalize on the scarcity of job opportunities by adopting master's degree programs designed to provide a competitive advantage relative to baccalaureate degree holders.

I argue that master's degrees represent a potential solution to enrollment problems at both non-prestigious and prestigious institutions. Non-prestigious institutions generally have excess capacity and undiversified revenue streams (Jones, 2001); master's degrees represent an opportunity to grow enrollments and an opportunity to lessen the reliance on undergraduate students as the sole source of funding. For prestigious institutions, master's degrees can subsidize the pursuit of prestige. Prestigious institutions may be reluctant to grow undergraduate enrollments because enrollment expansion may hurt academic profile. However, prestigious institutions can expand master's degree production with relative impunity because the academic profile of master's degree students has a smaller effect on the prestige of the overall institution.

No studies to date have analyzed the expansion of master's degrees from an organizational behavior perspective. Using a paradigm-driven research design, I derive testable hypotheses from three theoretical perspectives. Human capital theory argues that institutions adopt degrees demanded by the labor market. Resource dependence theory argues that institutions adopt degrees to generate revenues when "traditional" revenues decline. Research on the pursuit of prestige argues that institutions will maximize revenue from master's degrees in order to subsidize the pursuit of prestige. I test these hypotheses on a panel dataset of all accredited colleges and universities from 1975 to 2009.

Mission drift in liberal arts colleges. Chapter 4 analyzes the causes and effects of mission drift in the population of liberal arts colleges. I adopt a problem-based research design, developing a cohesive conceptual framework by integrating several literatures within institutional theory. An organizational template is the set of rules that defines permissible and prohibited behaviors for organizations of a particular type (Greenwood & Hinings, 1996). The liberal arts college template defines a liberal arts college as an organization that enrolls no more than 1,800 students and focuses exclusively on undergraduate liberal arts education for full-time, residential, "traditional" college-age students (Breneman, 1990). The comprehensive university template, by contrast, places no limits on enrollment growth, the adoption of graduate programs, or the recruitment of part-time and adult students. I define mission drift as a change in organizational template.

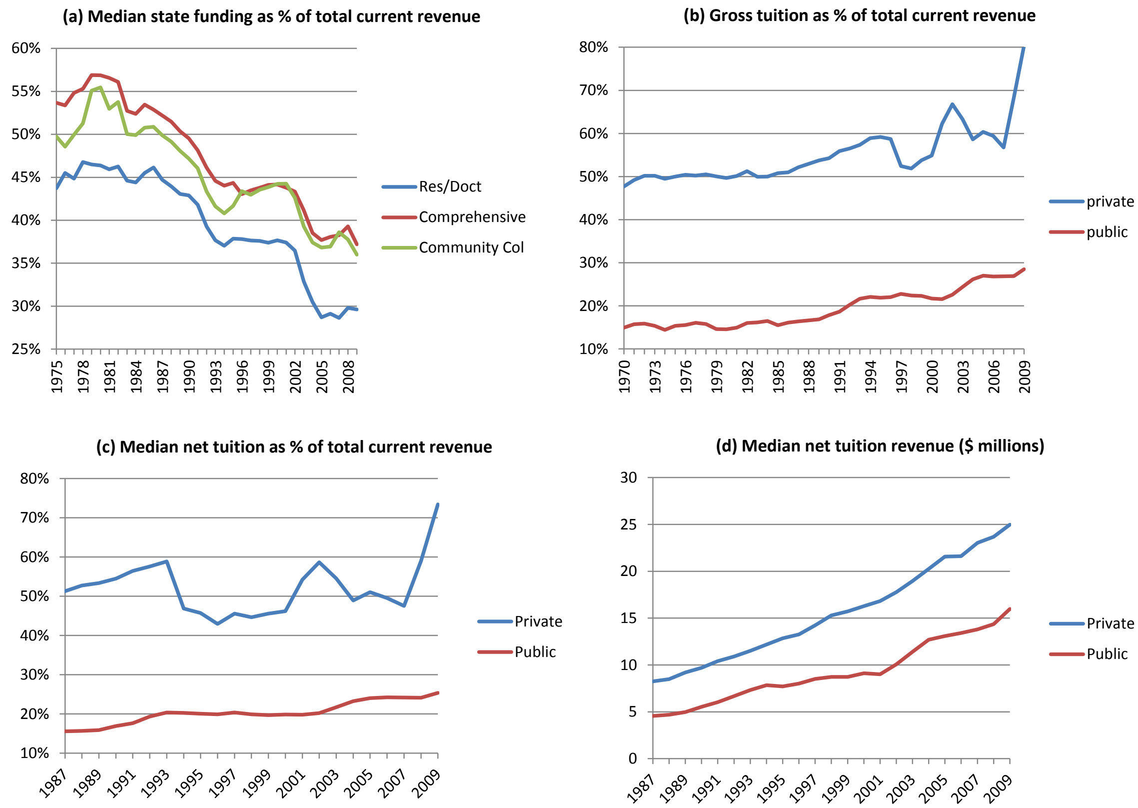
Liberal arts colleges primarily depend on tuition revenue to survive. In the 1970s and 1980s, changes in the external environment – population decline, changes in student preferences, and increasing enrollment capacity at public institutions – negatively affected the enrollments of colleges adhering to the liberal arts template. I argue that many liberal arts colleges became comprehensive universities in response to these environmental changes. I argue that dropping the word "college" and adding the word “university” to the organizational name (e.g., Lesley College becomes Lesley University) symbolizes the adoption of the comprehensive university template. I develop a conceptual framework to study the adoption of the comprehensive university template, drawing on market factors, institutional factors, and social network factors. I test hypotheses about the causes and effects of becoming a university on a panel dataset of all liberal arts colleges from 1975 to 2009.

Analyses of academic program adoption in Chapter 3 and mission drift in Chapter 4 pose intense panel data requirements. Chapter 2 describes the creation of a panel dataset that follows all colleges and universities from 1969 to 2010, using data from the Higher Education General Information Survey (HEGIS) and the Integrated Postsecondary Education Data System (IPEDS). The length of the panel allows researchers to analyze change over time in attributes that scholars often treat as fixed – e.g., whether the institution is a comprehensive university or a research university. I use this panel dataset to test hypotheses in Chapters 3 and 4. In the future, I hope that this panel dataset becomes a valuable resource for other researchers studying postsecondary institutional behavior.

Finally, Chapter 5 summarizes the findings from Chapters 3 and 4, and synthesizes the results to resolve apparent contradictions, especially with respect to the pursuit of prestige versus the pursuit of enrollment growth. I discuss implications for future research on postsecondary institutional behavior, arguing that problem-driven research (Chapter 4) is more likely to develop valuable insights about organizational change than paradigm-driven research (Chapter 3). I also discuss implications for practice and for policy. The results imply that administrators attempting to maximize resources and prestige should be aggressive in adopting an entrepreneurial curriculum. However, the pursuit of individually rational goals by organizations does not necessarily contribute to societal goals. Therefore, policies that seek to align the incentives of individual organizations with the goals of policy will be more successful than policies that ignore the self-interest of organizations.

Figure

Figure 1.1 Median revenues, 1976 Carnegie Classification excluding specialized institutions



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Chapter 2 :

Data

This paper describes the creation of a panel dataset of all accredited postsecondary institutions from 1969 to present, incorporating data from the Higher Education General Information Survey (HEGIS) for the years 1969 through 1986 and data from the Integrated Postsecondary Education Data System (IPEDS) for the years 1987 to the present. I refer to this panel dataset as the HEGIS/IPEDS panel. The HEGIS/IPEDS panel is the basis for the empirical analyses presented in Chapters 3 and 4 and will be used in future research projects.

HEGIS and IPEDS are the core sources of organization-level data on U.S. colleges and universities. The HEGIS survey consists of survey components on Finance, Fall Enrollment, Institutional Characteristics, Completions, State Migration, Libraries, and Faculty/Staff. The IPEDS survey consists of survey components on Institutional Characteristics, Fall Enrollment, 12-month Enrollment, Completions, Graduation Rates, Student Financial Aid, Instructional Staff/Salaries, and Fall Staff.

In the future, the HEGIS/IPEDS panel will be publicly released for use by other researchers. The HEGIS/IPEDS panel will be useful for researchers because raw HEGIS and IPEDS data require substantial manipulation prior to analyses. Some researchers may use the HEGIS/IPEDS panel to conduct research on organizational behavior. Others may use it to merge organization-level variables to student-level data. Although other public use datasets exist, they are inappropriate for certain research questions.

The goal of this chapter is to introduce researchers to concepts that must be understood prior to using HEGIS and IPEDS data. Section one describes potential uses of a longitudinal dataset that combines HEGIS and IPEDS data and also discusses strengths and limitations of existing public-use datasets. Section two provides an overview of HEGIS and IPEDS sampling procedures. Section three discusses how HEGIS and IPEDS record data from different organizational forms (e.g., systems, main campuses, and branch campuses). In particular, I focus on the "parent-child" relationship – when data for a "child" campus are reported with a "parent" campus – which poses the greatest challenge to creating the HEGIS/IPEDS panel. Section four discusses the individual survey components (e.g., Fall Enrollment, Finance), with a focus on core concepts and variable availability over time. Section five discusses limitations and future work.

Contributions and Existing Public Use Datasets

Potential Uses of the HEGIS/IPEDS Panel

The HEGIS/IPEDS panel can be used by researchers analyzing organizations as the unit of analysis. Research on organizational behavior typically requires panel data in order to analyze how and why behavior changes over time (Davis, 2010). For many researchers, the requisite time-investment in programming and understanding the idiosyncrasies of the raw HEGIS and IPEDS data create a significant obstacle to conducting panel data analyses. Therefore, the public release of the HEGIS/IPEDS panel may encourage research on postsecondary organizations by incurring some of these fixed costs.

Scholars of organizations can study many topics using the HEGIS/IPEDS panel. Most immediately, the HEGIS/IPEDS panel was created to analyze the adoption and production of master's degrees, in Chapter 3, and to analyze mission drift by liberal arts colleges, in Chapter 4. Other potential studies using the data include, but are not limited to:

- The production of science, technology, engineering, and mathematics (STEM) degrees (GAO, 2005)
- The diffusion of particular degree programs (Kraatz, 1998; Rojas, 2003)
- The recruitment of out-of-state students in response to declines in state funding
- The effect of changes in student loan policies on tuition prices (McPherson & Schapiro, 1993)
- Institutional closures and mergers
- The growing market share of for-profit education
- Changing age-composition and attendance-status in postsecondary education
- Changing revenue composition and expenditure composition in postsecondary education
- The growing use of adjunct professors
- Change over time in institutional aid to students (e.g., discounting)
- The adoption of responsibility centered management systems by institutions
- The effect of a change in rankings on the number of applications and enrollment yield.

Most quantitative studies in the field of higher education use students as the unit of analysis. The HEGIS/IPEDS panel can provide organization-level measures for student-level analyses. For example, measures of in-state and out-of-state tuition or average SAT/ACT scores can be merged to administrative data from state data systems, to institutional data, or to NCES longitudinal survey data such as NLS72, HS&B, NELS, or ELS.

Strengths and Limitations of Existing Public-Use Datasets

Several public-use panel datasets of higher education institutions exist: the Delta Cost Project; Colleges & Universities 2000 Database by Steven Brint; and the NSF WebCASPAR system.

The Delta Cost Project (DCP) has created a panel dataset of all postsecondary education institutions from 1987 to present using IPEDS data. Data from the DCP panel are high quality, have excellent documentation, and can be downloaded for free. The DCP panel has important strengths relative to the HEGIS/IPEDS panel. Principally, DCP creates measures from all survey components of IPEDS. Although additional survey components will be added over time , the current HEGIS/IPEDS panel includes only Finance (revenue only), Fall Enrollment, Institutional Characteristics (IC), and Completions.

The HEGIS/IPEDS panel has two advantages over to the DCP panel. First, the DCP panel covers the period 1987 to present whereas the HEGIS/IPEDS panel covers 1969 to present. Researchers may desire the longer panel for certain topics (e.g., academic program adoption). Second, DCP treatment of the parent-child relationship can undermine analyses. A parent-child relationship occurs when a university reports data at a multi-campus or system level, rather than the campus level. For example, the University of Texas (UT) campuses report assets at the system level. The DCP panel collapses all UT campuses (e.g., UT Austin, UT San Antonio) into a single organization. The same is true the University of Missouri, the University of Massachusetts, and other public universities.

Grouping many campuses into a single observation can undermine research. For example, consider research on whether out-of-state enrollment increase in response to declines in state funding. The analysis should differentiate between flagship and non-flagship campuses, since non-flagship campuses may be unable to attract out-of-state students. The HEGIS/IPEDS panel aggregates multi-campus institutions less often than the DCP panel, making it more appropriate for certain research questions.

A second public-use resource, NSF's WebCASPAR system allows users to download Completions Survey data from the HEGIS and IPEDS Completions Component for all years from 1966 to present. In isolation, these degree data are useful only for descriptive statistics. In contrast, the HEGIS/IPEDS includes measures from the Completions Component and from other survey components. A third public-use resource is the Colleges & Universities 2000 Database by Steven Brint.[3] This public-use dataset covers the years 1970 through 2005 and incorporates data from HEGIS, IPEDS, Census data and other sources. However, the data are available at five-year intervals and only for 383 institutions.

After reviewing extant public use datasets, the HEGIS-IPEDS panel can make a contribution to the research community. The DCP panel is the best existing public-use dataset. DCP data are used by academic researchers, institutional researchers, and non-researchers. By contrast, the HEGIS/IPEDS panel is targeted at scholars and will be

[3] http://www.higher-ed2000.ucr.edu/databases.html

especially useful when research questions require data prior to 1987 or require alternative solutions to the parent-child data problem.

Although the remainder of the chapter focuses on changes over time in the HEGIS and IPEDS surveys, I comment briefly on the creation of the HEGIS/IPEDS panel. A separate dataset of analyses variables is created from each survey component (e.g., Completions, Institutional Characteristics). These datasets are merged together by organization-id and year to create the HEGIS/IPEDS panel. I have developed user-defined statistical programs that create measures for multiple years of data. Therefore, newly released IPEDS data can be incorporated into the HEGIS/IPEDS panel and existing variables can be modified for all years without significant programming. Though input datasets have varying data structures, the final organization of HEGIS/IPEDS panel is one observation per organization-year.

HEGIS and IPEDS Sampling

The National Center for Education Statistics (NCES) conducted HEGIS from 1966-1986 and IPEDS from 1987 to present. This section provides an overview of the HEGIS and IPEDS sampling. Decisions about what institutions are included in the sample depend on key concepts (e.g., what is an "institution of higher education"). Therefore, this section pays particular attention to change over time in these concepts.

Table 2.2 shows the number of institutions in the HEGIS/IPEDS universe, using data from the IC Component. All institutions included in HEGIS were included in IPEDS, but IPEDS also includes institutions not included in HEGIS. The number of institutions increased from 3,714 in 1985-86, the last year of HEGIS, to 12,917 in 1986-

87, the first year of IPEDS. Over time the number of institutions included in IPEDS has decreased, mostly due to changes in sampling rules rather than a decline in the overall population of institutions.

Eligibility for Title IV financial aid programs has been an important determinant of which institutions are included in HEGIS and IPEDS samples. Both HEGIS and IPEDS are products of the NCES, which was created as part of the 1965 Higher Education Act (HEA) (Hyatt & Dickmeyer, 1980, p. 7). Title IV of HEA covers the administration of federal student financial aid programs, for example Pell Grants and low-interest student loans. A "Title IV institution" means that students attending the institution are eligible for Title IV financial aid programs (NCES, 2011).

Accreditation is the core concept that determined inclusion in the HEGIS universe. "Institution-level accreditation" covers the entire organization.[4] An "institution of higher education", a legacy concept used by NCES, is defined as an organization accredited at the institution level by an accrediting agency recognized by the Secretary of the U.S. Department of Education (NCES, 2011). All institutions of higher education are eligible for Title IV federal financial aid programs. All institutions of higher education were required to complete all HEGIS survey components. Table 2.2 shows that the number of institutions of higher education increased from about 2,800 in 1969 to 3,700 in 1986.

In 1987 IPEDS replaced not only HEGIS, but the Survey of Non-Collegiate Postsecondary Institutions (SNPI), and the Vocational Education Data System (VEDS). IPEDS includes all HEGIS institutions. IPEDS also includes institutions excluded from

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[4] *Program-level* accreditation accredits a particular academic program, for example when the Commission on Collegiate Nursing Education accredits a bachelor's of science in nursing program within an institution (Council for Higher Education Accreditation, 2002).

HEGIS. Whereas accreditation determined inclusion in HEGIS, accreditation is a characteristic about which data are collected in IPEDS (Cohen, 1990).

Beginning in 1987, the core concepts determining inclusion in IPEDS were "postsecondary institutions" and "sector." Postsecondary institutions are organizations having the provision of postsecondary education as their primary mission or one of their primary missions (Cohen, 1990). In turn, "postsecondary education" is defined as the provision of formal instructional programs whose curriculum is designed primarily for students who have completed the requirements for a high school diploma or its equivalent. This includes programs whose purpose is academic, vocational, and continuing education, but excludes a-vocational and adult basic education programs.

Postsecondary institutions are categorized into nine sectors according the highest level of degree warded and institutional control. Table 2.3 shows frequencies of academic-year by sector for the IPEDS universe from 1987 to 2010. The nine sectors are as follows:

- Baccalaureate degree or higher
    - (1) Public
    - (2) Private, not-for-profit
    - (3) Private, for-profit
- Two-year degree or higher, but less than baccalaureate degree
    - (4) Public
    - (5) Private, not-for-profit
    - (6) Private, for-profit
- Less than two-year degree

- (7) Public
- (8) Private, not-for-profit
- (9) Private, for-profit

In the early years of IPEDS, sector determined inclusion in the IPEDS universe and also which IPEDS survey components each institution had to complete. Initial IPEDS survey components included IC, Finance, Completions, Fall Enrollment, Instructional Staff & Salaries, and Fall Staff. All postsecondary institutions (i.e. all institutions in sectors 1-9) were required to complete the IC Component (Cohen, 1990). Postsecondary institutions in sectors 1-7 were required to complete all survey components. A probability sample of institutions in sector 8 (less than two-year, private not for profit) and sector 9 (less than two-year, private for profit) were also required to complete all survey components.

Cohen (1990) describes a two-stage process for choosing which sector 8 and sector 9 institutions must complete all IPEDS survey components. First, a "HEGIS institution" is an institution that fulfilled the requirements for inclusion in the HEGIS survey, specifically those institutions accredited by an accrediting agency recognized by the secretary of the U.S. Department of Education. All HEGIS institutions were required to complete all IPEDS survey components, regardless of sector. Based on data from the 1987-88 Fall Enrollment Component, there were two HEGIS institutions in sector 8 and 20 HEGIS institutions in sector 9 (Cohen, 1990). Second, in 1987-88 NCES set the sample size of non-HEGIS sector 8 and sector 9 institutions required to complete all survey components at 1,200, out of approximately 6,200 sector 8 and sector 9 institutions in the IPEDS universe (Cohen, 1990). Institutions were selected using probability sampling, with the probability of selection positively related to total enrollments.

The set of institutions required to complete each IPEDS survey component has changed over time. Since 1992, IPEDS has focused on institutions participating in Title IV federal financial assistance programs. Section 490 of the Higher Education Amendments of 1992 (P.L. 102-325) made IPEDS mandatory for institutions that participate in any Title IV program (NCES, 2005). Table 2.4, taken from NCES (1995), shows what institutions were required to complete each IPEDS survey components from 1992 to 2000. Note that different Fall Enrollment components were required for four-year institutions (EF1) versus less-than four-year institutions (EF2) and that different Finance Survey Components were required for public institutions (F1) and private institutions (F1A).

IPEDS was redesigned in 2000 (NCES, 1999). One dramatic change was the replacement of paper-based surveys with web-based surveys that included built-in checks to increase accuracy. Redesign reaffirmed Title IV institutions as the focus of IPEDS. The IPEDS redesign acknowledged four kinds of institutions:

A. Degree and other award granting Title IV postsecondary education institutions (i.e. whose primary mission is to provide postsecondary education) that are open to the general public
B. Degree and other award granting non-Title IV postsecondary education institutions that are open to the general public
C. Title IV institutions whose primary mission is not to provide postsecondary education, but that offer postsecondary education programs

to the general public (e.g., high schools that offer postsecondary education courses)

D. All other institutions, including (1) postsecondary education institutions whose programs are not open to the general public; and (2) non-Title IV institutions whose primary mission is not postsecondary education but includes postsecondary education programs

The IPEDS redesign recommended that type A institutions would be required to complete all IPEDS survey components (NCES, 1999). Type B and C institutions would be required to provide "minimal data," including (1) the directory information such as name, address, and accreditation status and (2) basic institutional characteristics such as enrollment by race and ethnicity, number of awards by program, and tuition and fees (NCES, 1999). IPEDS data would not be required of type D institutions. Beginning in 1997, the IC Survey Component includes an indicator of eligibility for Title IV programs. Table 2.5 shows a tabulation of academic-year and Title IV eligibility using data from the IC Survey Component. Note that the number of institutions included in the IC Survey Component that are ineligible for Title IV funding declines dramatically from 2,733 in 2001 to 165 in 2002.

In summary, although the rules for sample inclusion have changed over time, a particular set of institutions are present in all years. Institutions that are (1) accredited by an agency recognized by the secretary of the U.S. Department of education and (2) are eligible for Title IV federal funding are required to complete all survey components in all HEGIS years and all IPEDS years. Institutions that are (1) eligible for Title IV federal funding and (2) are in sectors 1-7 (1= 4-yr public; 2= 4-yr private, not-for-profit; 3= 4yr private, for-profit; 4=2-yr public; 5=2yr private, not-for-profit; 6=2yr private, for-profit; 7= less-than-2yr public) are required to complete all survey components in all IPEDS years. Depending on the year, institutions not fulfilling these criteria do not complete any survey components or complete only a subset of survey components.

Organizational Form and the Parent-Child Relationship

Postsecondary education institutions may be organized as standalone institutions, as multi-campus institutions with a main campus and one or more branch campuses, as a system of standalone institutions and multi-campus institutions, or as another organizational form. The organizational form of a postsecondary education institution affects how organizations record data in HEGIS and IPEDS survey components. For example, a main campus may separately record data for the main campus and each of its branch institutions. Alternatively, a main campus may aggregate data from branch campuses, reporting the cumulative data from all campuses as if these data belonged to a single institution. In this section I, first, provide an overview of how HEGIS and IPEDS treat different organizational forms. Second, I discuss the parent child relationship and on alternative solutions to problems posed by the parent-child relationship.

Treatment of Organizational Form in HEGIS and IPEDS

HEGIS survey components define five organizational forms: institutional systems; single campus institutions; multi-campus institutions; main-campuses; and branch campuses (U.S. Dept. of Education & NCES, 1976). These organizational forms are not mutually exclusive from one another. For example, a multi-campus institution can have a main campus and branch campuses or several multi-campus institutions may exist within a single institutional system. The organizational forms are defined below (U.S. Dept. of Education & NCES, 1976, p. 46) and Appendix A identifies what organizational forms were present in what survey components during the HEGIS years:

- INSTITUTIONAL SYSTEM. A complex of two or more institutions of higher education, each separately organized or independently complete, under the control of supervision of a single administrative body.
- MULTI-CAMPUS INSTITUTION. An organization bearing a resemblance to an institutional system, but unequivocally designated as a single institution with either of two organizational structures: (1) an institution having two or more campuses responsible to a central administration (which central administration may or may not be located on one of the administratively equal campuses) or (2) an institution having a main campus with one or more branch campuses attached to it.
- MAIN CAMPUS. In those institutions comprised of a main campus and one or more branch campuses, the main campus (sometimes called the parent institution) is usually the location of the core, primary, or most comprehensive program. Unless the institution-wide or central administrative office for such institutions is reported to be at a different location, the main campus is also the location of the central administrative office.
- BRANCH CAMPUS. A campus of an institution of higher education which is organized on a relatively permanent basis (i.e., has a relatively permanent administration), which offers an organized program or programs of work of at least 2 years (as opposed to courses), and which is located in a community

different from that in which its parent institution is located. To be considered in a community different from that of the parent institution, a branch shall be located beyond a reasonable commuting distance from the main campus of the parent institution.

During the HEGIS years, each separately accredited institution with its own institutional ID code – whether it is a single campus institution or a branch campus within a multi-campus institution – was responsible for completing HEGIS survey components. The data for each non-separately accredited institution/branch/campus were reported with a "parent" institution.[5] Therefore, "parent" institutions are defined as institutions that report data for themselves and at least one other institution, branch, or campus. A "parent-child relationship" identifies the parent institution and the child institution(s).

Difficulties arise when a parent-child relationship exists for one survey component (e.g., Finance) but not for another survey component (e.g., Fall Enrollment). For example, consider a multi-campus institution with one main campus and three branch campuses. The Fall Enrollment data may have four observations per year. The Finance data may have one observation per-year if Finance data for the three branch campuses are reported with the parent. In such cases, the Finance data and Fall Enrollment data cannot be merged without first devising a solution to the "parent-child problem."

Important differences exist between HEGIS and IPEDS in terms of reporting data from branch campuses. During HEGIS years, data were reported separately for a branch

[5] The formal language for this rule is as follows: "Please note that each institution, branch, campus, or other entity separately certified by the accreditation and institutional eligibility unit of the U.S. Office of Education, with its own FICE code, and listed separately in the Education Director of Higher Education, should be reported on a separate survey form and not included or combined with any other such certified unit. Branches, campuses, and other organizational entities not separately certified should be included with the appropriate institution or branch report" (U.S. Dept. of Education & NCES, 1976, p. 46)

campus if that branch campus was accredited at the institution level by an agency recognized by the Secretary of the U.S. Department of Education.[6] Under IPEDS, data are reported separately for each entity that offers at least one complete program of study, regardless of whether that institution is separately accredited (U.S. Dept. of Education & NCES, 1987). Therefore, relative to HEGIS, IPEDS has many more branch campuses that are required to report data separately from main campuses than HEGIS. Separately reporting branch campuses in IPEDS are less likely to operate as standalone institutions than separately reporting branch campuses in HEGIS and are more likely to report data with their parent institutions because data reporting capabilities often do not exist at the branch campus level. For these reasons, problems related to the parent-child relationship appear more often in IPEDS data than in HEGIS data.

Related to concerns about organizational form, is the issue of distinguishing organizational death from campuses that no longer report at the child level. During the transition from HEGIS to IPEDS, each organization with a FICE code – the institutional ID during the HEGIS years – was assigned a UNITID – the institutional ID during IPEDS years. For each organization that possessed a FICE but no UNITID, I investigated why that institution did not have a UNITID. Three common reasons existed: (1) the organization died; (2) the organization merged with another organization; and (3) the organization was a campus that once reported its own data, but at some point began reporting data with the parent institution. I treat mergers as organizational deaths, in that the organization was "eaten" by another organization and no longer exists. I treat

[6] These separately accredited branch campuses had their own FICE codes and were legally authorized to offer at least a 1-year program of study creditable toward a degree or other formal award.

organizations that ceased to report their own data as child-institutions, subject to the "parent-child solutions" I discuss in the next section.

Parent Child Relationship

Overview of the problem. The parent-child relationship represents the most difficult challenge to creating a panel dataset from multiple components of the HEGIS and IPEDS surveys. This section, first, provides an overview of the parent-child relationship, second, describe data patterns of the parent-child relationship by survey component, and, third, describe alternative solutions to the problems posed by the parent-child relationship.

A parent-child relationship occurs when the data for two or more campuses, each with their own institutional ID, are reported at a single campus or system office. Parent-child relationships differ across survey components, occurring most often in the Finance Component. For example, Rutgers University has campuses in New Brunswick (the flagship campus), Camden, and Newark. Each campus has its own institutional ID code. Each campus separately reports data on Fall Enrollment, IC, and Completions. However, the Finance data for the New Brunswick campus includes Finance data for all campuses combined whereas the Camden and Newark campuses do not report Finance data at all. In other examples of a parent-child relationship, the Finance data may be reported at the system office rather than at a flagship campus, as is the case with the Kentucky Community and Technical College System.

Parent-child relationships are not necessarily constant over time. For example, endowment revenues at University of California campuses (e.g., UC-Berkeley, UCLA) were reported at the system level for some years but at the campus level in other years.

The parent-child relationships are not necessarily constant within survey components. In the Finance Component, for example, revenues may be reported at the child-level but net assets may be reported at the parent-level.

The parent-child relationship poses problems for the creation of panel datasets that combines data from multiple survey components over time. When an institution reports certain measures at the multi-campus or system level, the campus-level has missing data for those measures. Consider the case of Rutgers University. For each year, the Newark campus has measures of Fall Enrollment and Completions, but no Finance measures. By contrast the New Brunswick campus contains measures of revenues, expenditures, and assets that are the aggregate of all campuses in the system.

Solutions to the parent-child problem. Two solutions exist for the problems posed by the parent-child relationship, though these solutions each introduce additional problems. "Collapsing" solutions collapse child data into parents. In the Rutgers University example, a collapsing solution aggregates the Fall Enrollment, Completions, and Finance measures from the New Brunswick, Newark, and Camden campuses into a single observation encompassing all campuses of Rutgers University. This solution solves the problem of missing observations for survey components reported at the parent level. However, we now have only one observation-per-year for all of Rutgers University, even though there may be important differences between each individual campus.

An alternative, the "allocation" solution, allocates data reported at the parent-level to the different child-campuses. In the case of Rutgers University, Fall Enrollment and Completions measures would remain untouched, but Finance data would be allocated to each campus based on some rule. The benefit of the allocation solution is that all organizations with their own institutional ID are retained in the final panel dataset. The drawback of the allocation solution is that the “rule” determining allocations from parents to children may be inaccurate.

The operationalization of solutions to problems posed by the parent-child relationship depends on data patterns of the parent-child relationship. Appendix B shows data patterns of the parent-child relationship over time and across survey components. Although data patterns of the parent-child relationship are quite esoteric, they have important effects on the creation of the HEGIS/IPEDS panel.

Collapsing solutions. Collapsing solutions collapse all child data into parents. For example, consider a parent institution connected to three child institutions. The child institutions report Completions and Fall Enrollment data but Finance data are reported at the parent level. For each year, the collapsing solution would create an observation that is the sum of all four input observations (one parent and three children) and would delete the four input observations.

Although several alternative collapsing solutions exist, they share important commonalities. The most general rule is that any institution that has ever been a child in any year for any survey component should be collapsed into parents for all years and for all surveys. From experience, child observations occur most frequently in the Finance Component, less frequently in the Completions Component, and very rarely in the Fall Enrollment Component. Child observations in the IC Component are irrelevant because the IC Component predominantly contains indicator variables (e.g., religious affiliation) rather than variables that must be aggregated across institutions (e.g., revenue from auxiliary enterprises).

Step one in a collapsing solution is to create a list of institutions that have ever been children in any survey component (see Appendix B for parent-child data patterns). Parent-child lists are created separately for each survey component. Each parent-child list contains two variables: the ID of the child and the ID of the parent. The master parent-child list is created by appending the parent-child lists from each survey component and deleting duplicate observations. Each child should have one parent only. In such cases where the parent changes over time for a child, the analyst must manually decide which parent to retain.

Step two is to merge the master parent-child list by child ID to the data from a particular survey component. Step three is, for those observations that merged from the parent-child list, to replace institutional ID with the parent institutional ID from the parent-child list. Step 4 is to sort by year and institutional ID. Those institutions that contain data from both parent institutions and child institutions will have multiple observations per year. Step five is to create sum variables. For example, the sum variable for tuition revenue is the sum of tuition revenue for all observations with the same combination of institutional ID and year. Step five is repeated for each variable. The majority of observations are neither parent institutions nor child institutions. These observations will only have one observation per institution-year and therefore the original variable measure will be the same as the sum variable. Step six is to keep only the last observation per each combination of institutional ID and year.

Steps two through six are repeated for each survey component except for institutional characteristics. Finally, step seven is to merge variables from each survey component together to make the analysis dataset. Institutional characteristics data should be merged last, keeping only those observations in the master dataset or those that merge with IC data. Therefore, the institutional characteristics retained are implicitly those of the parent, not the child.

The DCP parent-child solution is identical to the general solution described above; institutions that reported data together on any IPEDS survey for any year beginning in 1987 have been grouped together for all years. The DCP parent-child solution has 222 parent institutions linked to 593 child institutions. For each year of the panel, these 815 institutions (593+222) are collapsed into 222 observations. About 71% of these 815 institutions are public, reflecting the tendency for public institutions to have multi-campus institutions with centralized data reporting. Aggregating so many institutions masks important differences between campuses. Table 2.6 lists several multi-campus institutions/systems that are aggregated by the DCP parent-child solution, including all University of Illinois campuses (e.g., Urbana Champaign, Springfield) collapsed into University of Illinois Chicago, and all 23 Penn State campuses (e.g., Brandywine, Beaver, Harrisburg, Greater Allegheny, College of Medicine, etc.) collapsed into the Penn State-University Park campus.

I create an alternative collapsing solution that results in fewer collapsed institutions than the DCP solution. Explaining the differences between my solution and the DCP solution requires some background information. In theory, the collapsing solution collapses institutions that have ever been a child in any year for any survey component. In practice, collapsing occurs because data from the Finance Component – as opposed to Completions, Fall Enrollment, etc. – are reported at the parent level. Within the Finance Component, child institutions usually report partial data (see Appendix Table 2.1): revenues and expenditures are often reported at the child level; and net assets or plant, property, and equipment are reported at the parent level.

My solution is based on the idea that child institutions reporting partial data are not necessarily collapsed into parent institutions. Specifically, the following institutions are collapsed: institutions flagged as children that have zero or missing revenues; institutions flagged as children that have zero or missing degree completions (after summing all degree levels); and institutions flagged as children that have zero or missing total enrollments (after summing all degree levels and attendance patterns). Practically speaking, the primary difference between my solution and the DCP solution is that I do not collapse institutions that report revenues at the child level but report assets at the parent level.

The reason I do not collapse institutions reporting assets at the parent level is because, to date, the HEGIS/IPEDS panel has not yet incorporated asset measures. Including asset measures in the HEGIS/IPEDS would necessitate a collapsing solution more similar to the DCP solution. Therefore, my collapsing solution is not technically superior to the DCP solution; rather, it benefits from using fewer data sources.

Nevertheless, my solution results in fewer aggregations than the DCP solution. The DCP solution results in 222 parent institutions linked to 593 child institutions for a total of 815 institutions collapsed into 222 institutions.   My solution results in 183 parent institutions linked to 345 child solutions for a total of 528 institutions collapsed into 183 institutions. In the DCP solution 71% of the 815 collapsed institutions are public. In my solution, 45% of the 528 collapsed institutions are public. I do not collapse any of the institutions shown in Table 2.6, which are collapsed by the DCP solution. Most public institutions I collapse are community colleges, which often report all finances at the district level.

Allocation solutions. Rather than collapsing child institutions into parent institutions, allocation solutions allocate data reported at the parent level to child-institutions. Consider one parent institution connected to three child institutions. Fall Enrollment, Completions, and the revenue and expenditure measures from the Finance Component are reported at the child level, but the asset measures from Finance Component are reported at the parent level. The allocation solution would leave measures of Fall Enrollment, Completions, and revenues and expenditures untouched. Assets data would be allocated from parents to children based on some rule. Whereas the collapsing solutions result in one observation per year, the allocation solution would result in four observations per year. If a reasonable allocation rule is available, then an allocation solution is preferable to a collapsing solution because distinct institutions (e.g., UMass Boston and UMass Amherst) remain distinct observations.

The most critical step in an allocation solution is devising a rule to allocate data reported at the parent level to child institutions. Selecting the appropriate allocation rule involves multiple considerations. Should the allocation rule be constant across survey components (e.g., Completions vs. Finance)? Should the allocation rule be constant across variables within survey components (e.g., state appropriations revenue vs. tuition revenue)? Should the allocation rule be constant over time?

Selecting an allocation rule implicitly depends on whether an available variable can be used to allocate data. For example, data on assets may be allocated from parents to children based on the percent of total enrollment (=enrollment at parent + enrollment at each child campus) in each child campus. Clearly, using an existing variable to allocate parent data leads to potentially inaccurate measures. For example, the true value of assets per student is likely higher at a main campus (e.g., University of Washington, Seattle) compared to branch campuses (e.g., University of Washington, Tacoma). Therefore, using enrollment data to allocate asset data across parents and children may understate the true value of assets in the main campus.

Selecting an allocation rule also depends on data patterns of the parent child relationship across survey components. Practically speaking, Fall Enrollment data almost always exist at the child level. Completions data are usually reported at the child level, but may be reported at the parent level in particular years (see Appendix Table 2.4). The same is true for revenues and expenditures within the Finance Component (see Appendix Table 2.3). Asset data, however, are often reported at the parent level for all years of data for a particular institution.

Given the realities of these data patterns, several alternative allocation rules exist. Each rule has strengths and weaknesses. The first allocation rule is based on the proportion of overall enrollments. The advantage of this rule is availability of the measure over time. The rule would result in allocation proportions that are constant across survey components within a year but would vary over time. The disadvantage is that enrollments can be a poor proxy for both Finance and Completion data.

An alternative rule is, for a particular measure, to allocate parent data to children based on proportions from previous/subsequent years of that measure. For example, Completions data are usually reported at the child level in most years but there are particular years (e.g., 1995; see Appendix Table 2.4) when completions are often reported at the parent level. If the University of Washington, Tacoma conferred 20 of all 100 baccalaureate degrees in physics at the University of Washington in 1994, then the rule would allocate 20% of all 110 physics baccalaureate degrees in physics in 1995, when the data are reported at the parent level. The advantages of this allocation rule are that the rule varies from measure to measure, and is likely to be very accurate relative to alternative rules. The disadvantage is that this rule can only be used if a measure is reported at the child level at least once. Asset data, in particular, are often never reported at the child level.

A third allocation rule is based on parent-child allocation factor variables, which are available in the response status part of the IC Survey Component. Separate allocation factor variable exists for each survey component. This approach has several advantages. First, the institution, rather than the analyst, determines the allocation factors, potentially resulting in more accurate allocations. Second, the allocation factors are allowed to differ from survey component to survey component and over time. The primary disadvantage is that the allocation factors are only available beginning in 2004. Applying these allocation factors to previous years may lead to distortions when some institutions have grown more rapidly than others, especially given the length of the HEGIS/IPEDS panel. Note that DCP offers a panel dataset from the years 2004-2008 that uses an allocation solution rather than a collapsing solution.

Although the HEGIS/IPEDS panel does not yet employ an allocation solution, I will experiment with alternative allocation rules in the summer of 2012. My allocation solution will likely be based on combination of different allocation rules. For example, when available, the allocation rule for each measure would use proportions from previous/subsequent measures. When previous/subsequent measures are unavailable, the allocation rule could be based on total enrollments or allocation factor variables.

One attractive approach is to implement multiple allocation solutions and test which solution performs most closely to the "truth." For example, imagine that campuses in the University of California (e.g., UC Berkeley, UCLA, etc.) report asset data at the campus level but campuses in the University of Texas report asset data at the system level. Therefore, the "true" allocation of assets is known for University of California campuses but not for the University of Texas campuses. To test the efficacy of each allocation solution, I would first aggregate all asset measures for the UC campus to the system level. Second, I would allocate the system-level measures to individual campuses using several different allocation solutions (e.g., FTE enrollments, IPEDS allocation factors, etc.). Third, I would compare how each allocation solution compares to the true allocation of assets across UC campuses. The results of this test would inform which allocation solution is applied to campuses where the true allocation is unknown. This approach to the parent child solution may also provide useful information for the construction of allocation factors by NCES.

HEGIS/IPEDS Survey Components

This section discusses the variables available in specific HEGIS and IPEDS survey components over time. I discuss the Fall Enrollment Component (which includes enrollment by age, and state migration), the IC Component, the Completions Component, and the Finance Component (with a focus on revenues). Rather than discuss the construction of each individual variable, I take a forest-level approach; for each component, I focus on when key variables become available, consistency of variables over time, and important concepts (e.g., change over time in accounting standards). In the future I will create a separate codebook that discusses the construction of specific variables.

Fall Enrollment

Although HEGIS began in 1966, 1969 is the first year data are available for most survey components, as data from earlier years have been lost or damaged. Fall Enrollment data are first available for the fall of 1968. Data from the fall of 1968 are part of the 1968-69 academic year, which I refer to as 1969 in the HEGIS/IPEDS panel. The Fall Enrollment Component contains three different sets of variables relevant to the HEGIS/IPEDS panel: Fall Enrollment by gender and ethnicity; Fall Enrollment by state migration; and Fall Enrollment by age.

Table 2.7 shows Fall Enrollment variable availability over time by level of study, attendance status, gender, and ethnicity. For example, in 1969 total undergraduate enrollments are available. The three columns on the right indicate that in 1969 separate undergraduate enrollment variables are available by attendance status (full-time vs. part-time), and gender (men vs. women), but not for ethnicity. Graduate enrollment (master's degrees and PhD programs) and first-professional enrollment (e.g., dentistry, law) variables become available in 1970. These variables are available by attendance status and gender. Undergraduate freshman enrollment variables become available beginning in 1974.

Although not shown in Table 2.7, additional variables have been created from these raw input variables. For example, total undergraduate headcount is the sum of full-time undergraduate men, part-time undergraduate men, full-time undergraduate women, and part-time undergraduate women. Measures of full-time equivalent (FTE) enrollment can be created using some assumptions (e.g., 1 part-time student equals 1/3 a full-time student). Adding across degree-levels (e.g., undergrad + graduate + first-professional) yields measures of total headcount and total FTE students.

Fall enrollment measures are available by ethnicity beginning in 1977. From 1977 through 2008 the racial categories are: White; Black; Hispanic; Asian or Pacific Islander; Native American or Alaskan Native; non-resident alien; and ethnicity unknown. With the inclusion of ethnicity, the raw measures of undergraduate enrollment are white full-time men, white part-time men, white full-time women, white part-time women, black full-time men, …., black part-time women, etc. Similar measures are available for graduate and first professional students. Note that ethnicity measures are unavailable in 1978, 1986, 1988, and 1990. A new set of ethnicity categories was phased in beginning in 2009: Hispanic or Latino; American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or other Pacific Islander; White; two or more race; non-resident alien; and race or ethnicity unknown.

Table 8 shows the availability of state residence data over time. In general, these data indicate the number of freshmen from each state that are enrolled in a particular institution in a particular year. These data are useful for research analyzing the trends towards a national market in higher education (e.g., Hoxby, 1997, 2009), the recruitment of out-of-state students by public institutions, or the growing proportion of international students.

During HEGIS years, state residence was a separate survey component which was collected only in the years 1973, 1976, 1980, 1982, and 1985. With the inception of IPEDS, state residence became a sub-component of Fall Enrollment. IPEDS state residence data were collected in 1987, 1989, 1993, 1995, 1997, and 1999. Since 2001 state residence data have been collected in every year but survey response is optional for even-numbered years (e.g., 2002, 2004, 2006, etc.).

Table 2.8 shows that for 1973, the first year of state residence data, the only variable available is whether entering freshman are in-state or out-of-state residents. Beginning in 1976, measures of the total number of freshman from each state become available and also the number of students from a foreign country. For example, of the 1,624 total freshman students at Harvard University in 1976, 119 were from California and 43 were from a foreign country.[7] Measures of the number or percentage of in-state students can be created by coupling raw state residence variables with an indicator of institutional state location. Beginning in 1985, separate measures of enrollment by state residence become available for students who graduated high-school within the last year became available. For example, in 2009 there were 9,707 freshman students at Arizona

[7] Author's calculations.

State University and 9,199 of these students had graduated high school within the last year. Of these 9,199 students, 6,366 were from Arizona and 784 were from California.

State residence data, though powerful, have important limitations. First, state residence data are unavailable in some years, undermining causal analyses of change over time. Second, state residence data do not indicate the number of students coming from specific foreign countries (e.g., China, Turkey), except for certain protectorates (e.g., American Samoa, U.S. Virgin Islands). Third, state residence data do not provide information about the academic programs studied by students from different states. Fourth, the state residence data are provided only for undergraduate freshman, but not data on graduate or first-professional students.

Measures of enrollment by age, another sub-component of Fall Enrollment, are available in IPEDS but not in HEGIS. These data are useful for studying the changing age-profile of students. For example, Pfeffer and Salancik (1978) argue that colleges will attempt to increase adult enrollments in response to declines in the population of "traditional" college-age students. Table 2.9 shows that enrollment by age measures are available in 1988, 1992, 1994, 1996, and 1998. Beginning in 2000, the measures are available in all years but are optional in odd years (e.g., 2001, 2003, etc.). Measures are available for the following age groups: LT 18; 18 to 19; 20 to 21; 22 to 24; 25 to 29; 30 to 34; 35 to 39; 40 to 49; 50 to 64; and GT 64.

Enrollment-by-age the measures are available by level of study (undergraduate students, graduate students, and first-professional students), attendance status (full-time vs. part-time), and gender. For example, at Harvard University in 1994 there were 1,451 full-time men and 1,106 full-time women between 20 and 21 years-old in undergraduate programs , there were 1,057 full-time men and 1,035 full-time women between 22 and 24-years old in graduate programs , and there were 647 full-time men and 482 full-time women between 22 and 24 years-old in first-professional programs.

Institutional Characteristics

I discuss three sets of variables from the IC Survey Component: (1) directory information (e.g., highest degree awarded, institutional control); (2) tuition and fees; and (3) admissions/selectivity variables.

The HEGIS/IPEDS panel includes a modest number of directory information variables. Data from the IC Survey Component are missing for the years 1966, 1967, 1968, 1969, 1970, and 1972 (see Table 2.1). During the HEGIS years, basic directory variables are available in the data files of all survey components. Therefore, I create directory information variables for 1966, 1967, and 1968 using data from the Completions Component and create directory information variables for 1969, 1970, and 1972 using data from the Fall Enrollment Component.

This list of directory variables presently in the HEGIS/IPEDS panel includes: institutional name; level urbanization (e.g., institution located in city larger than 1,000,000 people); highest degree offered; institutional control (public, private not-for-profit, private for-profit); sector; zip code; minority serving institution; male only or female only; Land Grant institution; state; year institution established; religious affiliation; Title IV eligibility (available after 1997+); and whether institution is open to the public (available 2001+). These variables are generally time-varying. A much larger list of directory information variables are available but have not yet been included in the HEGIS/IPEDS panel.

Table 2.10 shows the available undergraduate and graduate tuition and fee measures, as well as available room and board measures. Tuition and fee measures are derived from IC Survey Component data except for the years 1970 and 1971, when the the measures are derived from Finance Survey Component data. Tuition and fee measures are unavailable for 1972.

Measures of undergraduate tuition and fees and graduate tuition and fees are available beginning in 1970. Note that tuition and fees are a single variable. Separate measures exist for in-state and out-of-state prices. By definition, in-state prices and out-of-state prices are the same for private institutions. Undergraduate in-district tuition and fees measures are available from 1987 onwards. In-district tuition and fee measures usually differ from in-state measures only for community colleges. Graduate in-district tuition and fees are available from 1990 onwards. Separate measures of tuition and separate measures of fees are available beginning in 2000.

Measures of room charges and board charges are available beginning in 1970. For the years 1970 through 1986, the variable "dyspweek" identifies the number of days-per-week covered by the board charge (e.g., five days per week or seven days per week). From 1987 to the present, the variable "mealswk" identifies the number of meals-per-week covered by the board charge.

Table 2.11 describes measures of first-professional tuition and fees, which are available beginning in 1987. Measures are available for the following first-professional degree programs: chiropractic; dentistry; medicine; optometry; osteopathic medicine; pharmacy; podiatry; veterinary medicine, law, theology, and "other" first professional degree. From 1987 through 1993, the combined tuition and fee measure does not indicate whether it applies to in-state students or out-of-state students. Beginning in 1994, separate measures of combined tuition and fees are available for in-state students and out-of-state students. Beginning in 2000, separate measures of tuition and separate measures of fees become available. Note that tuition and fee measures for first-professional degrees were not collected in 2010, but will be collected again in 2011.

I devised several rules to create consistent measures of tuition and fees. First, I converted all price variables to 2010 dollars using the 2010 CPI. Second, for private institutions I set prices for out-of-state, in-state, and in-district tuition/fees equal to one another. Measures for public institutions adhere to the rule that in-district-price <= in-state-price <= out-of-state price. Imputation variables are available beginning in 1999. I keep the raw imputation variables.

Part C of the IC Survey Component discusses admissions requirements and services. I use Part C to create measures of institutional selectivity. In 1975, the IC Survey Component included the question "what is the usual minimum requirement for admissions to your institution as a regular student." Potential responses are: the ability to profit from attendance; high school graduation or recognized equivalent; high school graduation, plus an indication of superior academic aptitude (e.g. class standing, grades, curriculum, particular school, test scores, etc.); two year college graduation; four year college graduation. Beginning with the inception of IPEDS in 1986-87, institutions were asked which specific standardized tests were required for admission (e.g., SAT, ACT). Also beginning in 1987, institutions were asked for the average class rank of the incoming freshman class. Unfortunately, the class-rank question had many missing values, even at selective institutions, and was discontinued in 1991.

Tables 12 and 13 show that the IC Component began collecting a more useful set of admissions indicators in 2002. These measures include how many men applied, how many women applied, how many men were admitted, how many women were admitted, how many men enrolled full-time, how many women enrolled full-time, how many men enrolled part-time, and how many women enrolled-part time (Table 2.12). From these variables, analysts can create measures of percent admitted and yield – the percent of admitted students who enroll. Table 2.13 shows the availability of SAT and ACT score measures. These measures include the number and percent of first-time students who submitted SAT scores and ACT scores and the 25th percentile score and 75th percentile score of first-time enrolled students in the various components of the SAT (verbal, math, writing) and ACT (English, math).

Degree Completions

Degree completions data from the Completions Survey Component have many applications. Completions data are important for the emerging policy focus on institutional productivity (Massy, 2010; Wellman, 2010), for research on degree productivity in STEM fields (GAO, 2005), for research on ethnic and gendered segregation of degree attainment, and for research examining the relationship between degree production and the labor market demand for skills (Jaquette, 2010). In this section I discuss change over time in degree classification systems, the organization of HEGIS and IPEDS Completions data, change over time in available measures of degree production, and finally the creation of degree adoption measures.

Degree classification systems. Table 2.14 shows the change over time in the degree classification systems used by NCES. From 1966 through 1970 the HEGIS

Completions Component used a system that is now commonly referred to as the "pre-HEGIS" system (Huff, Chandler, & NCES, 1970). The "HEGIS" degree classification system was used from 1971 through 1982. The Classification of Instructional Programs (CIP) system was introduced in 1983. The CIP has been revised periodically: the "1980 CIP" was used from 1983-1986 (Malitz, 1981); the 1985 CIP was used from 1987-1991 (Malitz, 1987); the 1990 CIP was used from 1992-2002 (Morgan, Hunt, & Carpenter, 1991); the 2000 CIP was used from 2003-2010 (NCES, 2002); and the 2010 CIP was introduced in 2011 (NCES, 2010). The underlying logic of the CIP has remained unchanged since its inception, but period revisions allow the CIP to incorporate newly emergent degree programs.

Huff, Chandler, and NCES (1970) provide information on both the Pre-HEGIS and HEGIS classification systems, as well as a cross-walk linking the two systems. The Pre-HEGIS system contains approximately 210 unique degree codes and the HEGIS system contains approximately 400 unique degree codes. In both systems the degrees are loosely organized by subject area (e.g., "Agricultural and Natural Resources" in the HEGIS system) but neither system has a true hierarchical organization. One draw-back of both the HEGIS and pre-HEGIS is the poor coverage of sub-baccalaureate degree programs. Instead, many sub-baccalaureate degree programs were covered by the separate "Handbook VI" degree classification system.

The CIP overcomes important flaws in the HEGIS system. First, the CIP is a truly hierarchical classification system. An individual degree program has a six-digit CIP code (e.g., 13.0406 is higher education administration). These individual degree programs are categorized within four-digit series (e.g., 13.04 is educational administration) and then within two-digit series (e.g., 13 is education). Therefore, researchers can create measures of degree production at the degree-level (i.e., 6-digit CIP), at the broader 4-digit CIP level, or at the broadest 2-digit level. By contrast, the HEGIS degree classification system is not hierarchically organized except at the broadest levels (e.g., biological sciences).

Second, the CIP covers all postsecondary education degree-levels. Prior to the CIP, separate classification systems existed for “higher education” degrees (pre-HEGIS and HEGIs systems) and for sub-baccalaureate vocational degrees (Handbook VI). In theory, each 6-digit CIP degree (e.g., higher education administration=13.0406) could be awarded at any level (e.g., associate’s degree). Third, whereas the pre-HEGIS and HEGIS degree classification systems only contain degree names, the CIP has detailed descriptions for each degree code, leading to higher levels of accuracy when institutions classify degrees.

Organization of completions data. To create a panel of completions data I first I read in the raw completions data for each year from 1966 to 2010, creating a separate dataset for each year. Second, I reshape the data from specific years, ensuring that each year of data follows the same organization. Third, I use standardized cross-walks to merge 1980 CIP codes to the pre-HEGIS and HEGIS classification system, so that all years of data use a hierarchical classification system. Fourth, I append each year of data to create a single dataset for all years.

Table 2.15 uses hypothetical data to shows how the completions panel is organized, with one observation for each institution >> year >> award-level >> 6-digit CIP code. I can create the completions panel at the 4-digit CIP code by summing the number of 6-digit degrees awarded within 4-digit CIP code. In actuality, I create four different completions panels, each with a slightly different organization:

1. One observation per institution >> year >> award-level >> 6-digit CIP code (e.g., 14.0903 Computer Software Engineering)
2. One observation per institution >> year >> award-level >> 4-digit CIP code (e.g., 14.09 Computer Engineering, General)
3. One observation per institution >> year >> award-level >> 2-digit CIP code (e.g., 14 Engineering)
4. One observation per institution >> year >> award-level

Comparing the organization of the HEGIS/IPEDS panel to the four completions panels, the HEGIS/IPEDS panel has a "wide" organization with one observation per organization-year and each of the four completions panels has a "long" organization, with multiple observations per organization-year. Using each of the four panel datasets as inputs, I create output datasets with one observation per-organization-year. For example, from panel #3 I create measures of the total number of bachelor's degrees awarded in business (CIP code=52) in each organization-year. Finally, I merge these measures by organization-year to the HEGIS/IPEDS panel.

I do not merge all possible variables from the four completions panels to the HEGIS/IPEDS panel because the resulting dataset would be many thousands of variables "wide." Therefore, the HEGIS/IPEDS panel contains an incomplete set of completions measures. Researchers using the HEGIS/IPEDS panel may desire additional Completions measures. Therefore, I will make the four input datasets available.

Available degree production variables. Table 2.16 shows what specific degree production measures are available in what years. Beginning in 1966, degree production measures are available for baccalaureate degrees, master's degrees, doctoral degrees, and first professional degrees (e.g., law). Measures are also available for associate's degrees for the years 1966 through 1982, but only a portion of associate's degrees awarded by accredited institutions were included in the pre-HEGIS and HEGIS surveys. Reliable measures of associate's degrees begin in 1983 with the inception of the 1980 CIP. Production measures for sub-baccalaureate degree programs of less than one year, and sub-baccalaureate degree programs greater than one year become available in 1984. Measures of sub-baccalaureate degrees greater than two years and post-baccalaureate certificate programs (e.g., a post-baccalaureate certificate in museum studies) become available in 1987.

From 1966 through the present, separate degree production measures are available for men and women. Measures of degree production by ethnicity become available in 1976, but only for broad degree levels (e.g., all engineering degrees), not for specific degree programs (e.g., chemical engineering). These broad-degree measures of degree production by ethnicity are available in the years 1976, 1977, 1979, 1981, 1985, and 1987. Beginning in 1989 these measures are available every year. Beginning in 1995, degree production measures are available by ethnicity for both broad and specific degrees. From 1976 through 2007 the ethnicity categories are: White; Black; Hispanic; American Indian or Native Alaskan; Asian or Pacific Islander; and non-resident alien. New race categories become available beginning in 2008: American Indian or Alaska Native; Asian; Black or African American; Native Hawaiian or Other Pacific Islander;

White; Hispanic or Latino; Two or more races. Data on the old race categories continue to be collected.

Degree adoption variables. I define adoption as the first time a specific degree is awarded at a particular institution, lagged a certain number of years. For example, if the George Washington University first awards a master's degree in political communications in 1993, I assume that degree was adopted in 1991. I create measures of adoption at the 6-digit CIP level (e.g., 52.2202 environmental health), the 4-digit CIP level (52.22 public health), and the 2-digit CIP level (e.g., 52 health). Adoption measures can be crated for any degree level (e.g., associate, baccalaureate, master's, etc.).

Revisions to degree classification systems pose challenges to the creation of adoption measures. For example, the 2000 CIP was implemented in 2003. The CIP Code 5.0131 – Tibetan Studies – was introduced in the 2000 CIP. According to a simple definition of adoption, all institutions awarding a degree in Tibetan Studies in 2003 would be defined as adopters because degree code 5.0131 is not observed in any institution prior to 2003. These so-called adopters may have been awarding the same degree for many years under a different degree code prior to the implementation of the 2000 CIP.

I create rules to avoid instances of "false-positive" adoption. One rule, for example, states that when a degree is new to a classification system, the degree cannot be adopted by an institution within two years of the inception of that classification system. For example, institutions that award degrees in Tibetan Studies in 2004 and 2004 cannot be adopters of Tibetan Studies. However, an institution that awards a master's degree in Tibetan Studies for the first time in 2005 is as an adopter.

In general, I do not trust adoption measures at the 6-digit CIP level because there is wide variability in how the same 6-digit degrees are classified across institutions. I prefer adoption measures at the 2-digit or 4-digit CIP level. For 4-digit (and 2-digit) adoption measures, I create a rule that a 4-digit degree cannot be adopted within two years of the inception of a revised degree classification system if all the 6-digit CIP codes within that 4-digit CIP code are new to the revised classification system.

Finance

Table 2.1 shows that Finance Component measures have been available since 1969. In 1973, NCES convened a working group to advise on changes to the Finance Component (AICPA, 1974; NCES, 1975). These recommendations were incorporated into the HEGIS Finance Component beginning in 1975. In 1997 the Finance Component was revised for private institutions, due to changes in accounting standards by the Financial Accounting Standards Board (FASB). Beginning in 2002 the Finance Component was revised for public institutions, as new accounting standards by the Governmental Accounting Standards Board (GASB) were phased in.

In this section I describe change over time in the Finance Survey Component, with an emphasis on changes in accounting standards. First, I describe accounting standards and the survey instrument from 1975 through 1996. Second, I describe 1997 changes in FASB accounting standards as they relate to the Finance Survey instrument. Finally, I identify the revenue variables available from 1969 to 2010, with an emphasis on whether variables are consistent across accounting standards. At present, the HEGIS/IPEDS panel only incorporates revenue variables from the Finance Component.

In the future, I will incorporate additional Finance measures, including expenditures and net assets.

Accounting Standards in the old finance survey. The Finance Component used from 1975 through 1996 (herein "the Old Finance Component") had six parts: (A) current fund revenues; (B) current fund expenditures and mandatory transfers; (C) physical plant assets; (D) indebtedness on physical plant; (E) details of endowment assets; and (F) statement of changes in fund balances.

The Old Finance Component was based on "fund group accounting," in which resources are classified by purpose into separate fund groups. A fund group is "an accounting entity with a self-balancing set of accounts" (AICPA, 1973, p. 5). The "statement of changes in fund balances" (part F of the Old Finance Component) is the master table for parts A-E. Table 2.17 recreates a copy of the statement of changes in fund balances used in the Old Finance Component. The columns of Table 2.17 show five different fund groups: current; loan; endowment; annuity/life income; and plant.

The first row of Table 2.17 shows additions. Additions are monies added to a fund group during a reporting period (NCES, 1975). For example, the amount of tuition revenue would be an addition to the current funds group. However, total current funds additions are different than total current funds revenue. To explain this difference, I introduce the concept of "accrual accounting."

In accrual accounting, revenues are reported only when they are *earned*, as opposed to "cash accounting" in which revenues are reported after payments have been *received*. Under accrual accounting, revenues are categorized as one of two types: restricted and unrestricted. Restricted revenues are not earned until "all of the terms of the agreement under which they were given to the institution have been met and these terms are met only when the monies are expended in accordance with those restrictions" (NCES, 1975, p. 9). Examples of restricted revenues are federal or private grants for the completion of a specific research project. Unrestricted revenues do not require specific obligations to be met before they are earned. Therefore, unrestricted revenues are earned as soon as they are received. Typically, government appropriations and tuition revenue are counted as unrestricted revenues.

To summarize, in accrual accounting, unrestricted revenues are earned as soon as they are received and restricted revenues are earned once those revenues are expended in accordance with designated funding restrictions. Table 2.18 recreates Part A – current fund revenues – of the 1989 Finance Survey Component. Column (1) refers to unrestricted revenues, column (2) refers to restricted revenues, and column (3) is the total of unrestricted and restricted revenues. The rows in Table 2.18 (e.g., tuition and fees, state appropriations) represent the revenue variables available in the HEGIS/IPEDS panel.

Having introduced several concepts, it is helpful to compare additions and revenues. Unrestricted current funds additions are the same unrestricted current funds revenues. Therefore, total unrestricted revenues (line 16, column 1 in Table 2.18) should equal unrestricted current fund additions (line 1, column 1 in Table 2.17). However, total restricted revenues (line 16, column 2 in Table 2.18 differ from restricted current fund additions (line 1, column 2 in Table 2.17). Specifically, restricted current funds additions includes restricted funds received during the reporting period, whether those funds were expended or not. In contrast, restricted funds revenues only include restricted funds which were expended during the reporting period.

FASB accounting standards. A new Finance Component was created in 1997 in response to changes in FASB accounting standards (NCES, 2000). The Old Finance Component contained the following parts: (A) current fund revenues; (B) current fund expenditures and mandatory transfers; (C) physical plant assets; (D) indebtedness on physical plant; (E) details of endowment assets; and (F) statement of changes in fund balances. The FASB Component contains the following parts: (A) statement of financial position; (B) summary of change in net assets; (C) student grants; (D) revenues and investment return; (E) expenses by functional category; and (F) endowment assets. I discuss broad changes between the Old Finance Component and the FASB Survey Component form. In the subsequent section I discuss changes to specific variables. Although some finance measures are consistent across accounting standards, others are incomparable before and after the FASB changes.

Whereas the Old Finance Component mostly focuses on current funds, the FASB Finance Component focuses on both current and non-current funds (NCES, 2000). For example, revenue amounts in the Old Finance Component focus on current revenues. Revenue amounts in the FASB Survey include all current and non-current revenues. Investment revenue is an example of a non-current revenue included in the FASB Finance Component but not the Old Finance Component. Another major difference is that the FASB Finance Component has complete balance sheet information whereas the Old Finance Component only has selected balance sheet information.

Whereas the Old Finance Component used the accrual accounting method, the FASB Finance Component uses the cash accounting method. In the accrual accounting method, unrestricted revenues are recognized when they are received and restricted revenues are recognized when the funds have been expended. In the cash accounting method, both unrestricted and restricted revenues are recognized as soon as they are received. Therefore, there the FASB Finance Component makes no distinction between restricted and unrestricted revenues. Analysts comparing revenue data before and after FASB accounting changes must add restricted and unrestricted revenues for data years using the Old Finance Component.

Another change is that the Old Finance Component included transfers from one intra-organizational department to another intra-organizational department (NCES, 2000). For example, the catering costs for an alumni fund-raising event catered by the dining hall would be considered auxiliary revenue in the Old Finance Component. The FASB Component only considers activities that increase or decrease net economic resources, not activities that shift resources within the organization.

Consistency of revenue measures over time. Many revenue measures are consistent before and after FASB accounting standards. Table 2.19 shows the survey instrument for “revenues and investment return” (Part D) from the 2006 FASB Finance Component. The instrument looks very similar to that of the Old Finance Component, shown in Table 2.18. Nevertheless, important differences exist, some of which cannot be overcome.

In the Old Finance Component, revenue from tuition and fees included allowances. In the FASB Finance Component, tuition and fee revenues are net of allowances. An allowance is the difference between the stated tuition price and the amount actually paid by the student or the third-party payer on behalf of the student (NACUBO Accounting Principles Council, 1997). For example, institutions often practice "tuition discounting" to increase enrollments (McPherson & Schapiro, 1999); the stated price is $25,000 but an individual student is charged only $20,000. Most institutions offer merit scholarships; the stated price of tuition is $25,000 but an individual student is offered a $5,000 merit scholarship. From the perspective of accounting principles, a tuition discount of $5,000 and an institutional merit scholarship of $5,000 are both allowances of $5,000. In the Old Finance Component, the institution would record tuition and fee revenues of $25,000 and an allowance expenditure of $5,000. In the FASB Finance Component, the institution would record tuition and fee revenues of $20,000 and an institutional allowance of $5,000 in Part C, student grants.

Analysts can add back allowances during FASB years to create a measure of gross tuition and fee revenue that is consistent with the Old Finance Component. Beginning in 1987, the Old Finance Component required institutions to record institutional allowances. Therefore, for the years 1987 through 1996, analysts can create measures of tuition net of institutional allowances that are consistent with measures from the FASB survey years.

For several reasons, endowment/investment revenues are not comparable before and after accounting changes. First, in the Old Finance Component, the "endowment revenue" measure is defined as annual endowment spending. In the FASB Finance Component, the most analogous measure – "investment revenue" – is the sum of (a) endowment spending and (b) investment return on short-term working cash pools (NCES, 2000). Second, in the Old Finance Component institutions reported debt and equity investments at cost, meaning that changes in value were not recognized until after they were sold. In the FASB Finance Component, institutions report debt and equity investments at market value. Several additional factors further undermine comparison (NCES, 2000). In general, and especially at institutions with large endowments, endowment/investment revenue increases dramatically after accounting changes in 1997. These changes cannot be explained by a strong stock market. At Yale, for example, endowment/investment revenue increases from 147,152,992 in 1996 to 1,056,937,984 in 1997. At Harvard, endowment/investment revenue increases from 310,904,000 in 1996 to 2,533,607,168 in 1997.

Another variable that is inconsistent before and after accounting changes is private gifts, grants, and contracts. One reason for comparison difficulties is the change from accrual to cash accounting. In accrual accounting, revenue from a private research grant is recognized once the revenue has been expended for the purpose of fulfilling grant requirements. Under cash accounting the private grant revenue is recognized when received. However, in the long run the measures should be similar before and after the switch to cash accounting. Second, the FASB standards require that contributions from affiliated entities be reported separately from other private gifts, grants, and contracts. Affiliated entities are fund raising foundations, booster clubs, and similar organizations created to support the institution (NCES, 2000). This change can be easily handled by adding revenue from affiliated entities to revenue from private grants, gifts, and contracts during the FASB years.

Therefore, with some modifications the measure of revenue from private gifts, grants, and contracts should, in theory, be comparable before and after FASB accounting changes. In practice, I find that post-FASB observations are much larger than the pre-FASB observations, especially for institutions with large amounts of private gifts, grants, and contract revenues. At Yale, for example, private gift, grant, and contract revenues increase from 104,446,480 in 1996 to 209,668,992 in 1998. At Harvard, private gift, grant, and contract revenues increase from 158,276,992 in 1996 to 518,060,544 in 1998. The measure is often missing in 1997.

Tables 20 and 21 show the availability of revenue measures over time and the consistency of revenue measures before and after FASB accounting changes. I do not show consistency before and after GASB accounting changes, which were phased in for public institutions beginning in 2002. However, consistency before and after GASB accounting changes is similar to consistency before and after FASB accounting changes (NCES, 2009). In Table 2.20, measures of government appropriations are available beginning in 1969 and are consistent before and after accounting changes. Government grants and contracts are available beginning in 1975 and are consistent before and after FASB accounting changes. Tuition variables are generally consistent before and after accounting changes, but only after making modifications to account for allowances. The measure of tuition excluding institutional allowances is available beginning in 1987 and the measure of tuition excluding all allowances is available beginning in 1997.

In Table 2.21, the measures of private gifts, grants, and contracts and endowment/investment revenue are inconsistent before and after FASB accounting changes. Sales of educational activities and auxiliary enterprise revenues are modestly comparable (denoted by the letter Z). Specifically, intra-organizational transfers are included as revenues in the Old Finance Component but not in FASB. However, intra-organizational transfers are usually a small proportion of total revenue in these categories. Total current revenues are broadly comparable before and after accounting changes, but only after making adjustments for tuition allowances and after excluding both private grant revenue and endowment/investment revenue.

Limitations and Future Work

Limitations

The HEGIS/IPEDS panel has several immutable limitations. First, the organization is the unit of analysis, rather than the academic sub-unit. March and Simon (1958) note that organizations are often coalitions of competing interests. A large organization, such as the University of Michigan, can be conceived as a collection of semi-autonomous organizations that includes a business school, a college of engineering, and a medical complex. For certain research questions – for example, academic program adoption, private giving, and sub-unit response to changes in organizational budgeting systems – the academic sub-unit, rather than the organization, may be the preferred unit of analysis. Unfortunately, neither HEGIS nor IPEDS collect data at the sub-unit level.

Second, the HEGIS/IPEDS panel cannot capture the increasingly "networked" nature of colleges and universities, except at a very crude level. For example, revenues and expenditures from university spin-off organizations are not included in the HEGIS/IPEDS panel, though these organizations exist somewhere between organizational borders and the "external environment." Changes in curricula provide another example. Enrollments are increasingly driven by online courses, but the HEGIS/IPEDS panel does not capture the extent to which institutions purchase online curricula from external vendors.   In general, scholarship on organizations find that auxiliary enterprises and even core competencies are increasingly outsourced to specialist organizations (Davis, 2005), such that the organization becomes a network of contracts. Although higher education is experiencing similar changes (Mars & Rios-Aguilar, 2010; Slaughter & Rhoades, 2004), they are not easily identified in the HEGIS/IPEDS panel.

A third limitation is that key variables are unavailable in certain years. For example, average standardized test scores of enrolled students provide an excellent measure of institutional selectivity. However, this measure is unavailable until 2002. Fundamental changes in variable definitions over time also limit the utility of the HEGIS/IPEDS panel. For example, measures of endowment revenue, private grant revenue, and (therefore) total revenue are incomparable before and after changes in FASB and GASB accounting standards.

A fourth limitation relates to the legality of providing HEGIS/IPEDS data to the public. In contrast to NCES longitudinal surveys (e.g., NELS:88, ELS:2002) where individual identities are confidential, both HEGIS and IPEDS data can be downloaded by anyone and the identities of individual institutions are not confidential. However, certain years of data – specifically early releases of data – can only be downloaded by users that are affiliated with an institution that reports IPEDS data. Therefore, it may be that early release data are not included in the public release of the HEGIS/IPEDS panel. In general, I will engage NCES in a discussion of legal issues about publicly releasing HEGIS/IPEDS data prior to the public release.

Future Work

Other limitations of the HEGIS/IPEDS panel can be overcome in future work. First, I will develop comprehensive explanations and solutions to issues arising from data collection efforts amidst different organizational forms (e.g., multi-campus institutions, multi-institution systems). For example, the data for child organizations are sometimes reported at a parent institution (e.g., UT Austin) and sometimes at a district office (e.g., Los Angeles Community College District). Understanding these data patterns is prerequisite to longitudinal analyses on, for example, community college finance. Additionally, I intend to create an allocation solution to the parent-child problem, such that organizations are never collapsed into multi-organization observations.

Second, I will conduct a more thorough investigation of changes over time in sampling and survey components. The culmination of this investigation will be a set of tables illustrating the following: what organizational types are included in HEGIS and IPEDS samples over time; what survey components must be completed by each organizational type over time; what versions of each survey component must be filled out by each organizational type over time; and how does each survey component change over time. Developing this expertise on sampling and survey components is a prerequisite step to longitudinal analyses of the for-profit sector, because many for-profit institutions fall into and out of the HEGIS and IPEDS universes over time .

I will continue to add survey components to the HEGIS/IPEDS panel. After additional training in accounting, I will add measures from the Finance Component, including measures of expenditures, plant assets, debt, endowment assets, and fund balances. A separate chapter on accounting changes and HEGIS/IPEDS Finance measures will accompany the completion of these measures. Upon completing the Finance measures, I will create measures from other survey components, including Graduation Rates, Employee Salaries, Instructional Staff, and Student Financial Aid.

Tables

Table 2.1 Availability of HEGIS/IPEDS survey components over time

	IC	Fall Enrollment	Completions	Finance	Migration
1966			X		
1967			X		
1968			X		
1969		X	X	X	
1970		X	X	X	
1971	X	X	X	X	
1972		X	X	X	
1973	X	X	X	X	X
1974	X	X	X	X	
1975	X	X	X	X	
1976	X	X	X	X	X
1977	X	X	X	X	
1978	X	X	X	X	
1979	X	X	X	X	
1980	X	X	X	X	X
1981	X	X	X	X	
1982	X	X	X	X	X
1983	X	X	X	X	
1984	X	X	X	X	
1985	X	X	X	X	X
1986	X	X	X	X	
1987	X	X	X	X	
1988	X	X	X	X	
1989	X	X	X	X	
1990	X	X	X	X	
1991	X	X	X	X	
1992	X	X	X	X	
1993	X	X	X	X	

1994	X	X	X	X
1995	X	X	X	X
1996	X	X	X	X
1997	X	X	X	X
1998	X	X	X	X
1999	X	X	X	X
2000	X	X	X	X
2001	X	X	X	X
2002	X	X	X	X
2003	X	X	X	X
2004	X	X	X	X
2005	X	X	X	X
2006	X	X	X	X
2007	X	X	X	X
2008	X	X	X	X
2009	X	X	X	X
2010	X	X	X	X

Table 2.2 Number of institutions in the IC survey by year

	Frequency
1969	2,775
1970	2,814
1971	2,843
1972	2,893
1973	2,945
1974	3,015
1975	3,038
1976	3,055
1977	3,068
1978	3,127
1979	3,170
1980	3,188
1981	3,264
1982	3,294
1983	3,327
1984	3,330
1985	3,734
1986	3,714
1987	12,917
1988	12,438
1989	11,727
1990	10,919
1991	10,287
1992	10,264
1993	10,886
1994	10,651
1995	10,508
1996	10,216
1997	10,095
1998	9,896

	Frequency
1999	9,744
2000	9,496
2001	9,513
2002	6,896
2003	6,823
2004	6,875
2005	6,804
2006	6,844
2007	6,891
2008	6,902
2009	7,034
2010	7,126

Table 2.3 Frequency of academic year by sector, 1987 to present

	Admin	BA or higher			Two-year			Less than two-year			
	Unit	1	2	3	4	5	6	7	8	9	Total
1987	170	641	1,960	144	1,267	923	892	533	563	5,769	12,862
1988	154	641	1,945	120	1,262	849	852	380	516	5,717	12,436
1989	141	633	1,907	112	1,244	773	877	321	467	5,252	11,727
1990	143	624	1,873	106	1,224	732	862	301	388	4,666	10,919
1991	123	623	1,867	114	1,221	629	845	280	361	4,224	10,287
1992	120	625	1,880	121	1,255	630	811	278	350	4,194	10,264
1993	126	626	1,976	149	1,272	627	758	277	372	4,703	10,886
1994	117	631	1,987	172	1,272	616	736	277	340	4,503	10,651
1995	105	629	2,005	185	1,284	627	746	299	335	4,293	10,508
1996	96	632	2,004	206	1,284	615	700	306	308	4,065	10,216
1997	94	635	2,002	217	1,288	599	988	278	303	3,691	10,095
1998	96	641	2,003	235	1,280	555	965	366	299	3,456	9,896
1999	91	645	1,998	264	1,269	527	970	365	303	3,312	9,744
2000	82	647	1,991	294	1,256	492	961	312	292	3,169	9,496
2001	83	651	1,991	348	1,254	459	932	361	292	3,142	9,513
2002	81	651	1,686	338	1,192	289	800	312	130	1,417	6,896
2003	80	655	1,673	312	1,181	274	788	306	132	1,422	6,823
2004	83	656	1,686	363	1,185	254	806	290	137	1,415	6,875
2005	83	661	1,648	381	1,165	236	817	272	128	1,413	6,804
2006	83	660	1,641	422	1,171	229	839	248	111	1,440	6,844
2007	84	665	1,629	465	1,164	219	859	240	104	1,462	6,891
2008	84	674	1,631	502	1,150	189	873	239	101	1,459	6,902
2009	84	674	1,629	542	1,143	195	915	236	94	1,522	7,034
2010	83	692	1,635	576	1,113	187	986	240	98	1,516	7,126

Table 2.4 What institutions are required to complete which IPEDS survey components

	BA or higher			Two-year			Less than two-year		
Sector	1	2	3	4	5	6	7	8	9
	Institutions eligible for Title IV programs accredited at the institutional level; Non-accredited institutions granting baccalaureate and higher degrees								
Institutional Characteristics (IC)	IC	IC	IC	IC	IC	IC	IC	IC	IC
Fall Enrollments (EF)	EF1	EF1	EF1	EF2	EF2	EF2	EF2	EF2	EF2
Completions (C)	C	C	C	C	C	C	C	C	C
Salaries (SA)	SA	SA	SA	SA	SA	SA	SA	SA	SA
Finance (F)	F1	F1A	F1A	F1	F1A	F1A	F1	F1A	F1
Fall Staff (S)	S	S	S	S	S	S	S	S	S
Libraries (L)	L	L	L	L	L	L	L	L	L
	Institutions eligible for Title IV programs accredited at the program level								
Institutional Characteristics (IC)	IC	IC	IC	IC	IC	IC	IC	IC	IC
Consolidated Form (CN)	CN	CN	CN	CN	CN	CN	CN	CN	CN
	Institutions not eligible for Title IV								
Institutional Characteristics (IC)	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4	IC4

Table 2.5 Tabulation of academic year by Title IV eligibility

	Not eligible/ missing	Eligible for Title IV	Branch Campus	Limited participation in Title IV (1999+)	Total
1997	3,186	6,712	197	0	10,095
1998	3,060	6,647	189	0	9,896
1999	3,010	6,550	130	54	9,744
2000	2,863	6,460	116	57	9,496
2001	2,733	6,613	116	51	9,513
2002	165	6,567	126	38	6,896
2003	171	6,503	105	44	6,823
2004	152	6,553	132	38	6,875
2005	138	6,509	127	30	6,804
2006	101	6,593	124	26	6,844
2007	108	6,637	120	26	6,891
2008	93	6,568	217	24	6,902
2009	154	6,652	211	17	7,034
2010	111	6,787	207	21	7,126

Table 2.6 Examples of institutions collapsed under the DCP collapsing solution

All University of Illinois campuses (e.g., Urbana Champaign, Springfield) collapsed into University of Illinois Chicago
All Louisiana community and technical colleges collapsed into LA Technical College – Baton Rouge Campus
All University of Maine campuses (e.g., Farmington, Augusta, Central Maine Community College) into University of Maine, Oreno Campus
All University of Massachusetts campuses (e.g., Amherst, Dartmouth, Lowell, Medical Center, etc.) collapsed into UMass Boston
All University of Missouri campuses (e.g., St. Louis, Kansas City, Science and Technology) collapsed into the University of Missouri-Columbia Campus
All Rutgers University campuses (e.g., New Brunswick, Newark) collapsed into the Rutgers-Camden campus
All City University of New York campuses (e.g., Baruch College, Hunter College, Queens College, LaGuardia Community College, Bronx Community College, Manhattan Community College) collapsed into CUNY-City College
All 23 Penn State campuses (e.g., Brandywine, Beaver, Harrisburg, Greater Allegheny, College of Medicine, etc.) collapsed into the Penn State-University Park campus
All University of Texas campuses (e.g., San Antonio, Dallas, Arlington, Tyler, Brownsville, Health Science Center) collapsed into the UT Austin campus.

Table 2.7 Fall enrollment by gender/ethnicity

	Available Enrollment variables:				Are Enrollment Variables Available by:		
	Undergrad	Undergrad-freshmen	Graduate	First-professional	Attendance (FT vs. PT)?	Gender?	By ethnicity?
1969	X				X	X	
1970	X		X	X	X	X	
1971	X		X	X	X	X	
1972	X		X	X	X	X	
1973	X		X	X	X	X	
1974	X	X	X	X	X	X	
1975	X	X	X	X	X	X	
1976	X	X	X	X	X	X	
1977	X	X	X	X	X	X	X
1978	X	X	X	X	X	X	
1979	X	X	X	X	X	X	X
1980	X	X	X	X	X	X	X
1981	X	X	X	X	X	X	X
1982	X	X	X	X	X	X	X
1983	X	X	X	X	X	X	X
1984	X	X	X	X	X	X	X
1985	X	X	X	X	X	X	X
1986	X	X	X	X	X	X	
1987	X	X	X	X	X	X	X
1988	X	X	X	X	X	X	
1989	X	X	X	X	X	X	X
1990	X	X	X	X	X	X	
1991	X	X	X	X	X	X	X
1992	X	X	X	X	X	X	X
1993	X	X	X	X	X	X	X
1994	X	X	X	X	X	X	X
1995	X	X	X	X	X	X	X
1996	X	X	X	X	X	X	X
1997	X	X	X	X	X	X	X

	Available Enrollment variables:				Are Enrollment Variables Available by:		
	Undergrad	Undergrad-freshmen	Graduate	First-professional	Attendance (FT vs. PT)?	Gender?	By ethnicity?
1998	X	X	X	X	X	X	X
1999	X	X	X	X	X	X	X
2000	X	X	X	X	X	X	X
2001	X	X	X	X	X	X	X
2002	X	X	X	X	X	X	X
2003	X	X	X	X	X	X	X
2004	X	X	X	X	X	X	X
2005	X	X	X	X	X	X	X
2006	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X

Table 2.8 State Migration/Residence

	Availability of Data		Availability of Specific Variables			
	Avail?	Mandatory?	State of Residence (freshmen, all)	State of Residence (freshmen, recent HS grad)	In-state (freshmen, all)	In-state (freshmen, recent HS grad)
1973	X	X			X	
1974						
1975						
1976	X	X	X		X	
1977						
1978						
1979						
1980	X	X	X		X	
1981						
1982	X	X	X		X	
1983						
1984						
1985	X	X	X	X	X	X
1986						
1987	X	X	X	X	X	X
1988						
1989	X	X	X	X	X	X
1990						
1991						
1992						
1993	X	X	X	X	X	X
1994						
1995	X	X	X	X	X	X
1996						
1997	X	X	X	X	X	X
1998						
1999	X	X	X	X	X	X
2000						

	Availability of Data		Availability of Specific Variables			
	Avail?	Mandatory?	State of Residence (freshmen, all)	State of Residence (freshmen, recent HS grad)	In-state (freshmen, all)	In-state (freshmen, recent HS grad)
2001	X	X	X	X	X	X
2002	X		X	X	X	X
2003	X	X	X	X	X	X
2004	X		X	X	X	X
2005	X	X	X	X	X	X
2006	X		X	X	X	X
2007	X	X	X	X	X	X
2008	X		X	X	X	X
2009	X	X	X	X	X	X
2010	X		X	X	X	X

Table 2.9 Enrollment by age-group

	Data Availability:		Measures available by:		
	Data Available?	Data Mandatory?	Level of Study (undergrad, grad, first-prof)	Attendance (full-time, part-time)	Gender
1988	X	X	X	X	X
1989					
1990					
1991					
1992	X	X	X	X	X
1993					
1994	X	X	X	X	X
1995					
1996	X	X	X	X	X
1997					
1998	X	X	X	X	X
1999					
2000	X	X	X	X	X
2001	X		X		
2002	X	X	X	X	X
2003	X		X		
2004	X	X	X	X	X
2005	X		X		
2006	X	X	X	X	X
2007	X		X		
2008	X	X	X	X	X
2009	X		X		
2010	X	X	X	X	X

Table 2.10 Undergraduate tuition and fee variables, graduate tuition and fee variables, room and board variables

Tuition and Fees Key: t+f= tuition + fees; t= tuition; f=fees

	Data Source	Undergrad Tuition & Fees									Graduate Tuition & Fees									Room and Board			
		Out-state			In-state			In-dist			Out-state			In-state			In-dist			Room	Board= days or meals-per-week		
		t+f	t	f	t+f	t	f	t+f	T	f	t+f	t	f	t+f	t	f	t+f	t	f		Boardamt	Days	Meals
1970	Finance	X			X						X			X						X	X	X	
1971	Finance	X			X						X			X						X	X	X	
1972																							
1973	IC	X			X						X			X						X	X	X	
1974	IC	X			X						X			X						X	X	X	
1975	IC	X			X						X			X						X	X	X	
1976	IC	X			X						X			X						X	X	X	
1977	IC	X			X						X			X						X	X	X	
1978	IC	X			X						X			X						X	X	X	
1979	IC	X			X						X			X						X	X	X	
1980	IC	X			X						X			X						X	X	X	
1981	IC	X			X						X			X						X	X	X	
1982	IC	X			X						X			X						X	X	X	
1983	IC	X			X						X			X						X	X	X	
1984	IC	X			X						X			X						X	X	X	
1985	IC	X			X						X			X						X	X	X	
1986	IC	X			X						X			X						X	X	X	
1987	IC	X			X			X			X			X						X	X		X
1988	IC	X			X			X			X			X						X	X		X
1989	IC	X			X			X			X			X						X	X		X
1990	IC	X			X			X			X			X			X			X	X		X
1991	IC	X			X			X			X			X			X			X	X		X
1992	IC	X			X			X			X			X			X			X	X		X
1993	IC	X			X			X			X			X			X			X	X		X
1994	IC	X			X			X			X			X			X			X	X		X
1995	IC	X			X			X			X			X			X			X	X		X
1996	IC	X			X			X			X			X			X			X	X		X
1997	IC	X			X			X			X			X			X			X	X		X
1998	IC	X			X			X			X			X			X			X	X		X

	Data Source	Tuition and Fees Key: t+f= tuition + fees; t= tuition; f=fees																		Room and Board			
		Undergrad Tuition & Fees									Graduate Tuition & Fees									Room	Board= days or meals-per-week		
		Out-state			In-state			In-dist			Out-state			In-state			In-dist						
		t+f	t	f	t+f	t	f	t+f	T	f	t+f	t	f	t+f	t	f	t+f	t	f		Boardamt	Days	Meals
1999	IC	X			X			X			X			X			X			X	X		X
2000	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2001	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2002	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2003	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2004	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2005	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2006	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2007	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2008	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2009	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
2010	IC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X

Table 2.11 First professional tuition and fee variables

	In-state/out-state not designated	In-state			Out-State		
	tuit+fees	tuit+fees	tuit	fees	tuit+fees	tuit	fees
1987	X						
1988	X						
1989	X						
1990	X						
1991	X						
1992	X						
1993	X						
1994		X			X		
1995		X			X		
1996		X			X		
1997		X			X		
1998		X			X		
1999		X			X		
2000		X	X	X	X	X	X
2001		X	X	X	X	X	X
2002		X	X	X	X	X	X
2003		X	X	X	X	X	X
2004		X	X	X	X	X	X
2005		X	X	X	X	X	X
2006		X	X	X	X	X	X
2007		X	X	X	X	X	X
2008		X	X	X	X	X	X
2009		X	X	X	X	X	X
2010							

Table 2.12 Admissions indicators

	# Applying		# Admitted		# Enrolled (full-time)		# Enrolled (part-time)	
	Men	Women	Men	Women	Men	Women	Men	Women
2002	X	X	X	X	X	X	X	X
2003	X	X	X	X	X	X	X	X
2004	X	X	X	X	X	X	X	X
2005	X	X	X	X	X	X	X	X
2006	X	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X	X

Table 2.13 Test score admissions indicators

	# and % of students reporting:		SAT scores						ACT scores			
	SAT scores	ACT scores	Math		Verbal		Writing		Math		English	
			25th%	75th%	25th%	75th%	25th%	75th%	25th%	75th%	25th%	75th%
2002	X	X	X	X	X	X			X	X	X	X
2003	X	X	X	X	X	X			X	X	X	X
2004	X	X	X	X	X	X			X	X	X	X
2005	X	X	X	X	X	X			X	X	X	X
2006	X	X	X	X	X	X			X	X	X	X
2007	X	X	X	X	X	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X	X	X	X	X	X

Table 2.14 Change over time in degree classification systems

System	Duration
Pre-HEGIS System	1966-1970
HEGIS System	1971-1982
1980 Classification of Instructional Programs (CIP)	1983-1986
1985 Classification of Instructional Programs	1987-1991
1990 Classification of Instructional Programs	1992-2002
2000 Classification of Instructional Programs	2003-2010
2010 Classification of Instructional Programs	2011+

Table 2.15 Sample organization of degree data, data organized at 6-digit CIP level

Obs	Institution	Year	Award-level	2-digit CIP Code	4-digit CIP Code	6-digit CIP code	6-digit CIP name	# of degrees awarded
1	The George Washington University	1997	BA	05	05.02	05.0201	African-American/Black Studies.	27
2	The George Washington University	1997	BA	09	09.09	09.0904	Political Communication	53
3	The George Washington University	1997	MA	05	05.02	05.0201	African-American/Black Studies.	12
4	The George Washington University	1997	MA	09	09.09	09.0904	Political Communication	28
5	The George Washington University	1997	PhD	05	05.02	05.0201	African-American/Black Studies.	5
6	The George Washington University	1997	PhD	09	09.09	09.0904	Political Communication	7
7	The George Washington University	1998	BA	05	05.02	05.0201	African-American/Black Studies.	32
8	The George Washington University	1998	BA	09	09.09	09.0904	Political Communication	61
9	The George Washington University	1998	MA	05	05.02	05.0201	African-American/Black Studies.	14
10	The George Washington University	1998	MA	09	09.09	09.0904	Political Communication	39
11	The George Washington University	1998	PhD	05	05.02	05.0201	African-American/Black Studies.	3
12	The George Washington University	1998	PhD	09	09.09	09.0904	Political Communication	5

Table 2.16 Degree production variables available over time

	Measures Available by Award-Level									Measures available by:		
	LT 1yr	LT 2yr	Assoc[a]	LT 4yr	BA	Post-BA	MA	PhD	First Prof (e.g., Law)	Gender	Ethnicity? Broad degree codes	Ethnicity? All degree codes
1966			X		X		X	X	X	X		
1967			X		X		X	X	X	X		
1968			X		X		X	X	X	X		
1969			X		X		X	X	X	X		
1970			X		X		X	X	X	X		
1971			X		X		X	X	X	X		
1972			X		X		X	X	X	X		
1973			X		X		X	X	X	X		
1974			X		X		X	X	X	X		
1975			X		X		X	X	X	X		
1976			X		X		X	X	X	X	X	
1977			X		X		X	X	X	X	X	
1978			X		X		X	X	X	X		
1979			X		X		X	X	X	X	X	
1980			X		X		X	X	X	X		
1981			X		X		X	X	X	X	X	
1982			X		X		X	X	X	X		
1983			X		X		X	X	X	X		
1984	X	X	X		X		X	X	X	X		
1985	X	X	X		X		X	X	X	X	X	
1986	X	X	X		X		X	X	X	X		
1987	X	X	X	X	X	X	X	X	X	X	X	
1988	X	X	X	X	X	X	X	X	X	X		
1989	X	X	X	X	X	X	X	X	X	X	X	
1990	X	X	X	X	X	X	X	X	X	X	X	
1991	X	X	X	X	X	X	X	X	X	X	X	
1992	X	X	X	X	X	X	X	X	X	X	X	
1993	X	X	X	X	X	X	X	X	X	X	X	

	Measures Available by Award-Level									Measures available by:		
	LT 1yr	LT 2yr	Assoc[a]	LT 4yr	BA	Post-BA	MA	PhD	First Prof (e.g., Law)	Gender	Ethnicity? Broad degree codes	Ethnicity? All degree codes
1994	X	X	X	X	X	X	X	X	X	X	X	
1995	X	X	X	X	X	X	X	X	X	X	X	X
1996	X	X	X	X	X	X	X	X	X	X	X	X
1997	X	X	X	X	X	X	X	X	X	X	X	X
1998	X	X	X	X	X	X	X	X	X	X	X	X
1999	X	X	X	X	X	X	X	X	X	X	X	X
2000	X	X	X	X	X	X	X	X	X	X	X	X
2001	X	X	X	X	X	X	X	X	X	X	X	X
2002	X	X	X	X	X	X	X	X	X	X	X	X
2003	X	X	X	X	X	X	X	X	X	X	X	X
2004	X	X	X	X	X	X	X	X	X	X	X	X
2005	X	X	X	X	X	X	X	X	X	X	X	X
2006	X	X	X	X	X	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X	X	X	X	X	X

[a] Production measures for associate degrees are incomplete from 1966 through 1982, during which many sub-baccalaureate degree programs were covered by the separate “Handbook VI” degree classification system. Reliable measures of associate’s degrees begin in 1983 with the inception of the 1980 CIP.

Table 2.17 Sample Statement of Changes in Fund Balances, 1975-1996

	Current funds		(3) Loan funds	(4) Endowment funds	(5) Annuity/life income funds	(6) Plant funds
	(1) Unrestricted	(2) Restricted				
(1) Additions						
(2) Deductions						
(3) Total transfers, in (out)						
(4) Net increase (decrease)						
(5) Beginning year fund balance						
(6) End year fund balance						

Table 2.18 Part A – current fund revenues by source, recreated from the 1990 finance survey component instrument

Row		(1) Unrestricted	(2) Restricted	(3) Total
1	Tuition and fees			
	Government appropriations			
2	Federal			
3	Federal through state channels			
4	State			
5	Local			
	Government grants and contracts			
6	Federal			
7	State			
8	Local			
9	Private gifts, grants, and contracts			
10	Endowment income			
11	Sales and services of educational activities			
12	Auxiliary enterprises			
13	Hospitals			
14	Other sources			
15	Independent operations			
16	Total current funds revenues			

Table 2.19 Part D – revenues and investment return, recreated from 2006 finance survey instrument for private not-for-profit institutions

Row	Source of Funds	Total Amount
1	Tuition and fees (net of allowance reported in Part C, line 08)	
	Government Appropriations	
2	Federal appropriations	
3	State appropriations	
4	Local appropriations	
	Government Grants and Contracts	
5	Federal grants and contracts	
6	State grants and contracts	
7	Local grants and contracts	
	Private Gifts, Grants, and Contracts	
8	Private gifts, grants, and contracts	
9	Contributions from affiliated entities	
10	Investment return	
11	Sales and services of educational activities	
12	Sales and services of auxiliary enterprises (net of allowance reported in Part C, line 09)	
13	Hospital revenue	
14	Independent operations revenue	
15	Other revenue calculated value= [D16-(D01+…+D14)]	
16	Total revenues and investment return (copied from line B01)	

Table 2.20 Availability of revenue measures over time, consistency before and after FASB accounting changes

	Tuition and Fees			Govt appropriations			Govt grants + contracts		
	Gross (includes Allowances)	No inst allowances	No allowances	Fed	State	Local	Fed	State	Local
Measure consistent before/after FASB?									
	X	X		X	X	X	X	X	X
Measure Available?									
1969	X			X	X	X			
1970	X			X	X	X			
1971	X			X	X	X			
1972	X			X	X	X			
1973	X			X	X	X			
1974	X			X	X	X			
1975	X			X	X	X	X	X	X
1976	X			X	X	X	X	X	X
1977	X			X	X	X	X	X	X
1978	X			X	X	X	X	X	X
1979	X			X	X	X	X	X	X
1980	X			X	X	X	X	X	X
1981	X			X	X	X	X	X	X
1982	X			X	X	X	X	X	X
1983	X			X	X	X	X	X	X
1984	X			X	X	X	X	X	X
1985	X			X	X	X	X	X	X
1986	X			X	X	X	X	X	X
1987	X	X		X	X	X	X	X	X
1988	X	X		X	X	X	X	X	X
1989	X	X		X	X	X	X	X	X
1990	X	X		X	X	X	X	X	X
1991	X	X		X	X	X	X	X	X
1992	X	X		X	X	X	X	X	X
1993	X	X		X	X	X	X	X	X

	Tuition and Fees			Govt appropriations			Govt grants + contracts		
	Gross (includes Allowances)	No inst allowances	No allowances	Fed	State	Local	Fed	State	Local
1994	X	X		X	X	X	X	X	X
1995	X	X		X	X	X	X	X	X
1996	X	X		X	X	X	X	X	X
1997	X	X	X	X	X	X	X	X	X
1998	X	X	X	X	X	X	X	X	X
1999	X	X	X	X	X	X	X	X	X
2000	X	X	X	X	X	X	X	X	X
2001	X	X	X	X	X	X	X	X	X
2002	X	X	X	X	X	X	X	X	X
2003	X	X	X	X	X	X	X	X	X
2004	X	X	X	X	X	X	X	X	X
2005	X	X	X	X	X	X	X	X	X
2006	X	X	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X	X	X

Table 2.21 Availability of revenue measures over time, consistency before and after FASB accounting changes

	Private grants, gifts, & contracts	endow/ invest	sales of educ activities	Auxiliary	Hospitals	ind operations/ other rev	Total Current Revenue: w/ Allowances	Total Current Revenue: No inst allowances	Total Current Revenue: No inst allow No priv grant No endow
Measure consistent before/after FASB?									
			Z	Z					Z
Measure available?									
1969		X	X	X					
1970		X	X	X					
1971		X	X	X	X				
1972		X	X	X	X				
1973		X	X	X	X				
1974		X	X	X	X				
1975	X	X	X	X	X	X	X		
1976	X	X	X	X	X	X	X		
1977	X	X	X	X	X	X	X		
1978	X	X	X	X	X	X	X		
1979	X	X	X	X	X	X	X		
1980	X	X	X	X	X	X	X		
1981	X	X	X	X	X	X	X		
1982	X	X	X	X	X	X	X		
1983	X	X	X	X	X	X	X		
1984	X	X	X	X	X	X	X		
1985	X	X	X	X	X	X	X		
1986	X	X	X	X	X	X	X		
1987	X	X	X	X	X	X	X	X	X
1988	X	X	X	X	X	X	X	X	X
1989	X	X	X	X	X	X	X	X	X
1990	X	X	X	X	X	X	X	X	X
1991	X	X	X	X	X	X	X	X	X
1992	X	X	X	X	X	X	X	X	X

							Total Current Revenue		
	Private grants, gifts, & contracts	endow/ invest	sales of educ activities	Auxiliary	Hospitals	ind operations/ other rev	w/ Allowances	No inst allowances	No inst allow No priv grant No endow
1993	X	X	X	X	X	X	X	X	X
1994	X	X	X	X	X	X	X	X	X
1995	X	X	X	X	X	X	X	X	X
1996	X	X	X	X	X	X	X	X	X
1997	X	X	X	X	X	X	X	X	X
1998	X	X	X	X	X	X	X	X	X
1999	X	X	X	X	X	X	X	X	X
2000	X	X	X	X	X	X	X	X	X
2001	X	X	X	X	X	X	X	X	X
2002	X	X	X	X	X	X	X	X	X
2003	X	X	X	X	X	X	X	X	X
2004	X	X	X	X	X	X	X	X	X
2005	X	X	X	X	X	X	X	X	X
2006	X	X	X	X	X	X	X	X	X
2007	X	X	X	X	X	X	X	X	X
2008	X	X	X	X	X	X	X	X	X
2009	X	X	X	X	X	X	X	X	X
2010	X	X	X	X	X	X	X	X	X

Appendices

Appendix 1: Organizational Forms Present in HEGIS Survey Components

Institutions were required to complete different HEGIS survey components depending on the category and sub-category of organizational form. The categories and sub-categories of organizational form were as follows:

- Individual institution
- Multi-campus institution
  - All campuses (present only in data from IC Component)
  - central office (present only in data from IC Component)
  - Main campus (present in data from all survey components)
  - Branch campus (present in data from all survey components)
- System
  - All campuses/institutions (present only in data from IC Component)
  - System office (present only in data from IC Component)
  - Individual institution (present in data from all survey components)
  - Main campus (present in data from all survey components)
  - Branch campus (present in data from all survey components)

All of the above categories and sub-categories of organizational form are present in HEGIS IC data. In the Finance, Completions, Fall Enrollment, and State Migration Survey Components data are reported only at the individual institution, main campus, or branch campus levels; data are not reported for the all campuses/institutions or central/system office levels. Unfortunately, although HEGIS data indicate whether the observation is part of an individual institution, main campus, or branch campus, the data do not provide indicators about the parent-child relationship.

Appendix 2: Patterns of Parent-Child Relationships By Survey Component

Before introducing alternative solutions to problems posed by the parent-child relationship, I show data patterns of the parent child relationship over time for different survey components. During IPEDS years, Parent-child patterns can be described using parent-child "flag" variables. These flag variables exist for each survey component (e.g., Completions, Finance, Fall Enrollment). They describe whether the institution is a parent, a child, or neither. From 1987 through 2000 parent-child flags were included in the dataset of each individual survey component. Beginning in 2001, parent-child flags for all survey components were included in the IC Survey Component. It is important to note that HEGIS data do not include information on parent-child relationships. This problem is not particularly crucial; if I know that an institution is a child during IPEDS years, I can define that institution as a child during HEGIS years as well.

Appendix Table 2.1 shows the parent child relationships for the Finance Survey Component, using Finance Survey data (parent child indicators for the Finance Survey Component are also available on the IC data). Column (1) shows institutions that are neither parents nor children or for whom the flag variable is missing. Column (2) refers to parents, meaning that the institution shows finance data for multiple institutions. Column (3) refers to child institutions for the years 1987 through 1994. Beginning in 1995, the parent-child flag indicated whether an institution was a "child with no data" (Column 4), or a "child with some data" (Column 7). A child with some data typically reports revenue and expenditure data but may report asset data at the parent level.

Beginning in 2001, child institutions were further disaggregated into those that reported their data to a parent institution (Columns 5, Column 8) and those that report their data to a system office (Column 6, Column 9). Note that there are very few child institutions that do not report any data (Columns 4-6). Parent child flags were unavailable in 2000.

Appendix Table 2.2 shows parent child relationships for the Finance Component, using parent-child flags available in the IC data for the years 2001 through 2010. In fact, I merge data from the IC Component to data from the Finance Component for the years 2001 through 2010 to create Appendix Table 2.1. Each parent institution (Appendix Table 2.2, Column 2) represents at least one child institution. Note that frequencies for columns representing child institutions with some data (Columns 8-9) are very similar to those for Appendix Table 2.1. However, Appendix Table 2.2 has many child institutions with no data (Columns 5-6) whereas Appendix Table 2.1 has very few such institutions. This is because child institutions with no data are not required to fill out the finance Component.

Appendix Table 2.3 shows results for two variables I constructed. First, Columns (1) and (2) show whether an institution is a child and has no revenue variables (defined as total current revenues are missing). Children with no revenue variables are concentrated in the years 1987, 1988, and 1998. Second, Columns (3) and (4) show whether an institution is *ever* a child with no revenue variables. As described later in this section, I use this latter variable to create my parent-child solution.

Appendix Table 2.4 shows-parent child relationships for the Completions Component during IPEDS years, using data from the Completions Component. In contrast to finance data, child institutions with partial data do not exist. There are very few child institutions with no data. These are concentrated in 1995. Appendix Table 2.5 shows parent child indicators for the Completions Component, using data from the IC Component. Note that in comparison to Appendix Table 2.4, Appendix Table 2.5 has more child institutions with no data because these institutions typically do not fill out the Completions Component. Appendix Table 2.6, using data from the Completions Component, shows institutions that are children and have no degree data (Columns 1 and 2) and institutions that were *ever* children with no degree data.[8] Note that child institutions with no degree data are concentrated in 1995, when the number of institutions in the completion Component increased to 8,712 from 5,154 in 1994.

Appendix Table 2.7 shows parent child relationships for the Fall Enrollment Component (which includes enrollment by gender and ethnicity, enrollment by age, and state migration) during IPEDS years, using data from the Fall Enrollment Component. Note that only instance of a child institution with no data occurs in in 2004. Appendix Table 2.8 shows parent child relationships for the Fall Enrollment Component using data from the IC Component. Child institutions with no data in Appendix Table 2.8 are not required to complete the Fall Enrollment Component and hence do not appear in Appendix Table 2.7

[8] I define "no degree data" as an institution that has total degrees of any kind equal missing or zero.

Appendix Table 2.1 Finance parent child relationships from Finance Survey (does not include for-profit institutions)

	(1) NA/ Missing	(2) Parent	(3) Child (1987-1994)	(4) Child no data (1995-2000)	(5) Child no data Report w/ parent (2001+)	(6) Child no data Report w/ system (2001+)	(7) Child w/ some data (1995-2000)	(8) Child w/ some data Report w/ parent (2001+)	(9) Child w/ some data Report w/ system (2001+)	(10) Tot
1987	3,293	77	234	0	0	0	0	0	0	3,604
1988	3,313	75	238	0	0	0	0	0	0	3,626
1989	3,216	77	116	0	0	0	0	0	0	3,409
1990	3,284	61	63	0	0	0	0	0	0	3,408
1991	3,376	61	209	0	0	0	0	0	0	3,646
1992	3,372	69	71	0	0	0	0	0	0	3,512
1993	3,353	110	79	0	0	0	0	0	0	3,542
1994	3,370	115	96	0	0	0	0	0	0	3,581
1995	3,308	135	0	0	0	0	130	0	0	3,573
1996	3,019	125	0	0	0	0	132	0	0	3,276
1997	2,953	131	0	0	0	0	173	0	0	3,257
1998	2,940	139	0	117	0	0	177	0	0	3,373
1999	2,830	130	0	2	0	0	179	0	0	3,141
2000	4,038	0	0	0	0	0	0	0	0	4,038
2001	3,581	138	0	0	5	1	0	175	35	3,935
2002	3,491	146	0	0	4	10	0	181	30	3,862
2003	3,471	152	0	0	9	0	0	182	41	3,855
2004	3,392	124	0	0	0	0	0	121	188	3,825
2005	3,346	107	0	0	0	0	0	171	240	3,864
2006	3,315	109	0	0	0	0	0	179	264	3,867
2007	3,289	104	0	0	0	0	0	166	275	3,834
2008	3,259	98	0	0	0	0	0	167	297	3,821
2009	3,270	93	0	0	0	0	0	166	315	3,844

Appendix Table 2.2 Finance Parent Child Relations from IC Survey (does not include for-profit institutions, does not include system offices)

	(1) NA/ Missing	(2) Parent	(5) Child no data Report w/ parent (2001+)	(6) Child no data Report w/ system (2001+)	(8) Child w/ some data Report w/ parent (2001+)	(9) Child w/ some data Report w/ system (2001+)	(10) Tot
2001	4,392	110	274	9	174	49	5,008
2002	3,629	120	272	23	183	33	4,260
2003	3,519	125	341	13	182	41	4,221
2004	3,484	117	328	26	175	78	4,208
2005	3,405	94	279	23	121	188	4,110
2006	3,339	82	204	23	171	241	4,060
2007	3,292	81	193	12	179	264	4,021
2008	3,269	76	186	12	166	275	3,984
2009	3,232	70	179	24	167	299	3,971
2010	3,242	65	178	0	166	314	3,965

Appendix Table 2.3 Child with no revenue variables, ever a child with no revenue variables

	(1) Child-no-rev=0	(2) Child-no-rev=1	(3) Ever-child-no-rev=0	(4) Ever-child-no-rev=1	(5) Total
1969	2,472	0	2,433	39	2,472
1970	2,493	0	2,450	43	2,493
1971	2,706	0	2,652	54	2,706
1972	2,804	0	2,748	56	2,804
1973	2,946	0	2,880	66	2,946
1974	3,015	0	2,950	65	3,015
1975	3,038	0	2,970	68	3,038
1976	3,055	0	2,986	69	3,055
1977	3,073	0	3,003	70	3,073
1978	3,130	0	3,062	68	3,130
1979	3,173	0	3,105	68	3,173
1980	3,189	0	3,122	67	3,189
1981	3,269	0	3,185	84	3,269
1982	3,294	0	3,208	86	3,294
1983	3,286	0	3,200	86	3,286
1984	3,302	0	3,230	72	3,302
1985	3,379	0	3,302	77	3,379
1986	3,388	0	3,311	77	3,388
1987	3,485	119	3,444	160	3,604
1988	3,499	127	3,471	155	3,626
1989	3,401	8	3,355	54	3,409
1990	3,408	0	3,366	42	3,408
1991	3,543	103	3,512	134	3,646
1992	3,512	0	3,455	57	3,512
1993	3,542	0	3,488	54	3,542
1994	3,581	0	3,518	63	3,581
1995	3,573	0	3,517	56	3,573
1996	3,276	0	3,236	40	3,276
1997	3,256	1	3,226	31	3,257

	(1) Child-no-rev=0	(2) Child-no-rev=1	(3) Ever-child-no-rev=0	(4) Ever-child-no-rev=1	(5) Total
1998	3,256	117	3,246	127	3,373
1999	3,141	0	3,111	30	3,141
2000	4,038	0	4,003	35	4,038
2001	3,934	1	3,900	35	3,935
2002	3,861	1	3,828	34	3,862
2003	3,853	2	3,820	35	3,855
2004	3,824	1	3,792	33	3,825
2005	3,863	1	3,800	64	3,864
2006	3,865	2	3,803	64	3,867
2007	3,832	2	3,771	63	3,834
2008	3,821	0	3,758	63	3,821
2009	3,844	0	3,781	63	3,844

Appendix Table 2.4 Parent-child indicator for completions survey, from completions data

	(1) NA/Missing	(2) Parent	(3) Child w/ no data	(4) Total
1987	4,874	51	0	4,925
1988	5,564	42	1	5,607
1989	5,757	32	0	5,789
1990	4,852	25	0	4,877
1991	4,995	19	0	5,014
1992	5,015	27	0	5,042
1993	5,109	48	0	5,157
1994	5,091	63	0	5,154
1995	8,442	103	167	8,712
1996	6,554	104	0	6,658
1997	6,373	113	0	6,486
1998	7,087	86	0	7,173
1999	6,151	76	0	6,227
2000	6,670	0	0	6,670
2001	6,419	99	21	6,539
2002	6,383	92	16	6,491
2003	6,488	86	8	6,582
2004	6,553	81	2	6,636
2005	6,672	39	10	6,721
2006	6,745	21	6	6,772
2007	6,763	19	3	6,785
2008	6,896	15	2	6,913
2009	7,017	13	0	7,030
2010	7,255	11	0	7,266

Appendix Table 2.5 Parent-child indicator for completions survey, from IC data

	(1) NA/Missing	(2) Parent	(3) Child w/ no data	(4) Total
2001	9,235	100	178	9,513
2002	6,594	101	201	6,896
2003	6,568	87	168	6,823
2004	6,627	83	165	6,875
2005	6,699	41	64	6,804
2006	6,793	21	30	6,844
2007	6,845	19	27	6,891
2008	6,862	16	24	6,902
2009	7,001	13	20	7,034
2010	7,100	11	15	7,126

Appendix Table 2.6 Child with no degree variables, ever a child with no degree variables

	(1) Child-no-degree=0	(2) Child-no-degree=1	(3) Ever-child-no-degree=0	(4) Ever-child-no-degree=1	(5) Total
1966	2,172	0	2,169	3	2,172
1967	2,299	0	2,295	4	2,299
1968	2,338	0	2,334	4	2,338
1969	2,468	0	2,464	4	2,468
1970	2,557	0	2,553	4	2,557
1971	2,623	0	2,618	5	2,623
1972	2,728	0	2,722	6	2,728
1973	2,778	0	2,772	6	2,778
1974	2,878	0	2,870	8	2,878
1975	2,893	0	2,886	7	2,893
1976	2,933	0	2,926	7	2,933
1977	2,954	0	2,946	8	2,954
1978	3,010	0	3,001	9	3,010
1979	3,059	0	3,049	10	3,059
1980	3,082	0	3,073	9	3,082
1981	3,175	0	3,166	9	3,175
1982	3,187	0	3,177	10	3,187
1983	3,201	0	3,191	10	3,201
1984	3,230	0	3,222	8	3,230
1985	3,276	0	3,268	8	3,276
1986	3,295	0	3,287	8	3,295
1987	4,925	0	4,918	7	4,925
1988	5,607	0	5,599	8	5,607
1989	5,789	0	5,780	9	5,789
1990	4,877	0	4,870	7	4,877
1991	5,014	0	4,997	17	5,014
1992	5,042	0	5,024	18	5,042
1993	5,157	0	5,138	19	5,157
1994	5,154	0	5,143	11	5,154

	(1) Child-no-degree=0	(2) Child-no-degree=1	(3) Ever-child-no-degree=0	(4) Ever-child-no-degree=1	(5) Total
1995	8,545	167	8,545	167	8,712
1996	6,658	0	6,639	19	6,658
1997	6,486	0	6,460	26	6,486
1998	7,173	0	7,144	29	7,173
1999	6,227	0	6,195	32	6,227
2000	6,670	0	6,629	41	6,670
2001	6,539	0	6,511	28	6,539
2002	6,491	0	6,462	29	6,491
2003	6,581	1	6,554	28	6,582
2004	6,636	0	6,610	26	6,636
2005	6,721	0	6,691	30	6,721
2006	6,772	0	6,740	32	6,772
2007	6,785	0	6,752	33	6,785
2008	6,913	0	6,880	33	6,913
2009	7,030	0	6,999	31	7,030
2010	7,266	0	7,234	32	7,266

Appendix Table 2.7 Parent-child indicator for fall enrollments survey, from fall enrollments data

	(1) NA/Missing	(2) Parent	(3) Child w/ no data	(4) Total
1987	6,485	52	0	6,537
1988	6,449	59	0	6,508
1989	5,324	31	0	5,355
1990	5,564	26	0	5,590
1991	5,273	23	0	5,296
1992	6,464	15	0	6,479
1993	6,589	28	0	6,617
1994	8,775	52	0	8,827
1995	8,494	88	0	8,582
1996	8,378	107	0	8,485
1997	6,566	100	0	6,666
1998	6,359	102	0	6,461
1999	7,053	84	0	7,137
2000	6,144	72	0	6,216
2001	6,476	80	0	6,556
2002	6,469	91	0	6,560
2003	6,457	69	0	6,526
2004	6,508	67	1	6,576
2005	6,612	17	0	6,629
2006	6,679	10	0	6,689
2007	6,745	3	0	6,748
2008	6,757	4	0	6,761
2009	6,885	1	0	6,886
2010	6,984	6	0	6,990

Appendix Table 2.8 Parent-child indicator for fall enrollments survey, from IC data

	(1) NA/Missing	(2) Parent	(3) Child w/ no data	(4) Total
2001	9,296	80	137	9,513
2002	6,626	91	179	6,896
2003	6,611	68	144	6,823
2004	6,670	67	138	6,875
2005	6,762	17	25	6,804
2006	6,825	10	9	6,844
2007	6,885	3	3	6,891
2008	6,894	4	4	6,902
2009	7,032	1	1	7,034
2010	7,108	6	12	7,126

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Chapter 3 :

The Adoption and Production of Master's Degrees by U.S. Colleges and Universities

Mendota Seminary was founded in 1893 in Mendota, Illinois. In 1912, the seminary moved to Aurora, 40 miles west of Chicago, where it was renamed Aurora College. The 1973 Carnegie Commission classified Aurora College as a “Liberal Arts II” college, meaning that curricular offerings were primarily in undergraduate liberal-arts majors, but that the college was unselective. From 1969 to 1979 full time equivalent (FTE) undergraduate enrollments declined from 931 to 644. Enrollment decline represented a threat to organizational survival because tuition accounted for 59% of total current revenues in 1969.[9]

In 1980 Aurora College adopted master’s degrees for the first time.[10] Two years later the first master’s degrees were awarded; 23 students received master’s degrees in business administration and 11 students received master’s degrees in criminal justice. In 1985 Aurora College changed its name to Aurora University and began granting additional master’s degrees: information sciences in 1985; teacher education and recreation management in 1986; social work in 1987; and educational administration in 1994. The number of master’s degrees awarded annually at Aurora increased from 34 in 1982, to 170 in 1990, and to 565 in 2000. In 2009, Aurora awarded 650 master’s degrees,

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[9] Statistics about Aurora College finances and degrees are based on author’s calculations from survey data.
[10] Master’s degree adoption is defined as two years prior to the year the degree was first awarded.

241 in teacher education, 188 in educational administration, 119 in social work, 68 in business administration, and 24 in recreation management.

The history of Aurora University raises two research questions. What factors explain the adoption and of new master's degrees by colleges and universities (herein institutions)? What factors explain the production (i.e., number of degrees conferred annually) of master's degrees by institutions? The annual U.S. production of master's degrees increased from 290,000 in 1987 – 29% of the total number of bachelor's degrees awarded that year – to 670,000 in 2009 – 41% of the total number of bachelor's degrees awarded that year.[11]

Empirical research on the proliferation of master's degrees remains scant. Conrad, Haworth, and Millar (1993) analyze the attributes of different master's programs and student experiences in these programs. Other contributions focus on particular master's degrees (e.g., Baker, Orr, & Young, 2007), often in relation to professional associations (e.g., Khurana, 2007), or discuss the growth of master's degrees as part of a larger research question (e.g., Gumport & Snydman, 2002). Kraatz and Zajac (1996) find that liberal arts colleges adopted vocational baccalaureate degrees during a period of changing student preferences and declines in the "traditional" college-age population, but no research has examined the growth of master's degrees from the perspective of degree granting institutions.

I derive testable hypotheses about the adoption and production of master's degrees from three theoretical perspectives. Resource dependence theory argues that institutions adopt and produce master's degrees in response to declines in "traditional" revenues (Pfeffer & Salancik, 1978). Research on the pursuit of prestige implies that the

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[11] Author's calculation based on IPEDS survey data.

production of master's degrees increases because institutions pursue prestige by maximizing revenue from all sources (Bowen, 1980; Winston, 1999), including master's degrees. Finally, drawing from human capital theory (Becker, 1964; Goldin & Katz, 2008), institutions adopt degrees associated with occupations demanded by the labor market.

I test these hypotheses by applying panel modeling methods to a panel dataset of all accredited institutions from 1969 to 2009. I analyze the total annual production of master's degrees. I also analyze the adoption of specific master's degree programs – including business, education, health, computer science, engineering, psychology, and biological sciences – which collectively account for 75% of all master's degrees awarded in 2009.

Results from statistical analyses support different narratives for different kinds of institutions. In support of resource dependence theory, non-prestigious private institutions adopt/produce master's degrees in interdisciplinary social science fields in response to declines in freshman enrollments and when alternative revenues are weak. Liberal arts colleges with strong alternative revenues do not adopt master's degrees at all, implying that master's degrees represent an option of last resort for institutions with a historical mission of undergraduate education. The results for prestigious research universities are mostly consistent with the literature on the pursuit of prestige; research universities enjoy strong student demand for master's degrees and increase the production of master's degrees even as alternative revenue streams grow. I discuss the implications of these results for the equity and efficiency goals of education policy, and for the literature on vertical stratification of institutions (e.g., Cheslock & Gianneschi, 2008).

Theory and Hypotheses

Labor Market Demand for Skills

I derive three sets of hypotheses from three theoretical perspectives. The first hypothesis argues that institutions adopt degrees that are demanded by the labor market. Both human capital theory and "functionalism" in sociology share the idea that advances in technology cause changes in the division of labor, creating demand for new skills. In economics, Goldin and Katz (2008) argue that technology is "skill biased"; firms require highly educated workers in order to exploit technological advances. For example, Chandler (1977) argues that advances in technology (e.g., transportation and refrigeration) allowed entrepreneurs to capitalize on economies of scale, leading to the emergence of the large corporation. In turn, the rise of the large corporation increased demand for college educated labor because managing the logistics of bureaucracy required high levels of literacy, numeracy, and communication skills (Brown, 1995). In sociology, Clark (1962, p. 2) reflects on post-World War II economic growth:

> technology alters nearly all institutions. Not the least of the alterations is seen in technology's effect on the role of education. Our age demands armies of skilled technicians and professional experts, and to the task of preparing these men the educational system is increasingly dedicated.

These ideas inform a hypothesis about institutional behavior. Technological advances create demand for workers possessing the skills to exploit these advances (Goldin & Katz, 2008). A shortage of skilled workers causes wages to increase. Individuals invest in human capital because they expect a positive return on their investment (Becker, 1964; Schultz, 1962). Ceteris paribus, individuals will invest in skills related to occupations experiencing skill shortages because these are associated with the highest wages. Therefore institutions that desire strong enrollments adopt degrees associated with occupations experiencing strong labor market demand.

H1: Institutions adopt academic programs related to occupations demanded by the labor market.

This hypothesis also represents a policy ideal for policymakers interested in economic growth. Policymakers fund postsecondary education, in part, because of the perceived relationship between human capital investment and regional economic growth (Grubb & Lazerson, 2004; Schultz, 1962). Policymakers want institutions to focus on degree programs associated with occupations that are experiencing growth in total employment (e.g., nursing) because graduates from these programs are likely to find employment. Policymakers also want institutions to focus on degree programs associated with growing wages because wage growth implies a shortage of skilled labor. When shortages of skilled labor force firms to raise wages, firms may relocate operations to regions where labor is less expensive.

Resource Dependence Theory

Summary of the theory. I derive a second set of hypotheses from resource dependence theory (Emerson, 1962; Pfeffer & Salancik, 1978). Whereas economics often assumes that firms pursue the goal of profit maximization, resource dependence theory highlights the goals of *survival*, *autonomy*, and *power*. All organizations require resources from the external environment to survive (Parsons, 1956). Organizations desire a predictable flow of resources because uncertainty undermines survival. For example, the increasing volatility in state higher education appropriations (Doyle & Delaney, 2009) may compel public universities to seek more stable revenue sources. Resource dependence theory defines autonomy and power as two sides of the same coin. Organizations dependent on resources from a particular organization are beholden to the performance requirements of that organization, undermining autonomy. Therefore, organizations attempt to avoid resource exchanges that entail unfavorable power asymmetries and seek exchanges entailing favorable power asymmetries.

Dependence is the key concept in resource dependence theory. Dependence occurs when a particular resource is (1) *important* for organizational survival, (2) other organizations have *discretion* over the distribution of that resource, and (3) few *alternative* sources for that resource exist. Resource importance can be measured as the proportion of total inputs or outputs accounted for by that exchange.[12] For example, student enrollments represent the primary revenue-source for non-prestigious liberal arts colleges whereas prestigious liberal arts colleges generate revenues from enrollments, endowments, and donations. Resource discretion refers to obligations the focal organization must fulfill to obtain the resource from the second organization. Organizations prefer resources that come with few strings attached. For example, public institutions prefer unconditional state appropriations over performance funding conditional on increasing graduation rates (Dougherty & Hong, 2005).

Finally, dependence increases when there are few alternative organizations that can provide a critical resource. Organizational relationships with local, state, or federal governments often involve problematic dependencies because resources provided by the

[12] Resource criticality is another component of resource importance. A critical resource is one that the organization cannot function without. For example, organization typically cannot function without electricity even though it represents as small proportion of total inputs.

government often cannot be obtained elsewhere. Whereas regional state colleges have an unfavorable asymmetric relationship with state governments, prestigious public universities have many revenue sources and may enjoy countervailing power over the state in that the state depends on these institutions to attract high-innovation industries and to retain high-ability individuals.

Resource dependence theory describes a litany of behavioral repertoires organizations can use to avoid unfavorable dependencies. When dependence results from reliance on a single critical resource exchange, the most direct solution is diversification.[13] Diversification can occur through the development of substitutable exchanges, such as when cereal manufacturers began to produce cereal bars, or more radically by moving into entirely new industries. The adoption of master's degrees can be thought of a substitutable exchange for undergraduate enrollment revenue. Pfeffer and Salancik (1978, p. 131) note that diversification often involves mission drift, that is "the tendency for organizations to redefine their stated goals to fit new contingencies in the environment ….[permitting] the organization to take on new tasks or activities, lessening dependence on old environments and activities."

Most empirical contributions to research dependence theory analyze the responses of corporations to dependencies that cannot be attenuated through diversification. These responses, largely outside the scope of the present research, include compliance, mergers, cooptation, and the formation of alliances or professional associations to gain countervailing control.[14] Empirical support for these responses has been mixed (Davis &

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[13] Diversification is defined as "altering the purposes and structure of the organization so that it no longer requires only a limited range of inputs or serves only a few markets" (Pfeffer & Salancik, 1978, p. 109).
[14] First, organizations may simply comply with demands or seek a stronger relationship with the organization providing scarce resources. For example, Covaleski (1988) shows that the University of

Cobb, 2009). Resource dependence theory is a child of the 1960s and 1970s and the behavioral repertoires posited by Pfeffer and Salancik (1978) did not reflect the repertoires used by organizations in the 1980s and 1990s.[15] Nevertheless, the diagnosis of the problem faced by organizations – dependence – remains apt: "the underlying theoretical approach of diagnosing the sources of power and dependence and predicting when and in what direction organizations are likely to respond still yields great insight into organizational behavior" (Davis & Cobb, 2009, p. 23).

Application of the theory. I use resource dependence theory to diagnose the problem of dependence for colleges and universities, but I am selective in predicting organizational responses. I argue that tuition from master's degrees programs offers an alternative source of revenue when "traditional" revenues decline. I hypothesize two traditional revenues. First, undergraduate enrollments are an important resource for all institutions. Enrollments are affected by the size of the college-age population. The population of "traditional" college freshman – defined as ages 18 and 19 – declined from

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Madison, Wisconsin responded to declines in state appropriations, in part, by attempting to demonstrate the university's contribution to the state economy. Other strategies involve gaining countervailing control over organizations that supply critical resources. Organizations may form professional associations – for example the American Association of Community Colleges or the Association of Private Sector Colleges and Universities – to lobby for legislation, attempting to make the external environment more conducive to the goals of the organization. Organizations may avoid dependence through guile or secrecy, for example through symbolic but not substantive fulfillment of obligations, or by claiming that the organization is paralyzed by conflicting demands from stakeholders. Mergers present another option. Vertical mergers – buying suppliers or distributors – are a method of extending organizational control over exchanges vital to the organization. Horizontal mergers – buying competitors – reduces competition and allows the organizations to gain more control over key suppliers in that they have fewer outlets for their products. Finally, the "cooptation" strategy is to invite members of controlling organizations to participate in various activities of the focal organization – most notably to sit on the corporate board – in order to socialize these individuals to the goals of the focal organization.

[15] Resource dependence theory says that power and stability, not profit, are the goals of corporations. This may have been true in the 1970s, but not in the 1980s and 1990s with the rise of "shareholder capitalism" (Davis, 2009). Consistent with the 1960s and 1970s, resource dependence theory predicts that firms often grow through diversification, but hostile takeovers eliminated the large conglomerate firm (Davis, Diekmann, & Tinsley, 1994). Finally, by the 1990s corporate board interlocks were nonexistent with competitors and were very rare with key suppliers, due to issues of legality and the high-visibility of corporate boards (Davis & Greve, 1997). By contrast, organizational repertoires such as outsourcing, downsizing, and spinoffs, unanticipated by Peffer and Salancik (1978), have become commonplace.

a peak of 8.7 million in 1977 to a low of 6.9 million in 1992 before increasing again (NCES, 2010, Table 15). Population decline is especially damaging for non-prestigious private institutions that struggle to attract students (Jones, 2001; Mayhew, 1979). Pfeffer & Salancik (1978, p. 46) write that "universities have defined themselves as processing…people between 18 and 22 years of age. As the supply of people in that cohort has decreased….one response has been to broaden the range of needed inputs to include older people in adult education and continuing education programs."

Second, state appropriations are an important resource for public institutions. From 1977 to 2002, state appropriations for higher education fell from $8.53 per $1,000 in personal income to $7.07 per $1,000 in personal income (Kane, Orszag, & Gunter, 2003). Resource dependence theory predicts that public institutions will attempt to diversify their revenue streams in response to declining state appropriations.

H2: Institutions will adopt master's degrees in response to declines in (a) undergraduate enrollments and (b) declines in state appropriations.[16]

H3: Institutions will increase the production of master's degrees in response to declines in (a) undergraduate enrollments and (b) state appropriations.

Resource dependence theory argues that the "extent of diversification [in response to declining or uncertain resources] should be related to the proportion of resources exchanged with one or a few dominant organizations" (Pfeffer & Salancik, 1978, p. 127). In other words, the diversification response should be stronger when that problematic resource exchange represents a higher proportion of total inputs or outputs.

[16] Future versions of this chapter may include hypotheses related to volatility of state appropriations (Doyle & Delaney, 2009).

Organizations already having diverse revenue streams have a smaller incentive to diversify in response to one problematic resource exchange.

H4: Institutions with strong alternative sources of revenue are less likely than institutions with weak alternative sources of revenue to adopt master's degrees.

H5: Institutions with strong alternative sources of revenue will have lower annual production of master's degrees than institutions with weak alternative sources of revenue.

If master's degrees represent attempts to diversify revenues then institutions will focus on degree programs that generate high enrollments. Few prospective students possess the prerequisite skills for master's degrees in scientific or technical fields (e.g., engineering, computer science, or statistics). By contrast, interdisciplinary social-science degrees (e.g., business, public health, social work, or education) have low fixed costs (Middaugh, Graham, Shahid, Carroll, & National Center for Education Statistics., 2003) and have the potential to generate strong enrollments because students may apply regardless of undergraduate major. As the number of "good" jobs in business or social-service occupations is surpassed by the number of aspirants, inter-disciplinary social science master's degrees allow individuals to differentiate themselves from baccalaureate degree holders:[17]

H6: (a) Adoption of new master's degrees and (b) production of master's degrees will be higher in interdisciplinary social-science fields than in scientific or technical fields.

[17] Collins (1974) notes that education requirements are higher in social-service occupations than "market-oriented" occupations. Higher education requirements are often the result of lobbying by professional associations (Larson, 1977). Demand for degrees resulting from increased education requirements represents a different source of demand than increasing competition for jobs due to "educational arms races" (Frank & Cook, 1995).

Prestige and Status

Pursuit of Prestige. Research on prestige in economics and status in sociology yields a third set of hypotheses on the adoption and production of master's degrees. In economics, Bowen (1980) describes colleges and universities as organizations that make as much money as they can and spend all the money they make on the pursuit of prestige. Winston (1999) states that higher education is an industry in which a vital input, prestige, can be bought only from its customers, students. Institutions, therefore, pursue prestige by competing with one another for students with the highest pre-collegiate academic achievement. Institutions compete for these desirable students by spending more on each student than they charge in tuition. That is, they offer a subsidy. That subsidy is comprised of revenues sources that are not undergraduate tuition revenue. Institutions with the largest sources of non-tuition revenue have the highest subsidies and are more successful in competing for the most desirable students. For example, tuition and fees are lower at Harvard than the George Washington University, but spending per student is higher at Harvard due to greater non-tuition revenues.

Selective institutions purposely set undergraduate tuition price and class size at levels where excess demand remains because prospective students often evaluate institutions based on selectivity and the pre-collegiate academic achievement of enrolled students (Winston, 1999). These characteristics are used to evaluate institutions in guidebooks such as *Barron's Profiles of American Colleges* and *U.S. News and World Report* (USNWR). Bowman and Bastedo (2009) find that "getting on the front page" of USNWR rankings significantly increases the following year's admissions indicators. Attracting students with strong pre-collegiate academic achievement increases future revenues because these students are likely to earn high incomes and donate to their alma mater, enabling institutions to increase student subsidies in future periods (Winston, 1999). Therefore, affluence and prestige reinforce one another in successive iterations.

The implications of Winston (1999) diverge from resource dependence theory with respect to the master's degree granting behavior of institutions. Resource dependence theory implies that institutions relying heavily on particular resource exchanges (e.g., undergraduate enrollments and state appropriations) have a greater incentive to diversify revenue streams than institutions that already have diversified revenue streams. By contrast, Winston (1999) implies that institutions maximize revenue from all non-tuition sources in order to subsidize the pursuit of prestige in undergraduate and PhD education. However, institutions will not maximize short-term net tuition revenue in by increasing sticker price or undergraduate class size, because these decisions would negatively affect rankings, and therefore future revenue.

I argue that institutions can pursue prestige by increasing revenue from master's degrees because the characteristics and behaviors of master's degree students do not contribute to overall USNWR College Rankings (U.S. News & World Report, 2010). Furthermore, for several USNWR graduate school rankings (e.g., education) the GRE scores and acceptance rate for master's degree students do not contribute to the ranking. This creates an incentive for academic units to generate revenues through the expansion of master's degree programs but to maintain selective doctoral degree programs. The strategy of pursuing revenues and prestige through master's degrees is discussed by Ehrenberg (2000, p. 184):

> The attraction of expanding professional master's programs is that [master's degree] students….typically receive much less financial assistance from

> university funds than do students enrolled in Ph.D. programs and also receive less financial aid, on average, than do the university's undergraduates. Hence these programs have the potential to generate revenues that can help support the core undergraduate and doctoral programs at the institution.

Signaling and status. Signaling theory (Spence, 1973) helps explain strong student demand for master’s degrees from prestigious institutions. A signal is any observable indicator held by an actor that meets two criteria. First, the indicator must be partially “manipulable” by the actor possessing the signal. Second, obtaining the signal requires effort, but requires less effort for actors with higher native productivity. A baccalaureate degree is a signal because (a) individuals influence receipt of the degree and (b) the degree is easier to obtain for smarter individuals (Spence, 1973). In contrast to human capital theory (Becker, 1964), signaling theory assumes that education does not increase productivity; rather, productive workers have an easier time obtaining the baccalaureate degree than less productive workers. Therefore, the population of degree holders will be more productive than the population of non-degree holders. Employers, uncertain about the productivity of an individual applicant, use possession of baccalaureate degree to discriminate among job applicants.

As the proportion of job applicants holding a baccalaureate degree approaches one, employers can no longer use that credential to discriminate between applicants. Instead, employers discriminate between job applicants based on the selectivity of the degree granting institution; degrees from more selective institutions send stronger signals. Hershbein (2010) finds that as the supply of college educated labor has increased over time, so has the “signaling effect” on wages due to graduating from a selective institution. Most individuals, however, cannot gain admission to selective undergraduate institutions. Hershbein (2010) also finds that, for students attending non-selective institutions, the signaling effect of graduating with a high GPA has increased. Graduating with a high GPA is one way that students attending non-selective institutions can differentiate themselves. I argue that obtaining a master's degree represents another means by which individuals attempt to differentiate themselves from the growing number of baccalaureate degree holders. Signaling theory implies that master's degrees from prestigious institutions send stronger signals than master's degrees from non-prestigious institutions. Therefore, student demand should be higher for master's degrees from prestigious institutions than for master's degrees from non-prestigious institutions. As Stephen Trachtenberg, president emeritus of The George Washington University, explained:

> "[A master's degree] does allow one to upgrade one's alma mater. If you originally matriculated at a college you are vaguely uneasy about, taking an M.A. at a more elite institution allows you to kick down and kiss up, henceforth letting you tell people you 'went to school' in New Haven" (New York Times, 2009).

Summarizing the literature on signaling and prestige, students have high demand for master's degrees from prestigious institutions because they send strong signals. At the same time, institutions will attempt to expand the production of master's degrees to subsidize the pursuits of prestige in undergraduate and doctoral education. Taken together, these ideas imply that the production of master's degrees is higher at prestigious institutions than at non-prestigious institutions.

H7: Prestigious institutions will have higher annual production of master's degrees than non-prestigious institutions.[18]

[18] I have constructed **H7** as an amalgamation of resource dependence and the pursuit of prestige in economics. A related hypothesis is that prestigious institutions would produce master's degrees in a *wider array* of fields, as opposed to *higher production* in **H7**. This new hypothesis would draw from the neo-institutional literature that organizations of a certain type adhere to practices that are taken for granted by organizations of that type (Meyer, 2008). It suggests that prestigious institutions are beholden to a "tyranny of coverage" in the scope of their curricula. I leave this hypothesis to a future paper.

In sociology, Podolny's (1993) work on status reinforces the signaling perspective on prestige, but also offers divergent predictions. Status is defined as the perceived quality of a producer's products in relation to the perceived quality of products made by competitors. The market status of a firm's product fulfills the two criteria of a signal. First, the producer exercises some control over its status. Second, the lower the quality of the product, the more difficult it becomes to acquire a reputation of high quality. Note that quality for Podolny (1993) is analogous to productivity for Spence (1973).[19]

Achieving high status has beneficial effects on both revenues and costs for an organization, largely consistent with the signaling perspective. Consumers ordinally rank producers along the single dimension of status. Consumers are willing to pay more for high status products because the risk of low-quality is low and because possession of high status products confer distinction in social spheres (Bourdieu, 1984). High status producers also enjoy lower costs; holding production costs constant, producers incur fewer marketing costs to convince customers to buy. For example, whereas Northeastern University may incur substantial advertising costs to incite applications to their master's degree in public administration, Harvard's Kennedy School of Government can generate large cohort sizes almost purely on the basis of reputation.

Podolny (1993) diverges from economics in predicting which organizations are likely to offer master's degrees. Given that high status producers can charge higher

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[19] Nevertheless, Podolny's (1993) research on status is not merely an application of signaling. For Spence (1973) a signal is something that is on-average true because those actors that evaluate signals will cease to value a "bad" signal after successive iterations, for example when an employer finds that graduates from a particular institution often perform poorly on the job. For Podolny (1993) status is loosely coupled from quality and that relationship does not necessarily become tighter over time. In industries where quality is difficult to judge – education being a canonical example (Meyer & Scott, 1983) – the relationship between status and quality can be particularly loose; "the greater the decoupling [between status and quality], the more the status position insulates and circumscribes the producer's action and the more the producer's reputation becomes external to itself" (Podolny, 1993, p. 835).

prices and enjoy lower costs than low-status producers, Podolny (1993) argues that economic theory has no explanation for why high-status producers do not achieve monopoly status in all segments of a product market. He argues that entering in market exchanges with lower-status market participants (producers and customers) undermines status: "to the extent that a higher-status producer attempts to expand into the position of a lower-status competitor, it changes its reputation and thus alters the cost-and-revenue profile that provided it with the initial advantage" (Podolny, 1993, p. 845). Because liberal-arts colleges are historically defined as organizations that specialize in undergraduate, liberal arts education, entering the market for master's degrees would undermine the status of high status liberal arts colleges. By contrast, research universities will not avoid master's degrees because their brand image does not depend on providing only liberal arts education. [20] I present the following hypothesis:

H8: Prestige will be negatively associated with the production of master's degrees for liberal arts colleges and positively associated with the production of master's degrees at universities.

Data and Methods

Sample and Analysis Period

I test these hypotheses on a panel dataset of all baccalaureate granting institutions from 1969 to 2009 (where 2009 = 2008-09 academic year). I use the Higher Education General Information Survey (HEGIS) for the years 1969 to 1986, ant its successor the

[20] Although I do not present a formal hypothesis, scholarship on status implies that research universities will avoid adopting low-status master's degrees that undermine the status of the entire organization. For example, it is unlikely that the University of Chicago would ever adopt a master's degree in corrections management.

Integrated Postsecondary Education Data System (IPEDS) for the years 1987 to 2009. [21] Multiple survey components are completed in each year. This chapter employs data from the completions, finance (principally revenues), enrollments, and institutional characteristics survey components.[22] I use Current Population Survey (CPS) data from 1979-2008 to test the hypothesis that institutions adopt degrees demanded by the labor market.

Although institution-level data are available from 1969-2009, models are run on a smaller analysis period depending on which variables are included in the models. The analysis period begins in 1975, the year that several key revenue variables become available. However, the analysis period ends prior to 2009 depending on when certain variables included in the models cannot be measured consistently over time. I explain these inconsistencies below. The analysis sample consists of all institutions categorized as research, doctoral, comprehensive, or liberal arts by the 1976 Carnegie Commission, about 1,250 institutions per year with modest attrition due to death or mergers. I omit associate's institutions, specialized institutions (e.g., medical, law, business, seminaries, etc.), and for-profit institutions (which generally did not complete the HEGIS survey).

Variables

Dependent variable. Two types of dependent variables are constructed from the HEGIS/IPEDS completions surveys. The first type of dependent variable is the total

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[21] Each institution has an identification code. Several ID codes represent the individual campuses of larger institution (e.g., the individual campuses of Youngstown State University in Ohio). At times, a survey component – most often in finance – will be reported at the level of the larger institution rather than the individual campus levels. This is called a "parent-child relationship"; the parent aggregates data for all the children. If a parent-child relationship ever exists for any survey component in any year, I aggregate all data to the parent level for all survey components in all years, and use the institutional characteristics of the parent institution. This chapter uses the parent-child relationships defined by the Delta Cost Project(http://www.deltacostproject.org/data/index.asp). Future iterations will use different definitions.

[22] The completions (i.e. degrees awarded) data begins in 1966. The other surveys begin in 1969.

number of master's degrees produced by a particular institution in a particular year. Production measures may be for a particular type of master's degree (e.g., MBA) or the total master's degree production across all degree programs. This chapter models production variables using linear panel models.

The second type of dependent variable measures the adoption of a particular master's degree program (e.g., educational administration) by a particular institution in a particular year. Similar to Kraatz and Zajac (1996), I define the adoption of master's degrees as two years prior to the year a degree was first awarded. Degrees are classified according to the Classification of Instructional Programs (CIP), which was first introduced in 1983 and has been revised periodically.[23] I use standardized cross-walks to categorize codes from legacy classification systems into the CIP for the years 1966 through 1982 (Huff, Chandler, & NCES, 1970; Malitz, 1981). An individual degree program has a six-digit CIP code (e.g., 13.0406 is higher education administration). These individual degree programs are categorized within four-digit series (e.g., 13.04 is educational administration) and then within two-digit series (e.g., 13 is education). I create adoption and production measures use two-digit and four-digit series because six-digit degree programs are often not reliably recorded across institutions.[24]

Labor market demand for skills (H1). I create employment measures using CPS data to test the hypothesis that institutions adopt degrees demanded by the labor market. I create two time-varying, occupation-specific employment measures: total

[23] 1966 – 1970 uses the "pre-HEGIS" classification; 1971 – 1982 uses the HEGIS classification; 1983 – 1986 uses the 1980 CIP; 1987 – 1991 uses the 1985 CIP; 1992 – 2002 uses the 1990 CIP; and 2003 – 2010 uses the 2000 CIP.

[24] I take precautions to avoid "false positive" mistakes due to new CIP codes being introduced with new iterations of the CIP. If an institution first awards a particular degree within two years of a new iteration of the CIP classification (i.e. 2000 CIP began in 2003 academic year) and that degree is new to that iteration of the CIP, then I do not count this as adoption.

employment, and average weekly earnings. The idea is that an institution is more likely to adopt a particular degree program when total employment or mean weekly earnings at the state/regional level increase in the related occupation. The measures are weighted to be representative of the national population. These labor market measures are called “generated estimators” in that they are estimates from a sample and as such require a special variance estimation procedure (Hole, 2006). At present, I treat employment measures as ordinary regressors.

Depending on un-weighted occupation-level sample size, I create employment measures at the state-level or the nine-category census division level (New England, Mid Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific). The rationale for creating measures at the census division level is that for occupations with relatively small total employment (e.g., educational administrators), small sample sizes at the state level cause measures of average earnings and total employment to be imprecise and erratic over time. Therefore, I use state-level measures for “large” occupations (e.g., management) and division-level measures for “small” occupations. At present, the distinction between a small and large occupation is a subjective judgment based on weighted and un-weighted state-level sample size. In the future, I will distinguish small and large occupations based on the tightness of confidence intervals on state-level employment measures.

Details on the construction of CPS employment measures are as follows. The CPS interviews about 65,000 households each month in eight “rotation groups.” Households in each rotation group are interviewed for four consecutive months, have eight months off, and then are interviewed for four consecutive months (NBER, 2010).

Questions about weekly earnings are asked in the last interview of the first four months and the last interview of the second four months, which are referred to as the "outgoing rotation groups." Therefore, each month of CPS data contains two outgoing rotation groups. I use data from both outgoing rotation groups for the years 1979 to 2008 to create the employment measures.

The CPS uses the Census Occupational Classification (COC) system, which has been based on the Standard Occupational Classification (SOC) system since 1983. I use standardized crosswalks to convert older versions of the COC to more recent versions of the COC, and then from COC codes to SOC codes. The primary advantage the SOC over the COC is that, like the CIP, the SOC is a hierarchical classification system, in which individual occupations are placed within larger groups of occupations (e.g., 11-9033=postsecondary education administrators; 11-9030=education administrators; 11-900=other management occupations; 11-00=management occupations). The next step is to assign degrees programs to each occupation. Standard crosswalks between occupations and degrees are unreliable. Therefore, I manually selected the occupations that are associated with particular degree programs. Due to fundamental changes in the year 2000 iteration of the SOC, labor market measures from 1979-2002 are generally incomparable to measures from 2003-2008. Therefore, models which include employment measures use years prior to the implementation of the 2000 SOC.

Resource dependence theory measures (H2, H3, H4, H5). Measures relating to resource dependence theory hypotheses are created from the HEGIS/IPEDS enrollments survey and the revenue questions of the finance survey. Enrollments serve as a proxy for tuition revenue because tuition revenue is not measured consistently over time and because undergraduate tuition is not separated from graduate tuition. I rely on two undergraduate enrollment measures for **H2a** and **H3a**: total undergraduate FTE enrollments (undergraduate enrollments) and undergraduate freshman FTE enrollments (freshman enrollments). I argue that institutional leaders will be particularly sensitive to declines in freshman enrollments as a "canary in the coal-mine" for declining enrollment revenues that will work their way through the institution in subsequent time periods.

I also create measures of revenues that are consistent over time despite changes in FASB accounting standards that affected private institutions in 1997 (NCES, 2000) and GASB accounting standards that were phased in for public institutions beginning in 2002 (NCES, 2009). For each revenue source I create a measure of raw revenue and revenue per total FTE.[25] I use total state appropriations to test **H2b** and **H3b**. To test hypotheses **H4** and **H5** I create the following revenue measures: state grants and contracts; federal appropriations, grants, and contracts; local appropriations, grants, and contracts; revenue from auxiliary enterprises; and the sum of investment revenue (principally endowment revenue) and private grant revenue (which includes donations). The rationale for combining investment revenue and private grant revenue is that this variable is the measure of "donative resources" as defined by Winston (1999). Unfortunately, this measure cannot be measured consistently across accounting standards, whereas the other revenue measures can. Therefore, models that include endowment revenue and private grant revenue use only the years prior to changes in accounting standards.

Prestige/status (H7, H8*)*. I use the 1976 Carnegie Classification to identify liberal-arts colleges. This iteration of the Carnegie Classification – rather than the 1970

[25] The revenue per FTE measures are based on total FTE (undergraduate + graduate), with the exception of state appropriations, which are based on undergraduate FTE.

or 1987 version – is sensible because 1975 is the first year of the analysis period. I use the 1982 version of Barron's Profile of American Colleges as a measure of prestige.[26] The measure has five categories: (1) not selective; (2) selective; (3) very selective; (4) highly selective; (5) most selective. This measure is more a measure of selectivity than prestige, in that it is purely derived from the selectivity and the high-school academic-preparation of enrolled students (Barron's, 1981).

Control variables. I include additional control variables: a six-category, time-invariant measure of urbanization drawn from HEGIS surveys; a binary time-invariant measure of religious affiliation drawn from HEGIS; institutional control (public vs. private); a seven-category measure of year founded; and a six-category region variable (Northeast, Mid-Atlantic, South, Midwest, Southwest, West). Other covariates may influence the adoption and production of master's degrees. For example, I do not yet include measures of tuition price, out-of-state students, institutional assets and expenditures, ratio of tenured to non-tenured faculty, and turnover in senior management (e.g., president). If these omitted variables are correlated with the dependent variable and independent variables in the model, then the coefficients on included variables may be biased. Therefore, future iterations of this chapter will add additional covariates related to the adoption and production of master's degrees.

Methods

This chapter tests hypotheses using panel modeling methods. I model the annual production of master's degrees using linear panel models and the adoption of specific

[26] I use 1982 Barron's data because I have these data from another project. I also have 1972 Barron's data. I chose 1982 because it is closer to the first year of data in regression analyses. Key variables are available beginning in 1975, but 1978 is the first year of regression analysis due to a three year lag in the time varying covariates.

degrees using binary panel models. I discuss linear panel models first. Many principles of linear panel models extend to binary panel models. For each dependent variable I fit random effects estimators and fixed effects estimators. Random effects models and fixed effects models rely on different assumptions. The goal is to choose an estimator that is as efficient as possible (i.e., lowest standard errors) without making unreasonable assumptions that lead to biased estimates. Although economists generally prefer fixed effects models over random effects models, I will argue that, for the data employed in this study, random effects models are sometimes preferable to fixed effects models.

Linear panel models. The basic individual-specific linear panel model is shown in Equation (1). The dependent variable y_{it} represents the number of master's degrees awarded at institution *i* in year *t*. I use a natural log of total master's degrees to account for the non-normal distribution of the variable. The natural log of zero is undefined. I replace the natural log of zero with zero, which Cameron and Travedi (2005) identify as an acceptable fix. Although not shown in this chapter, I also model the total production of master's degrees using Poisson panel models. Poisson models make weak assumptions about the distribution of the dependent variable and are appropriate for dependent variables with a large number of zeros. Because the results for Poisson panel models are very similar to linear panel models, I present results for the simpler linear panel models.[27]

$y_{it} = v + x_{it}\beta + z_i\gamma + v_i + \epsilon_{it}$ (1) (Individual-specific effects linear panel model)

$E[\epsilon_{it}|v_i, x_{it}, z_i] = 0$, for all t (2) (Strict exogeneity assumption)

$E[v_i|\, x_{it}, z_i] = E[v_i] = 0, for\ all\ t$ (3) (Random effects assumption)

[27] I do not fit Tobit panel models because these models cannot incorporate a fixed effects estimator (Cameron & Trivedi, 2009).

The unit-invariant, time-invariant intercept is represented by v; x_{it} is a matrix of independent variables that vary across units and over time, including total undergraduate FTE enrollments, undergraduate freshman enrollments, state appropriations, state grants, total federal revenue, total local government revenue, auxiliary enterprise revenue, the sum of endowment revenue and private grant revenue, and time (in years); β is the associated vector of coefficients. I use lags of the time-varying regressors – specifically a three year lag – because changes in revenue/enrollment variables are hypothesized to affect the master's degree granting behavior of institutions in subsequent periods, rather than the present period.[28] z_i is a matrix of independent variables that vary across units but not over time, including institutional control (public/private), religious affiliation, liberal arts college, "prestige", urbanization, region, and year founded; γ is the associated vector of coefficients.

v_i is the "individual-specific error term," which varies across units but not over time; and ϵ_{it} is the "idiosyncratic error term," which varies across units and over time. Equation (1) is called the individual-specific linear panel model due to the existence of the individual-specific error term v_i, as opposed to the population average linear panel model which does not separate the idiosyncratic error term into time-invariant and time-varying components.

All "basic" panel models assume some form of "strict exogeneity" meaning that the idiosyncratic error term, ϵ_{it}, is uncorrelated with x_{it} , z_i, and v_i, as shown in Equation (2). Relaxing this assumption generally requires an instrument (Cameron & Trivedi,

[28] The models presented in this chapter use a three-year lag for enrollment and revenue variables. Assuming that most master's degree programs take two years to complete, the three year lag implies that changes in enrollments/ revenues affect master's degree enrollments one year after changes in enrollments/revenues, and affect master's degree production three years after changes in enrollment/revenues. I find the results are robust to lag specifications of 2, 3, 4, and 5 years.

2005). Random effects models, and implicitly population average models, make the additional “random effects assumption” that the individual-specific effect, v_i, is uncorrelated with independent variables x_{it} and z_i, equation (3). If the random effects assumption is true, then v_i can be modeled as part of the composite error term and the coefficients will be unbiased. If the random effects assumption is false, then part of the error term, v_i, is correlated with the regressors, meaning that the coefficients are biased. If we believe the random effects assumption, we should fit random effects estimators. If we do not believe the random effects assumption, we should fit fixed effects estimators. Random effects estimators are more efficient than fixed effects estimators, because modeling the individual-specific effect usually provides additional knowledge about the composite error structure. Economists generally do not believe the random effects assumption and usually prefer fixed effects estimators over random effects estimators because they prioritize bias over efficiency (Cheslock & Rios-Aguilar, 2010).

The estimator for Equation (1) differs depending on whether the analyst assumes a population average, fixed effects, or random effects model. The estimator for the population average model is just a pooled OLS model (Equation (4), but without the individual specific effect, v_i). Fixed estimators perform a transformation on the panel OLS model that eliminate the fixed effects, v_i, in order to generate unbiased estimates of coefficients β and γ. Two fixed effects estimators are common, the within estimator shown in Equation (5) and the first-difference estimator shown in equation (6).

$$y_{it} = v + x_{it}'\beta + +z_i\gamma + u_{it} \quad (4)$$

$$y_{it} - \bar{y}_i = (x_{it} - \bar{x}_i)\beta' + (\epsilon_{it} - \bar{\epsilon}_i) \quad (5)$$

$$y_{it} - y_{i,t-1} = \left(x_{it} - x_{i,t-1}\right)\beta' + \epsilon_{it} - \epsilon_{i,t-1} \qquad (6)$$

Note that the within estimator eliminates v_i by subtracting the panel mean (e.g., average private giving at Harvard across all years of data) from each observation. The within estimator is a panel OLS on the transformed model. The within estimator utilizes only "within" variation (variation over time within a given panel) to calculate coefficients. Coefficients should be interpreted as how a change in x_{it} relative to the panel mean $\bar{x}_i$ affects y_{it}relative to the panel mean $\bar{y}_i$. The individual specific error, v_i, is eliminated because it does not vary over time and $v_i - \bar{v}_i = 0$. However, time-invariant regressors z_i are eliminated along with the individual-specific effect, v_i because $z_i - \bar{z}_i = 0$.

The random effects estimator uses both within and between variation. The random effects estimator employs a different transformation, shown in Equation (7). The random effects transformation does not eliminate time-invariant regressors, but nor does it eliminate the unobserved individual-specific effect. Note that whereas the within transformation uses the panel mean, the random effects transformation uses $\hat{\lambda}_i$ times the panel mean. The equation for $\hat{\lambda}$ is shown in equation (8). An important point to note is that when $\hat{\lambda}$=0, the random effects estimator simplifies to a panel OLS model. When $\hat{\lambda} = 1$, the random effects estimator simplifies to the within estimator shown in equation (6). Note that $\hat{\lambda} \rightarrow 1 \; as \; T \rightarrow \infty$. Therefore, in linear panel models with many time periods the coefficients on random effects models and fixed effects models should be similar. The greater the number of time periods, the more the random effects estimator uses within variation rather than between variation. For the present research, I find that fixed-effects (within) estimators and random effects estimators have nearly identical coefficients owing to the larger number of time periods. Given that the coefficients on fixed effects and random effects estimators are so similar I report both fixed effects and random effects estimates, which have the advantage of calculating coefficients for time invariant covariates.

$$y_{it} - \hat{\lambda}_i \bar{y}_i = (1 - \hat{\lambda}_i)v + (x'_{it} - \hat{\lambda}_i \bar{x}_i)\beta' + (1 - \hat{\lambda}_i) z_i \gamma' + (1 - \hat{\lambda}_i) v_i + (\epsilon_{it} - \hat{\lambda}_i \bar{\epsilon}_i)$$

(7)

Where, $\hat{\lambda} = 1 - \frac{\sigma_\epsilon}{\sqrt{\sigma_\epsilon^2 + T\sigma_v^2}}$ (8)

Binary panel models of adoption. I employ binary (logit) panel models to study the adoption of specific master's degrees. Studies of adoption often employ hazard models (Berry & Berry, 1990; Davis & Greve, 1997; Doyle, 2006; McLendon, Hearn, & Deaton, 2006). A "continuous-time" hazard model means that the exact timing of an event is known, for example the exact time a light-bulb fails (DesJardins, 2003). Thus, Davis and Greve (1997) can reasonably use a continuous-time hazard model because they know the exact day a firm adopts a poison-pill. A "discrete-time" hazard model means that the analyst knows only that an event occurred at some point within a time-interval. Allison (1982) shows that discrete-time hazard models can be estimated using binary panel models where all post-adoption observations are removed from the analysis sample.[29] Hazard models implicitly make the random effects assumption that individual-specific effects – usually called "unobserved heterogeneity" – are not correlated with regressors. Following Tucker (2008), I choose to model adoption using binary panel models because empirical methods for dealing with endogeneity are more robust for binary panel methods than for hazard methods. Furthermore, future research may employ

[29] Discrete-time hazard models can be estimated using binary panel models with a complementary log-log distribution.

two-stage panel models, jointly modeling adoption of a specific degree and production conditional on adoption.

Equation (9) shows a general logit panel model for the probability that institution *i* adopts a specific degree (e.g., MBA) in year *t*. I fit random effects and fixed effects estimators. Fixed effects binary panel models are problematic for the present research because the fixed effects transformation requires within-panel variation in both dependent and independent variables (Cameron & Trivedi, 2005). Institutions that never adopt a specific master's degree do not have variation in the dependent variable and are dropped from the analysis. This is problematic because I am interested in both the causes of adoption and non-adoption. For example, I theorize that prestigious liberal arts colleges will not adopt master's degrees because they maintain strong demand for undergraduate programs and have robust alternative revenue sources. Therefore, this chapter presents model results from random effects logit panel models of adoption. Fixed effects estimates are available upon request.

$$\Pr[y_{it} = 1|x_{it}, \beta, v_i] = \frac{e^{v_i + x_{it}'\beta}}{(1+e^{v_i + x_{it}'\beta})} \quad (9)$$

Limitations

This chapter has several limitations. The first is a problem of research scope. I test hypotheses about (a) labor market demand for skills, (b) resource dependence theory, and (c) the pursuit of status/prestige. Testing several theoretical perspectives in a single chapter limits the amount of space that can be devoted to each perspective, and forces the author to make general statements about theoretical traditions each contain internal inconsistencies. Furthermore, the inclusion of measures from multiple hypotheses in a single model can dramatically diminish the length of the analysis period when measures for certain constructs are unavailable in some years.[30]

Second, the production of master's degrees is the outcome of supply by institutions and demand by students, but my analyses focus entirely on the supply side. Drawing on theory (Podolny, 1993; Spence, 1973), I make assumptions that prestigious institutions enjoy stronger demand for bachelor's degrees and for master's degrees but I do not test this assumption directly. I assume that declines in freshman enrollments for non-prestigious institutions are a result of lack of demand. However, these institutions may instead be choosing to lower the sizes of their freshman classes. Future iterations of this chapter may attempt to incorporate direct measures of student demand (e.g., measures of the number of applications, number of students accepted, number of accepted students enrolled). Following Card and Lemieux (2001), I may attempt to simultaneously model supply and demand for the independent variable – undergraduate enrollments – in models of master's degree production. Related, I will attempt to find instruments for key independent variables. In a panel setting, the availability of instruments helps relax the strict exogeneity assumption that regressors are uncorrelated with the idiosyncratic error term, ϵ_{it}, which varies across units and over time (Cameron & Trivedi, 2005).[31]

Third, In the future I hope to incorporate a better measure of prestige. The ideal variable would measure prestige rather than selectivity and would be time-varying. How

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[30] For example, measures of labor market demand for skills are only available beginning in 1979 and require a lag of several years, so analyses that include labor market measures eliminate all years prior to 1982.

[31] For example, change in state tax revenues – often caused by the budget cycle (Kane, et al., 2003) – may be an instrument for state appropriations since state tax revenues affect appropriations but, arguably, may have no effect on production of master's degrees once the appropriation controls (e.g., state unemployment rate) are included.

do prestige and selectivity differ? Selectivity can be measured directly based on applications, acceptances, yield, and the pre-collegiate academic preparation of enrolled students (Barron's, 1981). I believe that Podolny's (1993) definition of status is equivalent to the concept of prestige. Podolny (1993) defines status as the perceived quality of a producer's products in relation to products of competitors. Therefore, status includes an element of reputation that selectivity does not.

U.S. News and World Report (USNWR) rankings provide the best available measure of prestige because 25% of rankings are based on reputation scores from administrators at peer institutions (U.S. News & World Report, 2010). Bastedo and Bowman (2010) find that, over time, administrators base reputation scores almost entirely on published rankings. In turn, these rankings have been shown to influence the perception and behavior of prospective students (Bowman & Bastedo, 2009; Espeland & Sauder, 2007). Unfortunately, USNWR rankings are unavailable until 1992. Therefore, variable construction must balance the ideal of a true measure of prestige with the availability of time-varying data.

Finally, degree specific models of adoption include measures of employment in related occupations. Whereas some degree programs (e.g., educational administration, nursing) prepare students for relatively specific occupations, other degree programs (e.g., MBA) prepare students for a wide range of occupations. It may not be appropriate to assign particular occupations to degree programs that prepare students for a wide variety of occupations. In future iterations of this chapter, I may include employment measures only for degree programs that prepare students for relatively specific occupations.

Results

Descriptive Statistics

Dependent variables. Tables 1 through 4 present descriptive statistics on dependent variables. Table 3.1 shows the median annual production of master's degrees, the dependent variable for linear panel models. Bachelor's degrees are shown for comparison. I categorize institutions by liberal arts status and "prestige" because **H8** predicts that the relationship between master's degree production and prestige will be different for liberal arts colleges vs. universities. For the purpose of descriptive statistics, prestige is separated into three categories: low (Barron's=1); medium (Barron's=2,3); high (Barron's=4,5).

Table 3.1 shows that median annual production of master's degrees increases dramatically for universities of all selectivity levels. However, production is highest for highly selective universities. For liberal arts colleges, the median selective liberal arts college awarded a handful of master's degrees from 1966 to 1975, at which point median production fell to zero. By contrast, median master's degree production for the low/medium liberal arts college increased dramatically since 1995. Master's degree production is highly right-skewed. Table 3.2 shows mean master's degree production, which is much higher than median master's degree production. By 2009, mean master's degree production at highly selective universities had reached 1,350 and had reached 143 for low/medium liberal arts colleges as compared to 21 for highly selective liberal arts colleges.

Tables 3 and 4 show the percent of institutions that ever-award or ever-adopt master's degrees in specific subject areas, which is similar to the dependent variable for logit panel models. MBAs are adopted by nearly all universities. Selective liberal arts colleges never adopt MBAs, whereas adoption by low/medium liberal arts colleges increases rapidly beginning in 1975. A moderate number of highly selective liberal arts colleges are early adopters of education master's degrees, but production (not shown) becomes zero for most of these institutions. Adoption of education master's degrees by low/medium selective liberal arts colleges is also dramatic. Adoption of health master's degrees increases dramatically at all universities and for low/medium liberal arts colleges. However, master's degrees in computer science, engineering, and biological sciences (not shown) are not adopted by either low/medium or highly selective liberal arts colleges.

Independent variables. Figures 3.1-3.5 present descriptive statistics on enrollments and state appropriations. Figure 3.1 shows median total undergraduate FTE enrollments as a proportion of undergraduate FTE enrollment in 1975. Median undergraduate enrollments relative to 1975 enrollments increased for all institution types, but especially for those of lesser selectivity. Figure 3.2 presents the same variable but for the 25th percentile institution, rather than the median institution. For 25th percentile liberal arts colleges with low/medium selectivity, total undergraduate enrollments were less than 1975 enrollments for the years 1975-1992. Because these institutions rely strongly on undergraduate enrollment revenue, the decline in total undergraduate enrollments represents severe financial strain.

Figure 3.3 shows median freshman undergraduate FTE enrollments as a proportion of 1975 freshman undergraduate FTE enrollments. The median liberal arts college with low/medium selectivity experienced modest declines in freshman enrollments relative to 1975 enrollments during the years 1982-1988 and again from

1991-1993. Figure 3.4 shows the same variable, but for 25th percentile institutions rather than median institutions. Note that freshman enrollments decline dramatically for all institution types except highly selective liberal arts colleges and highly selective universities. The freshman enrollment declines are especially sharp for low/medium liberal arts colleges. I argue that freshman enrollments are a leading indicator of financial strain that institutional leaders pay attention to. **H2** states that institutions will increase production of master's degrees in response to declines in freshman enrollments.

Finally, Figure 3.5 shows median state appropriations per undergraduate FTE (in $000s) for public institutions. I aggregate medium and highly selective public institutions because only four public institutions were categorized as highly selective. Generally, state appropriations per FTE increase during economic booms and decline during recessions when state tax revenues decline. However, Kane Orszag, and Gunter (2003) show that state higher education appropriations have not rebounded from recent recessions the way they did for previous recessions because a higher proportion of state revenues are diverted to mandatory funding programs such as K-12 education and Medicare. Figure 3.5 shows that medium/highly selective public institutions have higher appropriations per FTE than institutions with low selectivity, but this chasm has diminished in recent decades mostly due to declines in state appropriations for institutions with medium/high selectivity. Many institutions face even sharper declines in state appropriations than the median institution shown in Figure 3.5. I hypothesize that institutions will increase the production of master's degrees to generate enrollment revenue in response to declines in state appropriations.

Production of Master's Degrees

Table 3.5 presents linear panel regression results, where the dependent variable is logged annual production of master's degrees. Each column represents a different sample: (1) all institutions; (2) public institutions; (3) private liberal arts colleges; (4) private universities of low selectivity (Barron's=1); and (5) highly selective universities (includes four public universities); and (6) "Research 1" (R1) universities (institutions categorized as Research 1 by the 1976 Carnegie Classification). All models use cluster robust standard errors, cluster to deal with serial correlation within panels and robust to deal with heteroskedasticity. I present random effects models in Table 3.5 because the coefficients for random effects estimators and fixed effects estimators are very close owing to the large number of time periods for each panel. Therefore, the random effects coefficients on time-varying covariates primarily use within variation rather than between variation. Random effects estimators have the additional advantage of calculating coefficients on time-invariant covariates. Fixed effect (within) models that utilize within variation exclusively are presented in Appendix Tables 1-7.

The analysis period in Table 3.5 begins in 1978, because key revenue variables become available in 1975 and I use a three year lag (results were robust to lags of 2, 3, 4, and 5 years). The analysis period ends when (lagged) new accounting standards emerge. Private institutions adopted FASB accounting standards in 1997 and public institutions adopted GASB 34/35 accounting standards beginning in 2002. The measure "endowment and grants" – the sum of endowment revenues + private grants (which includes donations) – is inconsistent across accounting standards. Appendix Tables 1-5 show models for a 1978-2009 analysis period, but the coefficient on endowment and grants should not be interpreted.

Drawing on resource dependence theory, I hypothesize that production of master's degrees increases following declines in undergraduate enrollments **(H3a)**. I use two measures of undergraduate enrollments, (a) FTE total undergraduate enrollments (b) FTE freshman undergraduate enrollments. Contrary to resource dependence theory, growth in total undergraduate enrollments is significantly associated with subsequent growth of master's degrees. This is true for all institutions, public institutions, liberal arts colleges, and private universities with low selectivity. In other words, the analysis period spans a period of overall growth in undergraduate enrollments. Growth in undergraduate enrollments is associated with growth in master's degree production.

Although hypothesis testing depends primarily on the sign and significance of the coefficient, it useful to interpret the coefficients. Given that the dependent variable is logged annual master's degree production, the coefficient of 0.050 for "L3 Undergrad FTE (000)" can be interpreted as follows: an increase of 1,000 undergraduate FTE students three years ago is associated with a five percent increase in total production of master's degrees in the current year.

The coefficients on freshman enrollments provide different results. For the sample of all institutions, growth in freshman enrollments has a significant, positive relationship with subsequent master's degree production. This result conflicts with **H3a**. However, for liberal arts colleges and private universities of low selectivity, declines in freshman enrollments are positively associated with subsequent production of master's degrees. This result supports **H3a**.

The vast majority of liberal arts colleges are non-selective. Figures 3 and 4 show that non-selective liberal arts colleges often experienced dramatic decline in freshman enrollments. The modeling results suggest that liberal arts colleges responded to declines in freshman enrollments by increasing the production of master's degrees. The same is true for unselective private universities of low-selectivity in column (4), but not for medium-selective private universities in Appendix Table 3.5, or for highly selective universities in column (5). Resource dependence theory also suggests that public institutions should increase production of master's degrees in response to declines in state appropriations **(H3b)**. Column (2) shows that this hypothesis is not supported.

H5 states that institutions with strong alternative sources of revenue will have lower annual production of master's degrees than institutions with weak alternative sources of revenue. Although I include several alternative revenue measures, I emphasize endowment and grants and auxiliary enterprise revenues, as these are important sources of revenue for many institutions. Endowment and grants has a significant, negative relationship with subsequent production of master's degrees. This is true for all institutions, for public institutions, and for liberal arts colleges, and for highly selective universities. Growth in auxiliary enterprise revenue is also negatively associated with subsequent production of master's degrees for all institutions and especially for liberal arts institutions. These findings support the idea that production of master's degrees is lower when institutions have strong alternative revenue streams, implying that master's degrees are produced in order to diversify institutional revenues. Note that the sample of highly selective universities has a significantly negative coefficient on endowment and grants but the sample of research universities does not. I discuss this finding in the conclusion.

H7 states that master's degree production is positively associated with prestige, because prestigious institutions enjoy stronger demand than non-prestigious institutions and because all institutions desire as much revenue as possible (Winston, 1999). **H8** adds nuance, stating that prestige will be positively associated with master's degree production at universities and negatively associated with master's degree production at liberal arts colleges, because master's degrees represent low-status market segments for high-status liberal arts colleges. Column (1) shows that the main effect for the five-category prestige variable is significantly positive, consistent with **H7** (I treat prestige as a continuous variable for the interaction effect that tests **H8**). The 0.640 coefficient means that a one-unit increase in prestige is associated with a 64% increase in production of master's degrees. I find a similar result for the sample of public institutions, when I treat prestige as a categorical variable with prestige=1 as the base category.[32]

I test **H8** using an interaction effect between prestige and liberal arts colleges on the sample of all institutions. The main effect of prestige is positively significant. The main effect of being a liberal arts college is associated with a 104% reduction in the annual production of master's degrees relative to universities. The interaction effect of prestige X liberal arts is significantly negative. Whereas the slope of prestige for universities is 0.640, the slope of prestige for liberal arts colleges is (0.640 – 0.728)= -0.088; for liberal arts colleges a one-unit increase in prestige is associated with a 9% reduction in annual production of master's degrees, in addition to the lower intercept

[32] Note that there are no public institutions with prestige=5 and only four public institutions with prestige=5.

associated with being a liberal arts college. The significantly different slopes on prestige for liberal arts colleges versus universities provide strong support for **H8**.

Other results deserve mention, though they are not associated with specific hypotheses. First, production of master's degrees increases over time.[33] Second, production of master's degrees is significantly higher in urban institutions.[34] This result implies that strong master's degree production depends on being located in an urban area with a large pool of working adults who are potential customers. Third, master's degree production is lower for institutions with a religious affiliation.

Finally, public institutions have higher master's degree production after controlling for covariates. The significant effect for public institutions diminishes when urbanization covariates are removed because private institutions are disproportionately located in urban areas, which are associated with higher production of master's degrees. The significant effect for public institutions vanishes when the sample consists of institutions with prestige of 3, 4, or 5 (not shown). However, most institutions of higher education are not prestigious.

One potential explanation for the higher production of master's degrees at public institutions is that for the bulk of non-prestigious institutions, public institutions have a broader scope of degree offerings than private institutions. One finding from the adoption models (see below) is that adoption of a master's degree is more likely when the institution offers bachelor's degrees in the same subject. Therefore, production of master's degrees may be higher at public institutions than private institutions because the larger scope of baccalaureate degrees at public institutions provides more opportunities

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[33] Here I model time as a continuous variable, but modeling time as an indicator variable does not significantly affect the coefficients for other regressors.
[34] This finding does not hold when the dependent variable is production of bachelor's degrees (not shown).

for bricolage when attempting to generate enrollments from master's degrees. However, this finding deserves a more thorough investigation.

Adoption of Master's Degrees

Table 3.6 presents selected results for binary panel models of adoption of specific master's degrees: first master's degree ever adopted, business (2-digit CIP), education (2-digit CIP), educational administration (4-digit CIP), health (2-digit CIP), and computer science (2-digit CIP). The distinction between 2-digit CIP codes vs. 4-digit CIP codes merits explanation.[35] The analysis period for these models generally begins in 1983 because these models include employment variables that are available beginning in 1979 and use a four-year lag. The end of the analysis period reflects the last lagged year of "old" accounting standards. Model results that do not use employment variables, hence having, a 1978-1999 analysis period, are shown in Appendix Tables 6-15, as are results for adoption of master's degrees in teaching (4-digit CIP), nursing (4-digit CIP), engineering (2-digit CIP), and psychology (2-digit CIP), and biology (2-digit CIP).

Table 3.6 and Appendix Tables 8-18 present random effects panel models of adoption. I do not present fixed effect logit panel models of adoption; the fixed effects transformation eliminates any panel that does not have an event during the analysis period, but the correlates of non-adoption are theoretically important to this research. Stata does not provide cluster-robust standard errors for random effects logit panel models. Cameron and Travedi (2009) recommend using boot-strapped standard errors. I

[35] Adoption of a master's degree in education represents the first time an institution awards a master's degree within the 2-digit CIP code for education, which is "13." This may be a master's degree in mathematics teacher education (13.1311), special education for students with hearing impairments (13.1003), higher education administration (13.0406), etc. Adoption of a master's degree in educational administration represents the first time an institution awards a master's degree within the 4-digit CIP code for educational administration, which is "13.04." This may be a master's degree in general educational leadership and administration (13.0401), higher education administration (13.0406), etc.

presently lack the computing power to fit bootstrap standard errors for all models. Therefore the results in Table 3.6 are based on regular standard errors. I experimented with bootstrap standard errors for several models (not shown) and generally found standard errors to be 1.5 to 2 times larger than regular standard errors. Therefore, marginally significant coefficients should be viewed with some skepticism.

Table 3.6 shows results for three mutually exclusive samples: private non-liberal arts institutions; liberal arts colleges; and public institutions. Institutions are included in analyses if they have not yet adopted the degree in question prior to the beginning of the analysis period. Institutions are dropped from the analysis sample in the period after adoption. The analysis period – either 1978-1999 or 1983-1999 depending on whether employment variables are included – is problematic because many institutions adopted "common" master's degree programs (e.g., MBA) prior to the analysis period and, therefore, were excluded from analyses. This problem affects universities more than liberal arts colleges; the sample sizes are quite small for universities with respect to particular degrees (e.g., MA in Business, MA in Education).

My discussion of results focuses on liberal arts colleges. Of the total 531 liberal arts institutions in 1978, 397 had not yet adopted a master's degree. Table 3.6 shows that growth in total undergraduate enrollments is associated with an increase in the probability of adoption. This result runs contrary to **H2a**. I interpret total undergraduate enrollments as being a proxy for overall growth of the institution, which is positively associated with adoption of master's degrees as these liberal arts colleges attempt to become universities. Declines in freshman enrollments are positively associated with the likelihood of adopting a master's degree. This result is consistent with **H2a**; after controlling for changes in total undergraduate enrollments, liberal arts colleges adopt master's degrees in response to declines in freshman enrollments. Consistent with **H4**, liberal arts colleges are less likely to adopt master's degrees when alternative revenues – here endowment and grants and revenue from auxiliary enterprises – grow. The results for private non-liberal arts institutions and public institutions say little because so few of these institutions have yet to adopt prior to the analysis period.

The results for adoption of master's degrees in business are largely consistent with the results for first master's degree adopted. After controlling for total undergraduate enrollments, liberal arts colleges adopt master's degrees in business in response to declines in freshman enrollments. Strong endowment and grants revenues are negatively associated with adoption for liberal arts colleges, consistent with **H4**. Having previously awarded a bachelor's degree in business is positively associated with adoption for liberal arts colleges. **H2b** states that public institutions will adopt master's degrees in response to declines in state appropriations. This hypothesis is not supported for master's degrees in business, or for other master's degrees modeled. **H1** states that institutions will adopt master's degrees demanded by the labor market. I create state-level, occupation-level measures of total employment and weekly earnings. The significant coefficient of 0.238 for weekly earnings implies that a $100 increase in weekly earnings for management occupations, relative to the panel mean, increases the likelihood that liberal arts colleges located in that state will adopt a master's degree in business. There is no similar effect for total employment in management occupations for liberal arts colleges.

The results for master's degrees in education, educational administration, and health follow similar patterns. After controlling for total undergraduate growth, liberal arts colleges adopt in response to declines in freshman enrollments, but strong alternative revenues are negatively associated with adoption. Coefficients on the employment variables do not show clear patterns. Public universities and private universities adopt master's degrees in health in response to increases weekly earnings in health occupations. Liberal arts institutions are more likely to adopt master's degrees in educational administration when the number of jobs in educational administration declines.[36]

The correlates for adoption of computer science master's degrees by liberal arts colleges show a somewhat different pattern. Whereas master's degrees in business, health, and education were adopted in response to declines in freshman enrollments and when alternative revenues were weak, this is not true for master's degrees in computer science. Similarly, I find that adoption of master's degrees in biology (Appendix Table 3.18) and master's degrees in engineering (not shown) are not associated with declines in freshman enrollments or growth in alternative revenues.[37] Consistent with **H6a**, I argue that master's degrees in computer science, engineering, and biology are not as attractive sources of enrollment funding because these degrees are associated with high fixed costs and fewer students have the prerequisite skills to enroll in comparison to master's degrees in business, education, health, and psychology.

[36] The employment measure is at the regional – nine census regions in the country – rather than state level due to insufficient sample size in the CPS at the state level.

[37] So few liberal arts colleges adopt master's degrees in engineering that the models can only be run using a longer analysis period, 1983-2006, which spans the changes in accounting standards such that measures of endowment + private grant revenue are not measured consistently.

Conclusion

Summary

To summarize, **H1** states that institutions adopt master's degrees related to occupations experiencing strong labor-market demand. Models are most salient for liberal arts colleges because most universities have adopted master's degrees in "common" fields prior to the analysis period. Adoption of master's degrees in business, education, and computer science are positively related to earnings in the associated occupation. However, adoption of master's degrees in educational administration is negatively related to regional employment in educational administration occupations. To summarize, the evidence suggests that for certain degrees, adoption is related to rising earnings in related occupations, but not to rising employment in the occupation. Preliminary analyses of fixed effect models of degree-specific production (e.g., number of MBAs produced annually by an institution) shows similar results. More research is needed before causal statements can be made.

Drawing on resource dependence theory, I hypothesize that the adoption (**H2**) and production (**H3**) of master's degrees will increase in response to declines in (**a**) undergraduate enrollment (**b**) state appropriations. I create measures of total undergraduate enrollments and freshman enrollments. In conflict with **H2a** and **H3a**, adoption and production of master's degrees is positively related to growth in total undergraduate enrollments, implying that overall institutional growth occurs simultaneously at the undergraduate and graduate levels. Furthermore, for the sample of all institutions, growth in freshman enrollments is positively associated with increased master's degree production, also in conflict with **H3a**. However, in support of **H3a**, liberal arts colleges adopt master's degrees in interdisciplinary social/science fields (**H6a**), in response to declines in freshman enrollments. Figures 3 and 4 show that liberal arts colleges and unselective universities experienced the most dramatic declines in freshman enrollments as the size of the "traditional" college-aged population decreased. Consistent with **H3a**, I find that these institutions increased the production of master's degrees in response to declines in freshman enrollments. Analysis do not support the hypotheses that public institutions adopt (**H2b**) master's degrees or increase the production (**H3b**) of master's degrees in response to declines in state appropriations.

I find that for liberal arts colleges, adoption of specific master's degrees is negatively associated with growth in alternative revenues (chiefly, endowment and grants and auxiliary enterprises, consistent with **H4**. Both descriptive statistics and binary panel models show that high status liberal arts colleges (e.g., Bowdoin and Carleton) have strong alternative revenues and generally do not adopt master's degrees. Prior to the analysis period, many high status liberal arts colleges did award a handful of master's degrees but stopped at about the time low-status liberal arts colleges began adopting master's degrees. I argue that this is no coincidence.

Consistent with **H5**, production of master's degrees is negatively associated with strong alternative revenues for public institutions, liberal arts colleges, and for the sample of all institutions. This result implies that institutions attempt to increase revenue from master's degrees when alternative revenues are weak. Consistent with **H6b**, production is skewed towards business and "social service degrees" (e.g., education, health, social work) rather than technical and scientific fields. I argue that interdisciplinary social science degrees have the potential to generate strong enrollments because students can apply regardless of undergraduate major. Further, social service degrees may experience strong student demand because the education requirements for employment are highest in social service degrees (Collins, 1974).

Linear panel models of master's degree production on the sample of all institutions show that the main effect of prestige is positively related to production of master's degrees, consistent with **H7**. The strongly negative coefficient on the interaction between prestige and liberal arts colleges supports **H8** that prestige is negatively associated with the production of master's degrees for liberal arts colleges and positively associated with the production of master's degrees at universities. For liberal arts colleges, master's degrees are clearly a revenue source of last resort. High status liberal arts colleges avoid master's degrees in order to maintain their status (Podolny, 1993), relying instead on their strong revenues from tuition, endowment, and donation.

Discussion

The relationship for between alternative revenues, master's degrees, and prestige is more complicated for universities than for liberal arts colleges. Whereas resource dependence theory argues that institutions increase the production of master's degrees when alternative revenues are weak (Pfeffer & Salancik, 1978), literature on the pursuit of prestige implies that institutions maximize revenue from all sources to subsidize the pursuit of prestige (Bowen, 1980). Two stories emerge from the analyses. Most institutions are not prestigious, and the results show that non-prestigious institutions increase production of master's degrees when alternative revenues are weak, consistent with resource dependence theory.

The results are somewhat different for prestigious institutions. Column (5) of Table 3.5 shows the results for linear panel models of degree production for the sample of 39 highly selective universities (Barron's=4 or 5 & liberal arts college=0). Production of master's degrees is unrelated to revenues from state grants, auxiliary enterprises, and federal revenues, consistent with Bowen (1980), but negatively related to revenue from endowments and private grants, consistent with (Pfeffer & Salancik, 1978). Column (6) of Table 3.5 shows the results for the sample of 49 R1 universities, as defined by the 1976 Carnegie Classification. Consistent with Bowen (1980), production of master's degrees is unrelated to all alternative revenues sources, including endowments and private grants, and even has a positive relationship with state grants.

What explains the slightly different findings for R1 universities versus highly selective universities? Sixteen institutions are both highly selective and R1 (e.g., University of Chicago, Harvard). These institutions are mostly private and are included in the analyses of both columns (5) and (6) in Table 3.5. There are 33 R1 institutions that are not highly selective. These are mostly public institutions (e.g., University of Arizona, UC Boulder). There are 23 institutions that are highly selective but not R1 (e.g., Brandeis, Dartmouth, and Lehigh) and these institutions behave like a hybrid between prestigious universities and prestigious liberal arts colleges with respect to the production of master's degrees. For these 23 institutions production of master's degrees is negatively related to endowment and donation revenue, consistent with resource dependence theory. Therefore, the statement by Bowen (1980) that a university maximizes revenue from all possible sources seems to be true for R1 universities, some of which are more prestigious than others.

Why is production of master's degrees at R1 institutions unrelated to alternative revenue streams? One possible explanation is that selective non-research universities (e.g., Lehigh, Brandeis) limit the growth of master's degrees because they value a brand identity as selective undergraduate institutions with modest graduate enrollments. This reasoning is similar to the rationale for selective liberal arts colleges avoiding the adoption of master's degrees.

A second plausible explanation is based on the idea that research universities are large, complex organizations with many academic units and non-academic units. At the organization level, revenues from endowments, donations, auxiliary enterprises, and federal research grants may be quite strong. However, particular academic units (e.g., Harvard Graduate School of Education), may not benefit directly from auxiliary or endowment revenues. These academic units may have a strong financial incentive to expand master's degree production, especially when the university adopts a responsibility centered management (RCM) budgeting systems which requires academic units to generate revenues to match costs (Priest, Becker, Hossler, & St. John, 2002).

Setting aside the differences between R1 universities and highly selective universities, descriptive statistics show that these two groups have higher annual production of master's degrees than other institutions. This finding has implications for the literature on institutional stratification. Cheslock and Gianneschi (2008) find that prestigious public institutions generate more revenue from "voluntary" funding than regional public institutions. Slaughter, Leslie, and Rhoades (1997; 2004) find that commercialization of academic research disproportionately benefits research universities. Similarly, increased reliance on revenue from master's degrees is likely to widen the gap between the “haves” and “have-nots” because research R1 universities and highly selective universities generate more revenue from master’s degrees than other institutions.

The finding that revenue concerns affect the adoption and production of master’s degrees has important implications for the goal of equal opportunity.[38] If master’s degrees are largely valued by institutions and academic units for the purpose of generating revenue, then master’s degree programs will place more emphasis on recruiting students who can afford the tuition. As the educational “requirements” (Collins, 1974) for occupations continue to rise, low-income individuals who cannot afford master’s degree tuition will be unable to compete for certain job opportunities (Berg, 1970).

Revenue from master’s degrees may also be used to pursue equal opportunity by subsidizing the education of low-income or under-represented students at the baccalaureate, doctoral, or master’s degree level. However, Doyle (2010) finds that institutional aid is increasingly devoted to attracting high achieving students in order to raise academic profile, rather than increase access for low-income students. Therefore, revenue from master’s degrees more likely subsidizes the pursuit of prestige than the pursuit of equal opportunity.

The present research also has implications for the efficiency goal of education. From the perspective of economic growth, efficient spending on education would mean that individuals do not receive education in excess of the skills required to perform job

[38] This finding is most robust for small private institutions, where “wiggling X” causes “Y” to move. Organization-level data may not capture the financial pressures experienced by academic units within large, complex organizations. However, archival and qualitative research on master’s degrees in education (Levine, 2005) and business (Khurana, 2007) suggest that revenue concerns affect the adoption and production of master’s degrees within academic units at large, complex institutions.

duties adequately (Labaree, 1997). However, the goal of social efficiency does not affect the decision by individuals of whether to invest in educational credentials. Competition intensifies when the number of desirable jobs is surpassed by the number of people competing for those jobs (Blau, 1994; Boudon, 1974). Individuals compete for scarce jobs, in part, by acquiring more education than the next person. Therefore, individuals have an incentive to invest in credentials in excess of job skill requirements in order to obtain a position. In aggregate, this individually rational behavior contributes to a socially inefficient "arms race in educational attainment" (Frank & Cook, 1995). I argue that student demand for master's degrees is rising because individuals attempt to differentiated themselves as the proportion of baccalaureate degree holders surpasses the number of jobs that "require" a college-degree (Bureau of Labor Statistics, 2008; NCES, 2010).

University presidents often highlight the contribution of higher education to skills demanded by the labor market (Vitullo & Johnson, 2010). If this is true, then institutions should adopt degrees that are demanded by the labor market, those experiencing growth in total employment and increase in earnings. I find a mixed relationship between institutional adoption decisions and labor market demand for skills. Adoption of certain degrees – e.g., Business, Education – increases when earnings in the associated occupation increase. I do not find a similar relationship for changes in total employment. Indeed, liberal arts institutions are more likely to adopt master's degrees in educational administration when regional employment in educational administration declines. When employment in an occupation declines, individuals have a stronger incentive to obtain credentials in order to differentiate themselves in the competition for scarce job opportunities.

Tables

Table 3.1 Median annual production of bachelor's degrees and master's degrees, by liberal arts status (1976 Carnegie Classification and "prestige" (1982 Barron's Category)

	University Low Select (Barron's=1)	University Med Select (Barron's=2,3)	University High Select (Barron's=4,5)	Liberal Arts Low/ Med Select (Barron's=1,2,3)	Liberal Arts High Select (Barron's=4,5)
			Bachelor's Degrees		
1966	300	438	672	111	279
1970	443	658	737	150	295
1975	476	834	941	139	347
1980	476	821	1,029	138	379
1985	491	843	1,091	143	402
1990	557	912	1,101	162	422
1995	660	958	1,106	190	410
2000	684	983	1,253	222	426
2005	754	1,102	1,240	253	451
2009	829	1,227	1,309	261	472
			Master's Degrees		
1966	15	82	283	0	2
1970	48	148	343	0	3
1975	111	247	430	0	4
1980	121	256	442	0	0
1985	104	215	552	0	0
1990	117	254	551	0	0
1995	126	313	672	1	0
2000	164	367	708	11	0
2005	212	409	862	27	0
2009	234	473	881	42	0
N (1990)	304	380	39	484	33

Table 3.2 Mean master's degree production of master's degrees, by liberal arts status (1976 Carnegie Classification and "prestige" (1982 Barron's Category)

	University Low Select (Barron's=1)	University Med Select (Barron's=2,3)	University High Select (Barron's=4,5)	Liberal Arts Low/ Med Select (Barron's=1,2,3)	Liberal Arts High Select (Barron's=4,5)
1966	86	233	544	3	32
1970	142	353	609	5	36
1975	218	482	675	9	30
1980	226	466	728	14	22
1985	207	430	772	17	17
1990	219	483	871	30	18
1995	264	584	975	45	21
2000	303	631	1,035	77	19
2005	380	735	1,212	114	21
2009	412	790	1,349	143	21
N (1990)	304	380	39	484	33

Table 3.3 Percent of institutions ever adopting or awarding specific master's degrees

	Business (2-digit CIP)					Education (2-digit CIP)				
	University			Liberal Arts		University			Liberal Arts	
Selectivity	Low	Medium	High	Low/Med	High	Low	Medium	High	Low/Med	High
1966	20.5%	38.3%	64.1%	0.2%	0.0%	56.0%	72.8%	61.5%	9.2%	21.9%
1970	33.0%	47.1%	66.7%	1.0%	0.0%	62.2%	75.4%	69.2%	10.9%	30.3%
1975	48.7%	59.1%	82.1%	2.9%	0.0%	68.8%	79.3%	69.2%	15.2%	30.3%
1980	55.0%	67.2%	82.1%	7.4%	0.0%	72.8%	83.5%	74.4%	18.1%	30.3%
1985	62.3%	73.2%	82.1%	14.2%	0.0%	76.4%	85.6%	74.4%	23.5%	30.3%
1990	67.8%	76.3%	84.6%	17.8%	0.0%	78.6%	86.6%	74.4%	33.3%	30.3%
1995	71.8%	79.5%	84.6%	26.6%	0.0%	83.4%	89.5%	74.4%	44.0%	30.3%
2000	77.4%	82.9%	87.2%	39.3%	0.0%	87.4%	92.9%	74.4%	52.8%	30.3%
2005	80.3%	86.0%	92.3%	47.3%	0.0%	89.6%	94.4%	76.9%	61.2%	30.3%
2009	82.9%	87.0%	92.3%	50.7%	0.0%	91.0%	94.7%	76.9%	63.9%	30.3%

	Teaching (4-dgit CIP)					Educ Admin (4-dgit CIP)				
	University			Liberal Arts		University			Liberal Arts	
Selectivity	Low	Medium	High	Low/Med	High	Low	Medium	High	Low/Med	High
1966	51.0%	61.1%	48.7%	6.0%	18.8%	33.2%	43.6%	23.1%	1.7%	0.0%
1970	57.1%	72.2%	61.5%	8.9%	27.3%	36.7%	48.2%	25.6%	1.8%	0.0%
1975	64.6%	75.6%	64.1%	12.5%	30.3%	47.7%	56.2%	35.9%	3.3%	0.0%
1980	70.2%	78.5%	66.7%	14.0%	30.3%	52.1%	57.7%	43.6%	4.7%	0.0%
1985	73.4%	80.6%	69.2%	18.4%	30.3%	58.0%	61.7%	43.6%	7.2%	0.0%
1990	75.3%	82.4%	69.2%	26.5%	30.3%	58.2%	64.0%	43.6%	9.9%	0.0%
1995	80.1%	83.4%	69.2%	32.3%	30.3%	60.1%	65.3%	43.6%	14.5%	0.0%
2000	83.1%	85.5%	69.2%	37.2%	30.3%	63.1%	69.1%	48.7%	18.6%	0.0%
2005	86.3%	87.8%	71.8%	44.5%	30.3%	67.2%	72.5%	51.3%	23.4%	0.0%
2009	87.0%	88.6%	71.8%	48.7%	30.3%	69.2%	73.3%	51.3%	26.1%	0.0%
N (1990)	93	81	548	42	475	93	81	548	42	475

Table 3.4 Percent of institutions ever adopting or awarding specific master's degrees

	Health (2-digit CIP)					Nursing (4-digit CIP)				
	University			Liberal Arts		University			Liberal Arts	
Selectivity	Low	Medium	High	Low/Med	High	Low	Medium	High	Low/Med	High
1966	4.6%	17.5%	43.6%	0.2%	0.0%	1.5%	7.9%	18.0%	0.0%	0.0%
1970	9.2%	25.9%	46.2%	0.4%	0.0%	3.7%	13.5%	18.0%	0.0%	0.0%
1975	24.7%	43.0%	53.9%	1.3%	3.0%	6.2%	18.4%	18.0%	0.2%	0.0%
1980	31.4%	52.0%	59.0%	2.1%	3.0%	9.7%	23.9%	23.1%	0.2%	0.0%
1985	39.7%	60.6%	61.5%	7.2%	3.0%	15.1%	31.5%	30.8%	3.6%	0.0%
1990	44.4%	64.7%	64.1%	11.2%	3.0%	18.8%	36.8%	33.3%	5.4%	0.0%
1995	49.5%	69.2%	66.7%	16.6%	3.0%	25.6%	41.6%	33.3%	8.2%	0.0%
2000	58.1%	73.4%	66.7%	23.5%	3.0%	34.6%	48.0%	33.3%	13.3%	0.0%
2005	63.6%	77.3%	74.4%	31.5%	3.0%	40.8%	52.9%	33.3%	17.4%	0.0%
2009	66.6%	79.1%	74.4%	34.1%	3.0%	43.1%	54.0%	33.3%	19.8%	0.0%

	Engineering (2-dgit CIP)					Computer Science (2-dgit CIP)				
	University			Liberal Arts		University			Liberal Arts	
Selectivity	Low	Medium	High	Low/Med	High	Low	Medium	High	Low/Med	High
1966	10.0%	26.9%	71.8%	0.0%	0.0%	1.2%	4.1%	20.5%	0.0%	0.0%
1970	16.7%	33.1%	74.4%	0.0%	3.0%	5.1%	14.6%	41.0%	0.0%	0.0%
1975	18.8%	36.0%	74.4%	0.4%	3.0%	10.7%	24.7%	53.9%	0.2%	0.0%
1980	21.4%	38.3%	74.4%	0.4%	3.0%	16.8%	33.1%	61.5%	0.2%	0.0%
1985	25.9%	41.2%	76.9%	0.6%	3.0%	22.6%	41.2%	69.2%	2.0%	0.0%
1990	28.0%	44.7%	76.9%	0.8%	3.0%	26.6%	47.1%	71.8%	3.3%	0.0%
1995	30.6%	46.3%	76.9%	1.5%	3.0%	29.2%	50.8%	74.4%	4.0%	3.0%
2000	33.9%	48.8%	79.5%	2.6%	3.0%	34.9%	56.7%	74.4%	5.1%	3.0%
2005	36.1%	51.3%	82.1%	3.0%	3.0%	42.1%	59.8%	82.1%	7.2%	6.1%
2009	37.1%	51.6%	82.1%	3.0%	3.0%	43.8%	60.1%	84.6%	7.6%	6.1%
N (1990)	93	81	548	42	475	93	81	548	42	475

Table 3.5 Logged production of master's degrees, random effects linear panel models, by sample, analysis period 1978-1999

	(1) All	(2) Public	(3) Lib Arts	(4) Priv Univ Low Select	(5) University High Select	(6) Research 1 (1976 Carnegie)
	b/(se)	b/(se)	b/(se)	b/(se)	b/(se)	b/(se)
L3 Undergrad FTE (000) **(H3a)**	0.050***	0.037***	1.236***	0.321*	0.037	0.005
	(0.010)	(0.007)	(0.177)	(0.139)	(0.038)	(0.006)
L3 UG FTE Fresh (000) **(H3a)**	0.089*	0.036	-1.692***	-0.442*	0.150**	0.011
	(0.042)	(0.024)	(0.386)	(0.189)	(0.052)	(0.018)
L3. State Approp **(H3b)**		0.000				
		(0.000)				
L3 Endow+PrivGrant **(H5)**	-0.002***	-0.002***	-0.024***	0.005	-0.001*	0.000
	(0.001)	(0.001)	(0.006)	(0.010)	(0.000)	(0.000)
L3 State Grants **(H5)**	-0.000	-0.000	-0.004	0.033	0.001	0.001**
	(0.001)	(0.001)	(0.036)	(0.040)	(0.001)	(0.000)
L3 Auxiliary Revenues **(H5)**	-0.002*	-0.000	-0.059***	0.024	-0.000	-0.000
	(0.001)	(0.000)	(0.016)	(0.020)	(0.001)	(0.000)
L3 Federal Revenues **(H5)**	-0.001*	-0.000	0.000	-0.034	0.001	0.000
	(0.000)	(0.000)	(0.007)	(0.023)	(0.001)	(0.000)
L3 Local Revenues **(H5)**	-0.002***	-0.001	-0.012	-0.647***	0.005	0.000
	(0.000)	(0.001)	(0.069)	(0.177)	(0.003)	(0.001)
Time (Years)	0.048***	0.026***	0.063***	0.065***	0.021***	0.009***
	(0.003)	(0.003)	(0.005)	(0.015)	(0.005)	(0.003)
Public Institutions	0.865***					
	(0.180)					
Religious Institution	-0.562***		-0.139	-1.590**	-2.159*	
	(0.131)		(0.150)	(0.512)	(0.966)	
Liberal Arts College **(H8)**	-1.041***					
	(0.268)					
Prestige (Barron's) **(H7)(H8)**	0.640***					
	(0.087)					
Liberal Arts X Prestige **(H8)**	-0.728***					
	(0.115)					

	(1) All	(2) Public	(3) Lib Arts	(4) Priv Univ Low Select	(5) University High Select	(6) Research 1 (1976 Carnegie)
Prestige=2 (Barron's) **(H7)**		0.962***	0.324*			
		(0.194)	(0.141)			
Prestige=3 (Barron's) **(H7)**		1.087***	-0.118			
		(0.291)	(0.289)			
Prestige=4 (Barron's) **(H7)**		1.300*	-0.390			
		(0.513)	(0.361)			
Prestige=5 (Barron's) **(H7)**			0.196			
			(0.821)			
Rural	-1.460***	-1.558***	-0.902***	-0.737	-2.385*	-0.342
	(0.155)	(0.238)	(0.220)	(0.820)	(0.968)	(0.247)
Metro Area<250,000	-1.323***	-1.045***	-0.783**	-3.082***		-0.287
	(0.182)	(0.262)	(0.259)	(0.876)		(0.296)
Metro Area<500,000	-0.939***	-0.506	-0.528*	-2.203***	-0.876	-0.322
	(0.187)	(0.266)	(0.265)	(0.612)	(0.677)	(0.354)
Metro Area<1,000,000	-0.771***	-0.539	-0.433	-1.314	-1.141**	-0.348
	(0.181)	(0.275)	(0.300)	(0.848)	(0.399)	(0.255)
Metro Area<2,000,000	-0.497*	0.071	-0.854**	-1.796*	0.083	-0.147
	(0.203)	(0.312)	(0.304)	(0.823)	(0.829)	(0.397)
N_clust	1,249	424	531	66	39	49
N	27,006	11,432	11,326	1,384	853	1,070
g_max	22	27	22	22	22	22
g_avg	21.62	26.96	21.33	20.97	21.87	21.84
r2_w	0.16	0.15	0.29	0.27	0.43	0.36
r2_b	0.58	0.36	0.18	0.47	0.56	0.37
r2_o	0.55	0.34	0.21	0.44	0.56	0.37
sigma_u	1.62	1.47	1.37	1.85	1.43	0.54
sigma_e	0.71	0.54	0.83	0.84	0.17	0.12
Rho	0.84	0.88	0.73	0.83	0.99	0.95

* p<0.05, ** p<0.01, *** p<0.001

Table 3.6 Adoption of specific master's degrees, random effects logit panel models, selected results by sample

	First Ever MA Degree			**MA in Bus (2-digit CIP)**		
Sample	Priv Univ.	Lib Arts	Public	Priv Univ.	Lib Arts	Public
Analysis Period	1978-1999	1978-1999	1978-1999	1983-1999	1983-1999	1983-1999
L3 Undergrad FTE (000) **(H2a)**	0.777	1.471***	0.829	0.610	0.860**	0.113
L3 UG FTE Fresh (000) **(H2a)**	-0.473	-5.570***	-0.571	-2.054	-3.817**	0.480
L3 State Approp per FTE ($000) **(H2b)**			-1.075			-0.005
L3 Endow+PrivGrant per FTE ($000) **(H4)**	-0.125	-0.101**	-0.148	-0.036	-0.115*	0.267
L3 Aux Rev per FTE ($000) **(H4)**	-0.231	-0.133*	-0.223	-0.019	-0.099	-0.054
L4 Employ, State Level (10,000) **(H1)**				0.001	-0.005	-0.014
L4 Weekly Earn, State Level ($100) **(H1)**				-0.004	0.238*	-0.007
Ever Grant BA in Subject				0.958	2.366*	0.191
Number of Institutions	64	397	64	111	478	133
Wald Chi2	6.34	45.93	6.87	17.24	94.88	33.12

	MA in Edu (2-digit CIP)			**MA in Health (2-digit CIP)**		
Sample	Priv Univ.	Lib Arts	Public	Priv Univ.	Lib Arts	Public
Analysis Period	1983-1999	1983-1999	1983-1999	1983-1999	1983-1999	1983-1999
L3 Undergrad FTE (000) **(H2a)**	0.507	0.810***	0.148	-0.084	1.493**	0.107
L3 UG FTE Fresh (000) **(H2a)**	-2.080	-3.731***	1.122	1.405	-5.900**	0.369
L3 State Approp per FTE ($000) **(H2b)**			-0.001			0.080*
L3 Endow+PrivGrant per FTE ($000) **(H4)**	0.081	-0.087*	-1.379	0.011	-0.237**	0.178
L3 Aux Rev per FTE ($000) **(H4)**	-0.116	-0.110*	-0.023	0.461*	-0.110	-0.174
L4 Employ, State Level (10,000) **(H1)**	-0.038	-0.008	0.049	-0.042	-0.011	0.005
L4 Weekly Earn, State Level ($100) **(H1)**	0.262	0.265*	0.175	1.052**	0.201	0.440*
Ever Grant BA in Subject	0.016	1.173**	0.789	1.689	1.929**	2.094***
Number of Institutions	82	422	59	163	512	210
Wald Chi2	31.05	86.99	10.20	32.78	41.82	50.98

	MA in Ed Admin (4-digit CIP)			MA in Computer Sci (2-digit CIP)		
Sample	Priv Univ.	Lib Arts	Public	Priv Univ.	Lib Arts	Public
Analysis Period	1983-1999	1983-1999	1983-1999	1978-1999	1983-1999	1983-1999
L3 Undergrad FTE (000) **(H2a)**	0.166	0.997**	-0.138	0.433**	1.650*	0.561**
L3 UG FTE Fresh (000) **(H2a)**	-0.550	-5.125**	1.433	-0.884	-4.948	-1.232
L3 State Approp per FTE ($000) **(H2b)**			0.191*			0.006
L3 Endow+PrivGrant per FTE ($000) **(H4)**	0.042	-0.258**	-1.859	0.086*	-0.257	0.705
L3 Aux Rev per FTE ($000) **(H4)**	-0.034	0.113	-0.266	-0.078	0.062	-0.056
L4 Employ, Regional Level (10,000) **(H1)**	-0.042	-0.136**	-0.034	NA	-0.020	-0.011
L4 Weekly Earn, Regional Lvl ($100) **(H1)**	-0.273	-0.028	-0.960*	NA	0.900*	0.055
Ever Grant BA In Subject	-0.098	-23.815	-28.578	1.546**	2.032**	1.979*
Number of Institutions	153	504	156	244	526	278
Wald Chi2	19.47	58.47	18.75	61.48	26.50	29.99

* p<0.05, ** p<0.01, *** p<0.001

Covariates not included in table: State grants; federal government revenue; religions affiliation; time (years); urbanization

Figures

Figure 3.1 Total undergraduate FTE enrollments as a percentage of 1975 enrollments for institutions in the 50th percentile

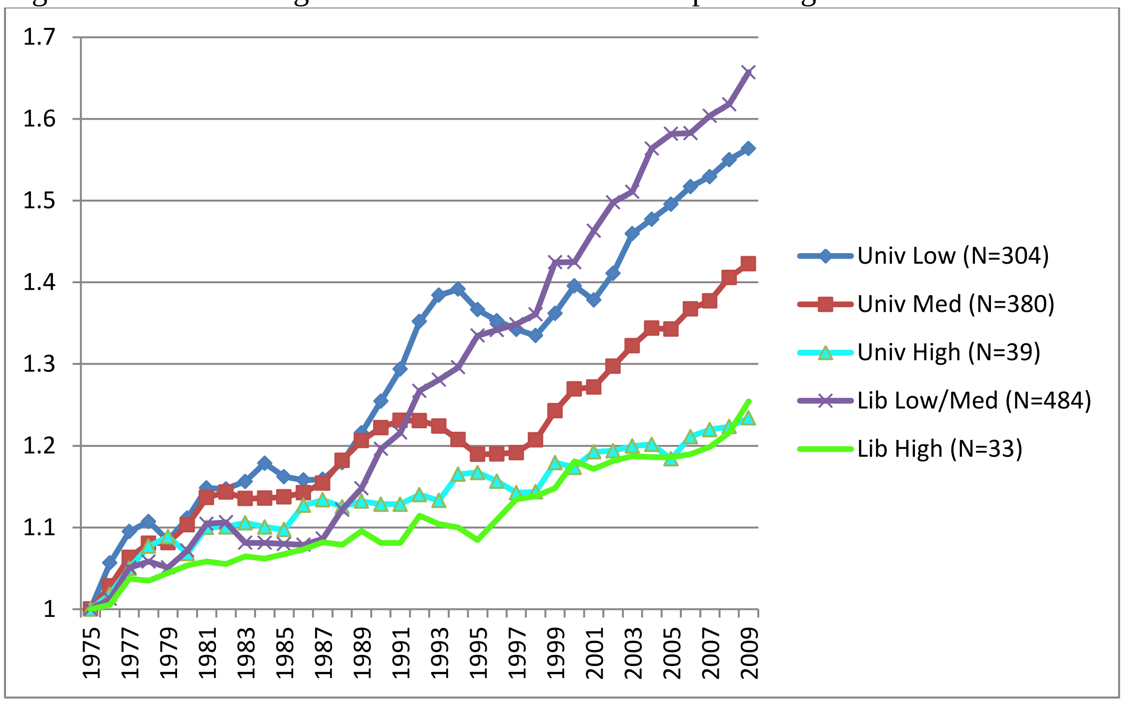


Figure 3.2 Total undergraduate FTE enrollments as a percentage of 1975 enrollments for institutions in the 25th percentile

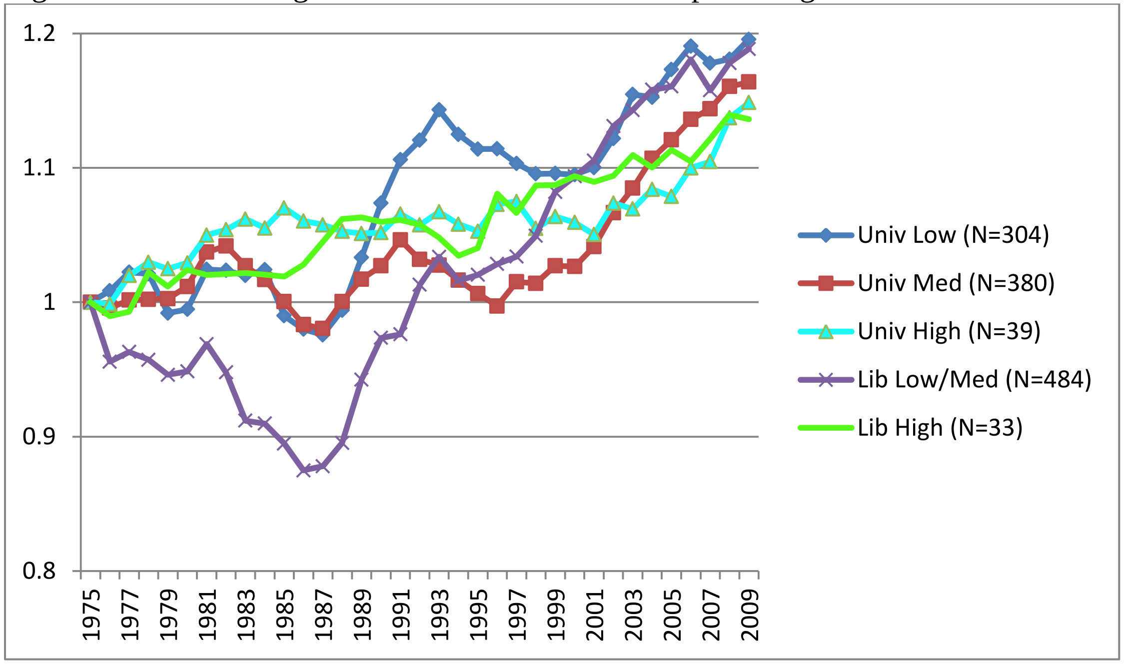


Figure 3.3 Freshman undergraduate FTE enrollments as a percentage of 1975 enrollments for institutions in the 50th percentile

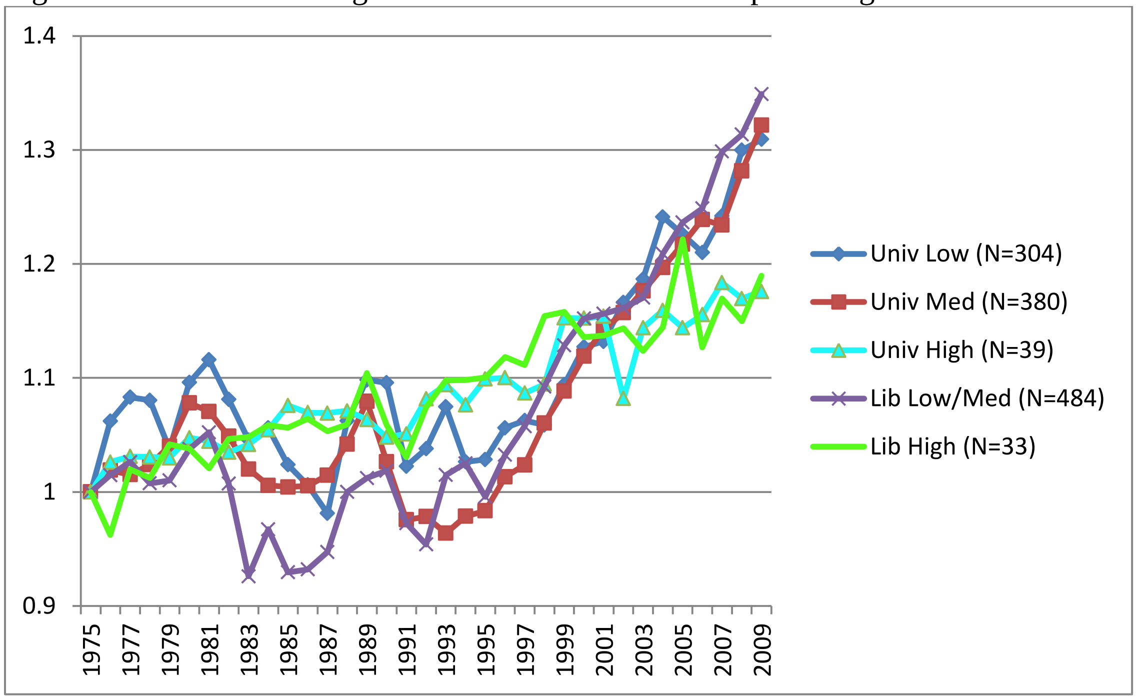


Figure 3.4 Freshman undergraduate FTE enrollments as a percentage of 1975 enrollments for institutions in the 25th percentile

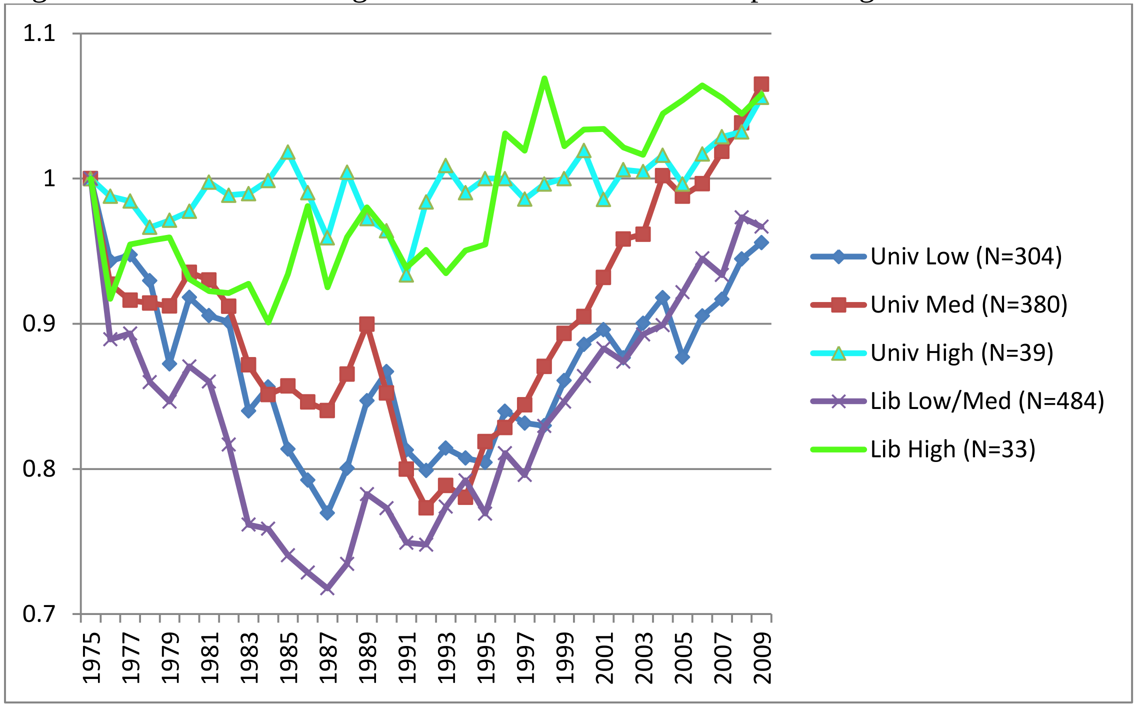
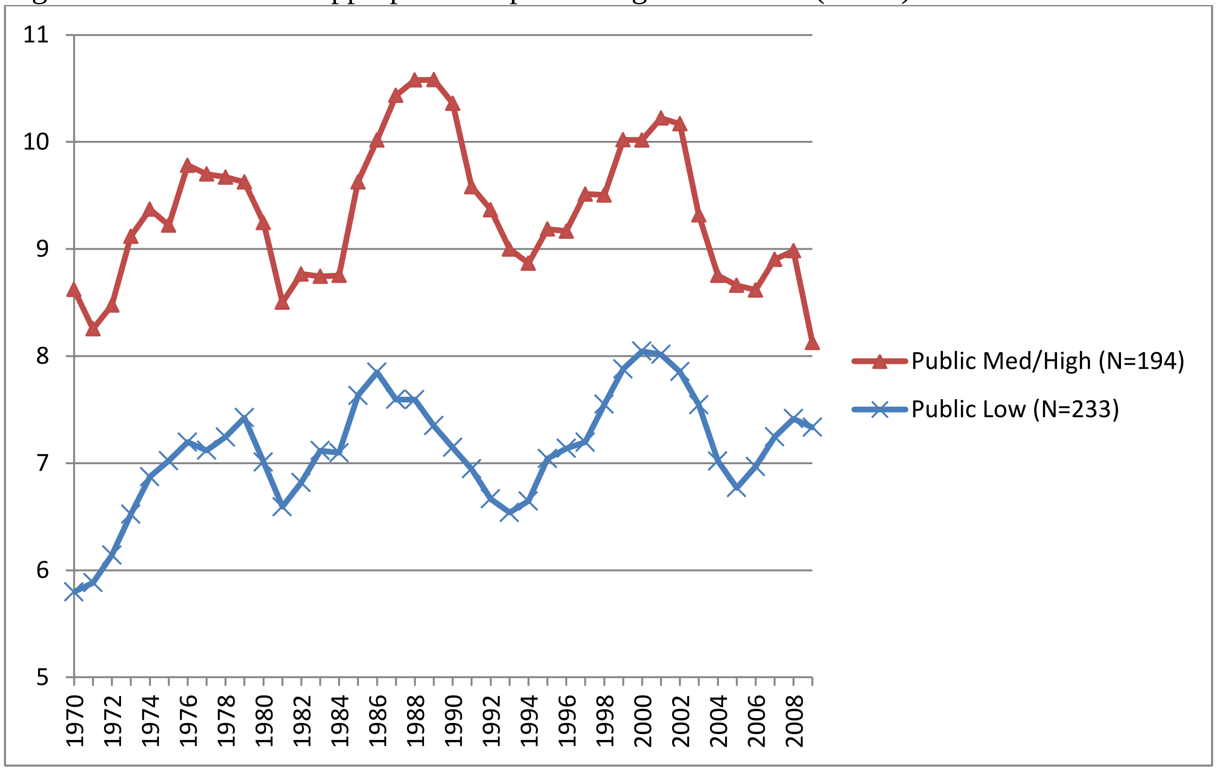


Figure 3.5 Median state appropriations per undergraduate FTE ($000s)



Appendix

Appendix Table 3.1 Random effects and fixed effects linear panel regression, whole sample

	(1)	(2)	(3)	(4)
	RE (1978-1999)	FE (1978-1999)	RE(1978-2009)	RE(1978-2009)
	b/(se)	b/(se)	b/(se)	b/(se)
L3 Undergrad FTE (000)	0.050***	0.030*	0.074***	0.059***
	(0.010)	(0.012)	(0.014)	(0.015)
L3 UG FTE Fresh (000)	0.089*	0.079*	-0.014	-0.016
	(0.042)	(0.037)	(0.032)	(0.032)
L3 Endow+PrivGrant	-0.002***	-0.002***	-0.000	-0.000
	(0.001)	(0.001)	(0.000)	(0.000)
L3 State Grants	-0.000	0.000	-0.004***	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
L3 Auxiliary Revenues	-0.002*	-0.002**	-0.002**	-0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
L3 Federal Revenues	-0.001*	-0.001**	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Local Revenues	-0.002***	-0.001*	-0.002**	-0.001
	(0.000)	(0.001)	(0.001)	(0.001)
Time (Years)	0.048***	0.049***	0.052***	0.053***
	(0.003)	(0.003)	(0.002)	(0.002)
Public Institutions	0.865***	.	0.860***	.
	(0.180)	.	(0.174)	.
Religious Institution	-0.562***	.	-0.493***	.
	(0.131)	.	(0.131)	.
Liberal Arts College	-1.041***	.	-0.729**	.
	(0.268)	.	(0.267)	.
Prestige (Barron's)	0.640***	.	0.604***	.
	(0.087)	.	(0.086)	.
Liberal Arts X Prestige	-0.728***		-0.808***	
	(0.115)		(0.117)	
Rural	-1.460***	.	-1.523***	.
	(0.155)	.	(0.152)	.
Metro	-1.323***	.	-1.323***	.

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
Area<250,000				
	(0.182)	.	(0.176)	.
Metro Area<500,000	-0.939***	.	-0.969***	.
	(0.187)	.	(0.184)	.
Metro Area<1,000,000	-0.771***	.	-0.815***	.
	(0.181)	.	(0.176)	.
Metro Area<2,000,000	-0.497*	.	-0.463*	.
	(0.203)	.	(0.201)	.
N_clust	1,249	1,249	1,249	1,249
N	27,006	27,006	38,921	38,921
g_max	22	22	32	32
g_avg	21.62	21.62	31.16	31.16
r2_w	0.16	0.16	0.25	0.25
r2_b	0.58	0.12	0.56	0.16
r2_o	0.55	0.08	0.52	0.11
sigma_u	1.62	2.53	1.60	2.42
sigma_e	0.71	0.71	0.86	0.86
rho	0.84	0.93	0.78	0.89

* p<0.05, ** p<0.01, *** p<0.001; variables omitted from regression table: region, year founded

Appendix Table 3.2 Random effects and fixed effects linear panel regression, public institutions

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
L3 Undergrad FTE (000)	0.037***	0.027**	0.036***	0.028***
	(0.007)	(0.008)	(0.007)	(0.008)
L3 UG FTE Fresh (000)	0.036	0.036	0.031	0.031
	(0.024)	(0.023)	(0.023)	(0.023)
L3 Endow+PrivGrant	-0.002***	-0.002**	-0.001**	-0.001**
	(0.001)	(0.001)	(0.000)	(0.000)
L3 State Grants	-0.000	0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
L3.astatev2	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Auxiliary Revenues	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Federal Revenues	-0.000	-0.000	-0.001	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Local Revenues	-0.001	-0.001	-0.001*	-0.001
	(0.001)	(0.001)	(0.000)	(0.000)
Time (Years)	0.026***	0.027***	0.029***	0.030***
	(0.003)	(0.003)	(0.003)	(0.003)
Prestige=2 (Barron's)	0.962***	.	0.954***	.
	(0.194)	.	(0.190)	.
Prestige=3 (Barron's)	1.087***	.	1.127***	.
	(0.291)	.	(0.279)	.
Prestige=4 (Barron's)	1.300*	.	1.270*	.
	(0.513)	.	(0.494)	.
Rural	-1.558***	.	-1.568***	.
	(0.238)	.	(0.230)	.
Metro Area<250,000	-1.045***	.	-1.047***	.
	(0.262)	.	(0.251)	.
Metro Area<500,000	-0.506	.	-0.521*	.

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
	(0.266)	.	(0.254)	.
Metro Area<1,000,000	-0.539	.	-0.564*	.
	(0.275)	.	(0.264)	.
Metro Area<2,000,000	0.071	.	0.060	.
	(0.312)	.	(0.307)	.
N_clust	424	424	424	424
N	11,432	11,432	13,550	13,550
g_max	27	27	32	32
g_avg	26.96	26.96	31.96	31.96
r2_w	0.15	0.15	0.21	0.21
r2_b	0.36	0.26	0.36	0.26
r2_o	0.34	0.21	0.35	0.19
sigma_u	1.47	1.86	1.42	1.81
sigma_e	0.54	0.54	0.58	0.58
rho	0.88	0.92	0.86	0.91

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.3 Random effects and fixed effects linear panel regression, liberal arts colleges

	(1)	(2)	(3)	(4)
	RE (1978-1999)	FE (1978-1999)	RE(1978-2009)	RE(1978-2009)
	b/(se)	b/(se)	b/(se)	b/(se)
L3 Undergrad FTE (000)	1.236***	1.224***	1.358***	1.351***
	(0.177)	(0.177)	(0.183)	(0.181)
L3 UG FTE Fresh (000)	-1.692***	-1.564***	-1.719***	-1.615***
	(0.386)	(0.383)	(0.450)	(0.441)
L3 Endow+PrivGrant	-0.024***	-0.024***	-0.005***	-0.005***
	(0.006)	(0.007)	(0.001)	(0.001)
L3 State Grants	-0.004	-0.001	-0.005	-0.003
	(0.036)	(0.035)	(0.026)	(0.026)
L3 Auxiliary Revenues	-0.059***	-0.060***	-0.064***	-0.064***
	(0.016)	(0.017)	(0.016)	(0.016)
L3 Federal Revenues	0.000	-0.005	-0.018	-0.022
	(0.007)	(0.010)	(0.012)	(0.013)
L3 Local Revenues	-0.012	-0.017	0.020	0.016
	(0.069)	(0.069)	(0.062)	(0.063)
Time (Years)	0.063***	0.064***	0.066***	0.066***
	(0.005)	(0.005)	(0.004)	(0.004)
Religious Institution	-0.139	.	-0.082	.
	(0.150)	.	(0.155)	.
Prestige=2 (Barron’s)	0.324*	.	0.234	.
	(0.141)	.	(0.148)	.
Prestige=3 (Barron’s)	-0.118	.	-0.436	.
	(0.289)	.	(0.306)	.
Prestige=4 (Barron’s)	-0.390	.	-0.997**	.
	(0.361)	.	(0.369)	.
Prestige=5 (Barron’s)	0.196	.	-0.453	.
	(0.821)	.	(0.813)	.
Rural	-0.902***	.	-1.012***	.
	(0.220)	.	(0.221)	.
Metro	-0.783**	.	-0.818**	.

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
Area<250,000				
	(0.259)	.	(0.261)	.
Metro Area<500,000	-0.528*	.	-0.579*	.
	(0.265)	.	(0.273)	.
Metro Area<1,000,000	-0.433	.	-0.561	.
	(0.300)	.	(0.301)	.
Metro Area<2,000,000	-0.854**	.	-0.801**	.
	(0.304)	.	(0.305)	.
N_clust	531	531	531	531
N	11,326	11,326	16,188	16,188
g_max	22	22	32	32
g_avg	21.33	21.33	30.49	30.49
r2_w	0.29	0.29	0.40	0.40
r2_b	0.18	0.05	0.22	0.09
r2_o	0.21	0.11	0.28	0.20
sigma_u	1.37	1.54	1.43	1.61
sigma_e	0.83	0.83	0.99	0.99
rho	0.73	0.78	0.68	0.73

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.4 Random effects and fixed effects linear panel regression, private universities low selectivity (Barrons=1)

	(1) RE (1978-1999)	(2) FE (1978-1999)	(3) RE(1978-2009)	(4) RE(1978-2009)
	b/(se)	b/(se)	b/(se)	b/(se)
L3 Undergrad FTE (000)	0.321*	0.313*	0.399***	0.392**
	(0.139)	(0.143)	(0.119)	(0.121)
L3 UG FTE Fresh (000)	-0.442*	-0.417*	-0.608*	-0.595*
	(0.189)	(0.187)	(0.259)	(0.261)
L3 Endow+PrivGrant	0.005	0.004	-0.009**	-0.009**
	(0.010)	(0.011)	(0.003)	(0.003)
L3 State Grants	0.033	0.030	0.012	0.011
	(0.040)	(0.039)	(0.041)	(0.041)
L3 Auxiliary Revenues	0.024	0.023	0.001	0.001
	(0.020)	(0.020)	(0.018)	(0.018)
L3 Federal Revenues	-0.034	-0.035	-0.030**	-0.030*
	(0.023)	(0.024)	(0.012)	(0.012)
L3 Local Revenues	-0.647***	-0.666***	-0.320**	-0.332**
	(0.177)	(0.175)	(0.115)	(0.115)
Time (Years)	0.065***	0.066***	0.072***	0.072***
	(0.015)	(0.015)	(0.012)	(0.012)
Religious Institution	-1.590**	.	-1.611***	.
	(0.512)	.	(0.489)	.
Rural	-0.737	.	-0.528	.
	(0.820)	.	(0.815)	.
Metro Area<250,000	-3.082***	.	-2.500**	.
	(0.876)	.	(0.880)	.
Metro Area<500,000	-2.203***	.	-1.964**	.
	(0.612)	.	(0.606)	.
Metro Area<1,000,000	-1.314	.	-1.039	.
	(0.848)	.	(0.833)	.
Metro Area<2,000,000	-1.796*	.	-1.509	.
	(0.823)	.	(0.804)	.
N_clust	66	66	66	66

N	1,384	1,384	1,977	1,977
g_max	22	22	32	32
g_avg	20.97	20.97	29.95	29.95
r2_w	0.27	0.27	0.36	0.36
r2_b	0.47	0.08	0.46	0.08
r2_o	0.44	0.10	0.43	0.13
sigma_u	1.85	2.22	1.80	2.16
sigma_e	0.84	0.84	0.95	0.95
Rho	0.83	0.88	0.78	0.84

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.5 Random effects and fixed effects linear panel regression, private universities, medium selectivity (Barrons=2, 3)

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
L3 Undergrad FTE (000)	0.082*	0.062	0.140**	0.123**
	(0.035)	(0.035)	(0.043)	(0.045)
L3 UG FTE Fresh (000)	-0.079	-0.084	-0.092	-0.083
	(0.092)	(0.093)	(0.098)	(0.099)
L3 Endow+PrivGrant	-0.002	-0.002	-0.001*	-0.001*
	(0.001)	(0.001)	(0.000)	(0.000)
L3 State Grants	0.001	0.001	0.006	0.006
	(0.003)	(0.003)	(0.005)	(0.005)
L3 Auxiliary Revenues	-0.001	-0.002	-0.004**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.001)
L3 Federal Revenues	0.002	0.002	-0.000	-0.000
	(0.002)	(0.001)	(0.001)	(0.001)
L3 Local Revenues	0.002	0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Time (Years)	0.029***	0.030***	0.033***	0.034***
	(0.005)	(0.005)	(0.004)	(0.005)
Religious Institution	-0.845***	.	-0.782***	.
	(0.242)	.	(0.226)	.
Rural	-2.384***	.	-2.430***	.
	(0.500)	.	(0.491)	.
Metro Area<250,000	-2.300***	.	-2.272***	.
	(0.442)	.	(0.411)	.
Metro Area<500,000	-1.885***	.	-1.901***	.
	(0.559)	.	(0.532)	.
Metro Area<1,000,000	-1.233***	.	-1.211***	.
	(0.366)	.	(0.336)	.
Metro Area<2,000,000	-0.373	.	-0.382	.
	(0.401)	.	(0.379)	.
N_clust	190	190	190	190

N	4,152	4,152	6,009	6,009
g_max	22	22	32	32
g_avg	21.85	21.85	31.63	31.63
r2_w	0.12	0.12	0.20	0.20
r2_b	0.44	0.23	0.47	0.22
r2_o	0.42	0.11	0.45	0.14
sigma_u	1.61	2.14	1.54	2.02
sigma_e	0.54	0.54	0.65	0.65
rho	0.90	0.94	0.85	0.91

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.6 Random effects and fixed effects linear panel regression, highly selective universities (note: includes four public institutions)

	(1) RE (1978-1999) b/(se)	(2) FE (1978-1999) b/(se)	(3) RE(1978-2009) b/(se)	(4) RE(1978-2009) b/(se)
L3 Undergrad FTE (000)	0.037	0.034	0.102	0.099
	(0.038)	(0.038)	(0.055)	(0.058)
L3 UG FTE Fresh (000)	0.150**	0.148**	0.004	-0.001
	(0.052)	(0.052)	(0.112)	(0.112)
L3 Endow+PrivGrant	-0.001*	-0.001*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 State Grants	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
L3 Auxiliary Revenues	-0.000	-0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
L3 Federal Revenues	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.000)	(0.000)
L3 Local Revenues	0.005	0.005	-0.002	-0.002
	(0.003)	(0.003)	(0.002)	(0.002)
Time (Years)	0.021***	0.021***	0.009	0.010
	(0.005)	(0.005)	(0.009)	(0.009)
Religious Affiliation	-2.159*	.	-2.015*	.
	(0.966)	.	(0.990)	.
Rural	-2.385*	.	-2.361*	.
	(0.968)	.	(0.949)	.
Metro Area<250,000	.	.		
	.	.		
Metro Area<500,000	-0.876	.	-0.896	.
	(0.677)	.	(0.641)	.
Metro Area<1,000,000	-1.141**	.	-1.149**	.
	(0.399)	.	(0.370)	.
Metro Area<2,000,000	0.083	.	-0.009	.
	(0.829)	.	(0.816)	.
N_clust	39	39	39	39

N	853	853	1,243	1,243
g_max	22	22	32	32
g_avg	21.87	21.87	31.87	31.87
r2_w	0.43	0.43	0.17	0.17
r2_b	0.56	0.21	0.58	0.27
r2_o	0.56	0.18	0.56	0.25
sigma_u	1.43	1.61	1.48	1.58
sigma_e	0.17	0.17	0.39	0.39
rho	0.99	0.99	0.94	0.94

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.7 Random effects and fixed effects linear panel regression, Research 1 institutions (1976 Carnegie Classification)

	(1)	(2)	(3)	(4)
	RE (1978-1999)	FE (1978-1999)	RE(1978-2009)	RE(1978-2009)
	b/(se)	b/(se)	b/(se)	b/(se)
L3 Undergrad FTE (000)	0.005	0.003	0.010	0.009
	(0.006)	(0.006)	(0.005)	(0.006)
L3 UG FTE Fresh (000)	0.011	0.010	0.004	0.004
	(0.018)	(0.018)	(0.019)	(0.019)
L3 Endow+PrivGrant	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 State Grants	0.001**	0.001**	0.001*	0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Auxiliary Revenues	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Federal Revenues	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
L3 Local Revenues	0.000	0.000	0.000	0.000
	(0.001)	(0.001)	(0.000)	(0.000)
Time (Years)	0.009***	0.010***	0.011***	0.011***
	(0.003)	(0.003)	(0.002)	(0.002)
Rural	-0.342	.	-0.451	.
	(0.247)	.	(0.239)	.
Metro Area<250,000	-0.287	.	-0.331	.
	(0.296)	.	(0.274)	.
Metro Area<500,000	-0.322	.	-0.418	.
	(0.354)	.	(0.338)	.
Metro Area<1,000,000	-0.348	.	-0.364	.
	(0.255)	.	(0.242)	.
Metro Area<2,000,000	-0.147	.	-0.143	.
	(0.397)	.	(0.378)	.
N_clust	49	49	49	49
N	1,070	1,070	1,559	1,559
g_max	22	22	32	32
g_avg	21.84	21.84	31.82	31.82

r2_w	0.36	0.36	0.55	0.55
r2_b	0.37	0.29	0.42	0.26
r2_o	0.37	0.23	0.43	0.26
sigma_u	0.54	0.65	0.57	0.63
sigma_e	0.12	0.12	0.14	0.14
rho	0.95	0.97	0.94	0.95

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: region, year founded

Appendix Table 3.8 Adoption of first master's degree, random effects logit panel model

	Priv Univ. (1978-1999) b/se	Liberal Arts (1978-1999) b/se	Public (1978-1999) b/se
L3 Undergrad FTE (000)	0.777	1.471***	0.829
	(0.721)	(0.403)	(0.713)
L3 UG FTE Fresh (000)	-0.473	-5.570***	-0.571
	(1.495)	(1.483)	(1.492)
L3. State Grants/TotFTE ($000)	-0.753	-0.005	-0.868
	(0.632)	(0.125)	(0.675)
L3. State Approp/TotFTE ($000)			-1.075
			(1.368)
L3. Aux Rev/TotFTE ($000)	-0.231	-0.133*	-0.223
	(0.217)	(0.055)	(0.212)
L3. Fed Rev/TotFTE ($000)	-0.461	-0.195**	-0.460
	(0.298)	(0.067)	(0.292)
L3. Endow+PrivGrant/TotFTE ($000)	-0.125	-0.101**	-0.148
	(0.185)	(0.038)	(0.190)
Religious Institution	-0.168	0.382*	
	(0.849)	(0.182)	
Time (Years)	0.188	0.030	0.183
	(0.127)	(0.025)	(0.118)
Number of Institutions	64	397	64
N	888	6,042	888
Max Number of Time Periods	22	22	22
Avg Number of Time Periods	13.88	15.22	13.88
chi2	6.34	45.93	6.87
Log likelihood	-148.97	-784.90	-148.63
sigma_u	2.08	0.30	2.08
Rho	0.57	0.03	0.57

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.9 Adoption of MA in business (2-digit CIP), random effects logit panel model

	Private University		Liberal Arts		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.528	0.610	0.993***	0.860**	0.095	0.113
	(0.459)	(0.323)	(0.251)	(0.276)	(0.116)	(0.147)
L3 UG FTE Fresh (000)	-1.137	-2.054	-4.361***	-3.817**	0.250	0.480
	(1.418)	(1.208)	(1.176)	(1.294)	(0.560)	(0.736)
L3. State Grants/TotFTE ($000)	0.059	0.034	0.067	0.049	0.449	0.429
	(0.256)	(0.176)	(0.102)	(0.113)	(0.266)	(0.414)
L3. State Approp/TotFTE ($000)					-0.025	-0.005
					(0.042)	(0.057)
L3. Aux Rev/TotFTE ($000)	-0.223	-0.019	-0.026	-0.099	-0.147	-0.054
	(0.182)	(0.108)	(0.054)	(0.064)	(0.118)	(0.135)
L3. Fed Rev/TotFTE ($000)	-0.130	-0.036	0.025	-0.125	-0.074	-0.081
	(0.150)	(0.093)	(0.021)	(0.077)	(0.083)	(0.114)
L3. Endow+PrivGrant/TotFTE ($000)	-0.080	-0.036	-0.141**	-0.115*	0.241	0.267
	(0.132)	(0.083)	(0.045)	(0.048)	(0.322)	(0.343)
L4 Employment Mgt Occ (10,000) State level		0.001		-0.005		-0.014
		(0.010)		(0.005)		(0.009)
L4 Weekly Earn Mgt Occ ($100) State level		-0.004		0.238*		-0.007
		(0.199)		(0.101)		(0.144)
Religious Institution	-1.466	-0.365	0.348	0.480*		
	(0.806)	(0.390)	(0.193)	(0.219)		
Time (Years)	0.170**	0.031	0.059***	0.083***	0.008	0.016
	(0.065)	(0.038)	(0.015)	(0.022)	(0.021)	(0.034)
Ever Grant BA in Bus	2.472	0.958	2.070**	2.366*	0.384	0.191
	(1.571)	(1.144)	(0.724)	(1.019)	(0.485)	(0.680)
Number of Institutions	135	111	521	478	159	133
N	2,118	1,484	9,541	7,009	2,532	1,776
Max Number of Time Periods	22	17	22	17	22	17
Avg Number of Time Periods	15.69	13.37	18.31	14.66	15.92	13.35
chi2	14.82	17.24	106.53	94.88	40.27	33.12
Log likelihood	-270.59	-175.33	-716.36	-565.05	-331.23	-226.02
sigma_u	2.96	0.01	0.01	0.01	0.00	0.01
Rho	0.73	0.00	0.00	0.00	0.00	0.00

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.10 Adoption of MA in education (2-digit CIP), random effects logit panel model

	Private University		Liberal Arts		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.094	0.507	0.933**	0.810***	0.258	0.148
	(0.232)	(0.321)	(0.305)	(0.238)	(0.293)	(0.461)
L3 UG FTE Fresh (000)	-0.409	-2.080	-4.314***	-3.731***	-0.312	1.122
	(0.998)	(1.596)	(1.282)	(1.076)	(1.232)	(1.831)
L3. State Grants/TotFTE ($000)	-0.648	-0.402	-0.047	-0.068	0.421	0.273
	(0.375)	(0.381)	(0.127)	(0.122)	(0.411)	(0.655)
L3. State Approp/TotFTE ($000)					0.056	-0.001
					(0.071)	(0.117)
L3. Aux Rev/TotFTE ($000)	-0.152	-0.116	-0.058	-0.110*	-0.111	-0.023
	(0.108)	(0.125)	(0.055)	(0.053)	(0.178)	(0.289)
L3. Fed Rev/TotFTE ($000)	-0.289	-0.457	-0.250**	-0.181*	0.129	0.428*
	(0.171)	(0.260)	(0.088)	(0.078)	(0.100)	(0.190)
L3. Endow+PrivGrant/TotFTE ($000)	-0.008	0.081	-0.133**	-0.087*	-0.273	-1.379
	(0.086)	(0.101)	(0.043)	(0.037)	(0.422)	(0.796)
L4 Employment Edu Occ (10,000) State level		-0.038		-0.008		0.049
		(0.021)		(0.009)		(0.064)
L4 Weekly Earn Edu Occ ($100) State level		0.262		0.265*		0.175
		(0.271)		(0.118)		(0.328)
Religious Institution	0.385	0.143	0.221	0.229		
	(0.348)	(0.429)	(0.212)	(0.195)		
Time (Years)	0.091**	0.155**	0.100**	0.040*	0.076*	0.247*
	(0.029)	(0.053)	(0.031)	(0.020)	(0.036)	(0.122)
Ever Grant BA in Edu	-0.105	0.016	1.396**	1.173**	0.924	0.789
	(0.510)	(0.706)	(0.470)	(0.408)	(0.874)	(1.209)
Number of Institutions	99	82	454	422	67	59
N	1,614	1,143	7,951	5,743	1,177	853
Max Number of Time Periods	22	17	22	17	22	17
Avg Number of Time Periods	16.30	13.94	17.51	13.61	17.57	14.46
chi2	25.81	31.05	35.39	86.99	23.79	10.20
Log likelihood	-195.22	-124.91	-729.27	-627.99	-133.89	-90.48
sigma_u	0.01	0.01	0.76	0.01	0.01	1.24
Rho	0.00	0.00	0.15	0.00	0.00	0.32

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: urbanization

Appendix Table 3.11 Adoption of MA in teaching (4-digit CIP), random effects logit panel model

	Private University		Liberal Arts	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.151	-0.002	0.690	0.616*
	(0.192)	(0.298)	(0.353)	(0.254)
L3 UG FTE Fresh (000)	0.614	1.502	-3.934**	-3.809**
	(0.732)	(1.034)	(1.520)	(1.260)
L3. State Grants/TotFTE ($000)	0.010	0.097	-0.251	-0.219
	(0.293)	(0.285)	(0.183)	(0.177)
L3. Aux Rev/TotFTE ($000)	-0.182	-0.072	0.015	-0.003
	(0.114)	(0.144)	(0.060)	(0.061)
L3. Fed Rev/TotFTE ($000)	-0.156	-0.475	-0.004	0.002
	(0.118)	(0.307)	(0.029)	(0.025)
L3. Endow+PrivGrant/TotFTE ($000)	0.071	-0.062	-0.100*	-0.084
	(0.082)	(0.156)	(0.044)	(0.043)
L4 Employment Teach Occ (10,000) State level		-0.019		-0.014
		(0.035)		(0.017)
L4 Weekly Earn Teach Occ ($100) State level		-0.196		0.165
		(0.243)		(0.128)
Religious Institution	0.691	0.315	0.633*	0.475
	(0.396)	(0.512)	(0.312)	(0.243)
Time (Years)	0.050	0.163**	0.066*	-0.009
	(0.029)	(0.058)	(0.033)	(0.027)
Ever Grant BA in Teaching	0.844	0.307	0.417	0.349
	(0.532)	(0.570)	(0.380)	(0.364)
Number of Institutions	117	99	467	442
N	2,010	1,444	8,677	6,383
Max Number of Time Periods	22	17	22	17
Avg Number of Time Periods	17.18	14.59	18.58	14.44
chi2	29.06	25.21	21.30	35.32
Log likelihood	-180.32	-111.56	-542.08	-479.89
sigma_u	0.01	0.00	0.75	0.01
Rho	0.00	0.00	0.15	0.00

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.12 Adoption of MA in education administration (4-digit CIP), random effects logit panel model

	Private University		Liberal Arts		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.022	0.166	1.124**	0.997**	-0.080	-0.138
	(0.233)	(0.326)	(0.373)	(0.384)	(0.108)	(0.285)
L3 UG FTE Fresh (000)	0.555	-0.550	-5.248**	-5.125**	0.813	1.433
	(0.964)	(1.497)	(1.675)	(1.821)	(0.558)	(1.469)
L3. State Grants/TotFTE ($000)	-0.166	0.111	-0.528*	-0.358	0.276	0.343
	(0.263)	(0.281)	(0.250)	(0.254)	(0.267)	(0.446)
L3. State Approp/TotFTE ($000)					0.042	0.191*
					(0.040)	(0.095)
L3. Aux Rev/TotFTE ($000)	0.015	-0.034	0.133*	0.113	-0.251	-0.266
	(0.100)	(0.129)	(0.057)	(0.079)	(0.223)	(0.431)
L3. Fed Rev/TotFTE ($000)	-0.091	-0.335	0.028	0.043*	0.117	0.116
	(0.073)	(0.190)	(0.019)	(0.020)	(0.099)	(0.271)
L3. Endow+PrivGrant/TotFTE ($000)	0.001	0.042	-0.252***	-0.258**	-1.147	-1.859
	(0.057)	(0.074)	(0.070)	(0.079)	(0.651)	(1.204)
L4 Employ EdAdm Occ (10,000) Regional level (9 regions)		-0.042		-0.136**		-0.034
		(0.075)		(0.052)		(0.159)
L4 Weekly Earn EdAdm Occ ($100) Regional level (9 regions)		-0.273		-0.028		-0.960*
		(0.236)		(0.159)		(0.434)
Religious Institution	-0.011	-0.348	0.551	0.674*		
	(0.320)	(0.431)	(0.291)	(0.316)		
Time (Years)	0.039	0.127**	0.070**	0.071*	-0.038	0.131
	(0.027)	(0.045)	(0.023)	(0.031)	(0.033)	(0.088)
Ever Grant BA in Edadm	-0.480	-0.098	-23.626	-23.815	-22.527	-28.578
	(0.760)	(0.782)	(59033)	(94739)	(76020)	(70810)
Number of Institutions	174	153	524	504	167	156
N	3,203	2,335	10,370	7,786	3,222	2,405
Max Number of Time Periods	22	17	22	17	22	17
Avg Number of Time Periods	18.41	15.26	19.79	15.45	19.29	15.42
chi2	16.20	19.47	60.23	58.47	19.58	18.75
Log likelihood	-225.85	-142.91	-351.90	-303.42	-158.21	-101.34
sigma_u	0.01	0.01	0.01	0.01	0.03	4.69
Rho	0.00	0.00	0.00	0.00	0.00	0.87

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.13 Adoption of MA in health (2-digit CIP), random effects logit panel model

	Private University		Liberal Arts		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.134	-0.084	1.461***	1.493**	0.193*	0.107
	(0.260)	(0.531)	(0.428)	(0.466)	(0.082)	(0.097)
L3 UG FTE Fresh (000)	-0.101	1.405	-5.365**	-5.900**	0.089	0.369
	(0.859)	(1.923)	(1.658)	(1.849)	(0.373)	(0.451)
L3. State Grants/TotFTE ($000)	0.055	0.036	-0.271	-0.197	-0.205	-0.260
	(0.192)	(0.292)	(0.195)	(0.194)	(0.291)	(0.338)
L3. State Approp/TotFTE ($000)					0.082**	0.080*
					(0.030)	(0.035)
L3. Aux Rev/TotFTE ($000)	-0.450**	-0.461*	-0.067	-0.110	-0.120	-0.174
	(0.170)	(0.214)	(0.076)	(0.081)	(0.103)	(0.113)
L3. Fed Rev/TotFTE ($000)	-0.016	0.016	0.032	0.025	-0.047	-0.059
	(0.069)	(0.060)	(0.079)	(0.087)	(0.058)	(0.067)
L3. Endow+PrivGrant/TotFTE ($000)	-0.001	0.011	-0.241**	-0.237**	0.075	0.178
	(0.091)	(0.103)	(0.076)	(0.081)	(0.298)	(0.306)
L4 Employ Health Occ (10,0000)		-0.042		-0.011		0.005
State level		(0.030)		(0.013)		(0.012)
L4 Weekly Earn Health Occ ($100)		1.052**		0.201		0.440*
State level		(0.401)		(0.182)		(0.180)
Religious Institution	-0.146	-0.029	0.036	0.110		
	(0.542)	(0.827)	(0.264)	(0.275)		
Time (Years)	0.127*	0.154	0.079**	0.017	0.027	-0.025
	(0.057)	(0.087)	(0.028)	(0.044)	(0.019)	(0.034)
Ever Grant BA in Health	1.234	1.689	1.819***	1.929**	2.218***	2.094***
	(0.772)	(1.244)	(0.509)	(0.589)	(0.560)	(0.605)
Number of Institutions	202	163	536	512	241	210
N	3,365	2,364	10,317	7,675	4,051	2,898
Max Number of Time Periods	22	17	22	17	22	17
Avg Number of Time Periods	16.66	14.50	19.25	14.99	16.81	13.80
chi2	17.45	32.78	49.22	41.82	61.52	50.98
Log likelihood	-298.07	-184.33	-435.02	-393.97	-428.26	-329.64
sigma_u	2.40	3.72	0.62	0.58	0.00	0.00
Rho	0.64	0.81	0.10	0.09	0.00	0.00

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: urbanization

Appendix Table 3.14 Adoption of MA in nursing (4-digit CIP), random effects logit panel model

	Private University		Public	
	No Emp	Emp Vars	No Emp	Emp Vars
	1978-1999	1983-1999	1978-1999	1983-1999
	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.216	0.203	0.100	0.081
	(0.159)	(0.189)	(0.057)	(0.065)
L3 UG FTE Fresh (000)	-0.585	-0.387	-0.338	-0.288
	(0.624)	(0.751)	(0.286)	(0.325)
L3. State Grants/TotFTE ($000)	-0.107	-0.093	0.066	0.323*
	(0.120)	(0.142)	(0.080)	(0.135)
L3. State Approp/TotFTE ($000)			0.011	0.004
			(0.033)	(0.040)
L3. Aux Rev/TotFTE ($000)	-0.211*	-0.316*	-0.107	-0.066
	(0.104)	(0.141)	(0.109)	(0.115)
L3. Fed Rev/TotFTE ($000)	0.049	0.037	-0.068	-0.145
	(0.035)	(0.052)	(0.088)	(0.113)
L3. Endow+PrivGrant/TotFTE ($000)	-0.065	-0.036	0.400	0.330
	(0.069)	(0.086)	(0.228)	(0.280)
L4 Employment Nurse Occ (10,000) State level		-0.040		0.039
		(0.038)		(0.031)
L4 Weekly Earn Nurse Occ ($100) State level		0.377		0.096
		(0.200)		(0.146)
Religious Institution	0.027	0.155		
	(0.320)	(0.398)		
Time (Years)	0.072	0.025	0.029	-0.013
	(0.037)	(0.063)	(0.018)	(0.036)
Ever Grant BA in Nursing	2.610***	3.025***	3.346***	3.147***
	(0.525)	(0.718)	(0.526)	(0.528)
Number of Institutions	262	241	355	335
N	4,899	3,555	6,688	4,942
Max Number of Time Periods	22	17	22	17
Avg Number of Time Periods	18.70	14.75	18.84	14.75
chi2	33.73	27.74	63.05	60.52
Log likelihood	-279.20	-227.51	-457.44	-387.47
sigma_u	0.59	0.87	0.00	0.01
Rho	0.10	0.19	0.00	0.00

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.15 Adoption of MA in computer science (2-digit CIP), random effects logit panel model

	Private University	Liberal Arts		Public	
		No Emp	Emp Vars	No Emp	Emp Vars
	No Emp	1978-	1983-	1978-	1983-
	1978-1999	1999	1999	1999	1999
	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.433**	1.633**	1.650*	0.202*	0.561**
	(0.150)	(0.599)	(0.693)	(0.079)	(0.181)
L3 UG FTE Fresh (000)	-0.884	-4.592	-4.948	-0.210	-1.232
	(0.558)	(2.490)	(2.919)	(0.291)	(0.711)
L3. State Grants/TotFTE ($000)	0.180*	-1.226	-0.944	-0.156	-0.127
	(0.078)	(0.719)	(0.744)	(0.319)	(0.478)
L3. State Approp/TotFTE ($000)				0.023	0.006
				(0.034)	(0.061)
L3. Aux Rev/TotFTE ($000)	-0.078	0.082	0.062	0.031	-0.056
	(0.084)	(0.132)	(0.152)	(0.107)	(0.193)
L3. Fed Rev/TotFTE ($000)	-0.075	-0.107	-0.162	0.117	0.359*
	(0.044)	(0.192)	(0.275)	(0.089)	(0.155)
L3. Endow+PrivGrant/TotFTE ($000)	0.086*	-0.351*	-0.257	0.599*	0.705
	(0.044)	(0.154)	(0.145)	(0.237)	(0.380)
L4 Employment CompSci (10,000) Regional level (9 regions)			-0.020		-0.011
			(0.037)		(0.025)
L4 Weekly Earn CompSci ($100) Regional level (9 regions)			0.900*		0.055
			(0.451)		(0.309)
Religious Institution	-0.189	-0.836	-0.580		
	(0.269)	(0.570)	(0.625)		
Time (Years)	-0.063**	-0.057	-0.154	-0.030	0.040
	(0.024)	(0.051)	(0.083)	(0.027)	(0.061)
Ever Grant BA in CompSci	1.546**	2.192***	2.032**	1.642***	1.979*
	(0.495)	(0.660)	(0.730)	(0.430)	(0.950)
Number of Institutions	244	544	526	318	278
N	4,497	11,070	8,381	5,565	4,031
Max Number of Time Periods	22	22	17	22	17
Avg Number of Time Periods	18.43	20.35	15.93	17.50	14.50
chi2	61.48	26.26	26.50	56.79	29.99
Log likelihood	-293.74	-130.57	-108.90	-491.25	-330.23
sigma_u	0.00	1.31	1.11	1.01	2.26
Rho	0.00	0.34	0.27	0.24	0.61

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: urbanization

Appendix Table 3.16 Adoption of MA in engineering (2-digit CIP), random effects logit panel model

	Private University		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.218	0.274	0.181*	0.218*
	(0.292)	(0.383)	(0.083)	(0.094)
L3 UG FTE Fresh (000)	-0.228	-0.635	0.045	0.021
	(1.233)	(1.699)	(0.396)	(0.459)
L3. State Grants/TotFTE ($000)	-0.470	-0.411	0.024	0.033
	(0.476)	(0.526)	(0.323)	(0.353)
L3. State Approp/TotFTE ($000)			0.048	0.037
			(0.037)	(0.043)
L3. Aux Rev/TotFTE ($000)	0.066	0.121	-0.148	-0.270
	(0.108)	(0.125)	(0.132)	(0.165)
L3. Fed Rev/TotFTE ($000)	0.055	0.044	0.228*	0.354***
	(0.119)	(0.131)	(0.091)	(0.100)
L3. Endow+PrivGrant/TotFTE ($000)				
Regional level (9 regions)	-0.017	0.000	0.535	0.835*
	(0.112)	(0.124)	(0.306)	(0.328)
L4 Employment Engr Occ (10,000)				
Regional level (9 regions)		-0.033		-0.014
		(0.025)		(0.016)
L4 Weekly Earn Engr Occ ($100)		0.679		0.310
		(0.482)		(0.291)
Religious Institution	-0.235	-0.183		
	(0.478)	(0.573)		
Time (Years)	0.016	-0.043	-0.009	-0.053
	(0.038)	(0.065)	(0.024)	(0.035)
Ever Grant BA in Engr	1.556**	1.580*	1.963***	1.928***
	(0.531)	(0.676)	(0.400)	(0.468)
Number of Institutions	225	213	268	255
N	4,572	3,381	5,268	3,931
Max Number of Time Periods	22	17	22	17
Avg Number of Time Periods	20.32	15.87	19.66	15.42
chi2	15.75	12.59	64.62	68.29
Log likelihood	-119.46	-93.34	-258.36	-201.53
sigma_u	0.01	0.65	0.00	0.00
Rho	0.00	0.11	0.00	0.00

* p<0.05, ** p<0.01, *** p<0.001
Variables omitted from regression table: urbanization

Appendix Table 3.17 Adoption of MA in psychology (2-digit CIP), random effects logit panel model

	Private University		Liberal Arts		Public	
	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999	No Emp 1978-1999	Emp Vars 1983-1999
	b/se	b/se	b/se	b/se	b/se	b/se
L3 Undergrad FTE (000)	0.130	0.189	0.540	0.683	0.668*	0.295
	(0.186)	(0.384)	(0.367)	(0.361)	(0.277)	(0.282)
L3 UG FTE Fresh (000)	0.141	0.417	-3.542*	-4.411*	-0.456	0.749
	(0.781)	(1.421)	(1.741)	(1.787)	(1.194)	(1.150)
L3. State Grants/TotFTE ($000)	-0.007	-0.242	0.187	0.198	0.359	-0.472
	(0.225)	(0.369)	(0.138)	(0.136)	(0.374)	(0.858)
L3. State Approp/TotFTE ($000)					0.198*	0.220
					(0.097)	(0.129)
L3. Aux Rev/TotFTE ($000)	-0.074	-0.167	-0.035	0.013	-0.346	0.100
	(0.084)	(0.179)	(0.090)	(0.084)	(0.269)	(0.294)
L3. Fed Rev/TotFTE ($000)	-0.076	-0.146	0.001	-0.000	-0.278	-0.268
	(0.089)	(0.128)	(0.051)	(0.063)	(0.260)	(0.266)
L3. Endow+PrivGrant/TotFTE ($000)	0.080	0.226**	-0.170*	-0.159*	0.362	-0.568
	(0.053)	(0.087)	(0.069)	(0.069)	(0.774)	(1.023)
L4 Employ Psych Occ (10,000) Regional level (9 regions)		0.119		-0.018		-0.314*
		(0.106)		(0.049)		(0.138)
L4 Weekly Earn Psych Occ ($100) Regional level (9 regions)		0.051		0.272		0.235
		(0.322)		(0.211)		(0.344)
Religious Institution	0.408	1.227	0.150	0.334		
	(0.320)	(0.774)	(0.298)	(0.305)		
Time (Years)	0.024	0.181*	0.055	0.011	0.123*	0.245*
	(0.024)	(0.077)	(0.034)	(0.031)	(0.054)	(0.120)
Ever Grant BA in Psych	0.925	1.629	0.688	1.901	3.490*	0.783
	(1.055)	(1.787)	(0.548)	(1.020)	(1.668)	(1.158)
Number of Institutions	174	152	510	488	166	149
N	3,083	2,204	10,043	7,525	3,085	2,299
Max Number of Time Periods	22	17	22	17	22	17
Avg Number of Time Periods	17.72	14.50	19.69	15.42	18.58	15.43
chi2	18.88	16.94	19.43	38.60	27.60	10.21
Log likelihood	-266.44	-175.25	-369.32	-317.35	-202.06	-128.49
sigma_u	0.01	2.68	0.69	0.09	3.82	1.92
rho	0.00	0.69	0.13	0.00	0.82	0.53

* p<0.05, ** p<0.01, *** p<0.001

Variables omitted from regression table: urbanization

Appendix Table 3.18 Adoption of MA in biology/life sciences (2-digit CIP), random effects logit panel model

	Private University 1978-1999 b/se	Liberal Arts 1978-1999 b/se	Public 1978-1999 b/se
L3 Undergrad FTE (000)	0.714***	0.052	0.207
	(0.215)	(1.094)	(0.249)
L3 UG FTE Fresh (000)	-1.984	-0.000	0.195
	(1.108)	(4.031)	(1.188)
L3. State Grants/TotFTE ($000)	0.011	-0.098	-0.127
	(0.461)	(0.496)	(0.627)
L3. State Approp/TotFTE ($000)			0.080
			(0.065)
L3. Aux Rev/TotFTE ($000)	0.044	0.047	0.010
	(0.141)	(0.052)	(0.226)
L3. Fed Rev/TotFTE ($000)	-0.024	-0.009	0.324**
	(0.137)	(0.026)	(0.122)
L3. Endow+PrivGrant/TotFTE ($000)	0.158*	-0.015	0.027
	(0.077)	(0.077)	(0.715)
Religious Institution	-0.232	-1.218	
	(0.567)	(0.700)	
Time (Years)	-0.017	0.031	-0.016
	(0.044)	(0.054)	(0.043)
Number of Institutions	164	508	126
N	3,305	10,414	2,591
Max Number of Time Periods	22	22	22
Avg Number of Time Periods	20.15	20.50	20.56
chi2	28.91	4.15	13.07
Log likelihood	-92.10	-97.58	-92.06
sigma_u	0.00	1.71	0.01
Rho	0.00	0.47	0.00

* p<0.05, ** p<0.01, *** p<0.001

Note: do not include models with employment variables due to low number of individuals employed in biology/life sciences occupations

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Chapter 4 :

Mission Drift in Liberal Arts Colleges: The Rise of the Enrollment Economy

Clark (1956) studies mission drift and the enrollment economy, using California adult education as a case. The traditional pedagogical philosophy of adult education providers was similar to that of K-12 and higher education: educators determine what knowledge is important and students exercise choice within predetermined channels.[39] However, adult education administrators were particularly sensitive to the enrollment economy – the extent to which “school income is largely set by student attendance” (Clark, 1956, p. 332) – because revenue from state and local governments was determined by enrollments. Prior to 1925, adult education generated strong enrollments by providing basic education to immigrants. Legislators valued adult education because socializing immigrants was a national imperative.

After 1925, however, enrollments declined as immigration ebbed. Administrators responded by broadening the curriculum to generate enrollments. Enrollments eventually became the primary criteria by which courses were initiated and continued. The pedagogical philosophy of educators determining what knowledge students obtain was abandoned in favor of a customer service ethic. Clark (1956, p. 336) concludes that,

> this value adaptation, where purpose is reduced to service, will be pronounced when (a) organizations attached to a precarious value (b) continue to find themselves without a dependable clientele, or more broadly, with no specific

[39] Clark (1956) distinguishes between adult education and community colleges.

> outside social forces to sustain them. Then organizational needs of survival and security are likely to propel an adaptation to a diffuse social base, and purpose will be adjusted accordingly.

Clark's (1956) analysis of California adult education is prescient of contemporary critiques of commercialization, marketization, privatization, and consumerism in higher education (e.g., Bloom, 1987; Bok, 2003; Kirp, 2003; Labaree, 1997; Newman, Couturier, & Scurry, 2004; Slaughter & Rhoades, 2004).

Empirical scholarship examining the historical origins of the contemporary higher education system tends to identify efforts to increase enrollments as the impetus for important changes in organizational behavior (Brint & Karabel, 1989; Kraatz & Zajac, 1996; Veysey, 1965). Brint and Karabel (1991) argue that community colleges originally focused on the "academic mission" of lower-level (i.e. freshman and sophomore) undergraduate coursework. However, community college enrollments related to the academic mission declined once universities realized they could increase tuition-related revenue by no longer diverting students to community colleges for lower-level coursework. In response, community colleges invented the "vocational mission" to generate the enrollments necessary for survival (Brint & Karabel, 1989). In another exemplar, Kraatz and Zajac (1996) show that liberal arts colleges adopted professional baccalaureate degrees to generate enrollments in response to market conditions that had become hostile to the traditional liberal arts curriculum.

Building on these studies, this paper shows how the contemporary higher education system emerges from previous efforts to generate enrollments amidst a changing external environment. Building on Kraatz and Zajac (1996), I study organizational change in liberal arts colleges. Specifically, I analyze why liberal arts colleges become universities and I examine the effects of becoming a university on organizational outcomes. Whereas Kraatz and Zajac (1996) find that curricula at liberal arts colleges becomes more heterogeneous, I show that many liberal arts colleges adopt an entirely new organizational form, the comprehensive university.

Published systems that categorize and rank colleges and universities typically distinguish colleges from universities on the basis of enrollment size, the scope of degree programs, and the level of degree programs (e.g., baccalaureate, doctoral). At the margin, however, the distinction between a college and a university is not clear cut and the definition of a university changes over time (Barron's, 1971, 2003; Carnegie Foundation for the Advancement of Teaching., 1973, 2005; U.S. News & World Report inc., 1996, 2003). In the analyses to follow, I define "becoming a university" as an event in which a liberal arts college deletes the word "college" from its name and adds the word "university." Therefore, the dependent variable is purely a change in organizational name. However, the name change may be caused by changes in curricula and it may have subsequent effects on curricula.

Becoming a university is an organizational change that can be studied as the adoption of an innovation (Rogers, 2003). After reviewing the literature on organizational change and mission drift in liberal arts colleges (e.g., Breneman, 1994; Kraatz & Zajac, 1996; Morphew, 2002), I derive testable hypotheses about adoption by integrating institutional theory literatures on radical change (Greenwood & Hinings, 1996), market forces (D'Aunno, Succi, & Alexander, 2000; Kraatz & Zajac, 1996), the "old-institutionalism" (Kraatz & Zajac, 2001; Selznick, 1957), and diffusion (Greve, 1995; Rao, Davis, & Ward, 2000). I test these hypotheses by applying panel methods to a panel dataset of all liberal arts colleges from 1970 to 2010.

I find that colleges become universities to engage in behaviors that increase enrollments and diversify their customer base. Colleges are also more likely to become universities when their network contacts have previously become universities. However, market position, non-tuition revenue, and organizational age are negatively related to becoming a university. The effects of becoming a university include enrollment growth, subsequent adoption of professional master's degrees, and increases in both tuition revenue and total revenue.

This study makes contributions scholarship on mission drift in higher education (Aldersley, 1995; Baker, Orr, & Young, 2007; Morphew, 2002). I make a conceptual contribution by defining mission drift as a form of "divergent change" (Greenwood & Hinings, 1996), which can be studied using concepts from institutional theory. I make an analytic contribution by using panel data and panel methods to study the causes of mission drift.

The central contribution of this study, however, is to reintroduce Clark's (1956) concept of the enrollment economy as an important impetus of organizational change in postsecondary education.[40] All colleges and universities – especially non-prestigious organizations – depend on enrollments as a primary revenue source. The enrollment economy becomes increasingly important to organizational decision-making as the proportion of total revenue derived from tuition increases over time.[41] When the enrollment economy dominates organizational decision making, the ethic that educators

[40] Although prior studies of organizational change highlight the importance of enrollments (Brint & Karabel, 1989; Kraatz & Zajac, 1996; Veysey, 1965), the enrollment economy is not their central thesis. Contemporary critiques of postsecondary education also discuss enrollments (e.g., Kirp, 2003; Newman, et al., 2004), but as part of broader marketization and commercialization trends. Other critiques focus on research commercialization (Slaughter & Rhoades, 2004), and auxiliary enterprises (Bok, 2003), but few universities generate substantial revenues from research and auxiliary enterprises provide modest revenues for most organizations (Wellman & AIR, 2009).

[41] Author's calculations.

determine curricula is replaced by a customer service ethic in which students determine curricula by voting with their feet.

Research on institutional aid to students and enrollment management (e.g., Doyle, 2010; Kraatz, Ventresca, & Deng, 2010; McPherson & Schapiro, 1999) implies that the enrollment economy concept should also include organizational efforts to attract certain kinds of students. Therefore, I suggest that the question "how does this change in organizational behavior affect enrollments from desired student populations" can generate research on a number of topics. These topics include organizational budgeting systems (Hearn, Lewis, Kallsen, Holdsworth, & Jones, 2006), institutional aid to students (Doyle, 2010), administrative reorganization (Kraatz, et al., 2010), recruitment of out-of-state students (Curs, 2010), adoption of summer programs, grade inflation, and capital construction projects.

Literature on Organizational Change in Liberal Arts Colleges

Scholars and educators have long argued that liberal arts colleges make important and unique contributions to society. Breneman (1990, p. 3) summarizes several of these contributions:

> Liberal arts colleges are distinguished by a mission of providing four-year baccalaureate education exclusively, in a setting that…rewards good teaching above all else. [They] are the source of a disproportionate number of graduates who go on to earn doctorates and to pursue academic careers. Their "privateness" means that certain values – religious and otherwise – can inform their mission in ways not possible at state institutions, while their small size makes possible a sense of community among students, faculty, and staff that can rarely be achieved in larger settings.

In the late 1970s and early 1980s, however, three changes in the external environment threatened the survival of liberal arts colleges. First, student preferences changed dramatically from the liberal arts to professional majors (Brint, Riddle, Turk-Bicakci, & Levy, 2005; Labaree, 2006; Turner & Bowen, 1990). Second, the population of "traditional" college freshman – defined as ages 18 and 19 – declined from a peak of 8.7 million in 1977 to a low of 6.9 million in 1992 (NCES, 2010, Table 15). Third, liberal arts colleges faced increased competition, due to the growing enrollment capacity of public institutions which charged lower tuition prices (Kraatz & Zajac, 1996). Given these adverse economic conditions, many commentators feared that liberal arts colleges would become extinct (e.g., Mayhew, 1979; Zammuto, 1984). These fears proved unfounded. Enrollments at most liberal arts colleges grew rather than declined and few colleges closed their doors (Breneman, 1994; Kraatz & Zajac, 1996; St. John, 1991).

However, Breneman (1990, p. 3) made the "startling discovery" that many liberal arts colleges survived only by transforming themselves into a different kind of organization:

> While I began with the belief that there were roughly 600 such institutions in this country, I have concluded that, given a reasonable definition of a liberal arts college, we have only about 200 of them left. My discovery was as simple as it was disturbing: the liberal arts college as we know it is disappearing…and another type of institution – the professional college – is taking its place.

Breneman (1990, 1994) defines a liberal arts college as an organization that awards at least 40% bachelor's degrees in liberal arts fields and does not have "significant" graduate and first-professional programs. Applying these criteria to 1985-86 HEGIS data, the population of 600 liberal arts colleges, as defined by the 1987 Carnegie Classification, diminished to 200 colleges. Curiously, Breneman's (1994) book-length analyses focus only on the 200 "remaining" liberal arts colleges, ignoring the 400 organizations that ceased to fulfill his liberal arts criteria. Furthermore, Breneman

(1994) does not analyze change over time in curricula, the primary reason for the decline in the number of liberal arts colleges.

Kraatz and Zajac (1996) analyzed curricular change in liberal arts colleges at a time when the cutting-edge in neo-institutional theory predicted that organizations in strong institutional environments would be resistant to change, even in the face of adverse economic conditions (DiMaggio & Powell, 1983; Meyer & Scott, 1983). Liberal arts colleges provided an ideal test case; these organizations had rich institutional histories and the liberal arts curriculum was the core of its organizational identity. Contrary to the predictions of institutional theory, most liberal arts colleges adopted professional bachelor's degrees from 1971 to 1986, especially non-selective tuition-dependent institutions and those lacking "distinctive" resources (e.g., reputation, student quality, endowment) (Kraatz & Zajac, 1996; Kraatz & Zajac, 2001). Kraatz (1998) shows that professional baccalaureate degrees diffused from prior to potential adopters via membership in inter-organizational consortia (e.g., The Christian College Association), especially when prior adoption increased organizational performance.

The research set-up of Kraatz and Zajac (1996) is not immune to criticism. As their story goes, liberal arts colleges exhibited homogenous, liberal arts curricula prior to the onset of adverse market conditions. As early as 1966, however, 87% of liberal arts colleges awarded at least one professional bachelor's degree, 49% of colleges awarded bachelor's degrees in business, and the colleges exhibited strong heterogeneity in the proportion of professional degrees awarded.[42]

A more nuanced criticism of Kraatz and Zajac (1996) relates to the concept of mission drift. Mission drift, usually defined in terms of curriculum, is a shift away from

[42] Author's calculations.

an organization's historic mission towards the mission of another type of college or university (Aldersley, 1995). Kraatz and Zajac (1996) argue that the population of liberal arts colleges becomes more heterogeneous with respect to curriculum, but that liberal arts colleges do not adopt an entirely different organizational form. In contrast, I argue that the curricular change observed by Kraatz and Zajac (1996) represents the early stages of mission drift, in which many liberal arts colleges become comprehensive universities.

Existing scholarship identifies two causes of mission drift. First, drawing on the mechanism of mimetic isomorphism (DiMaggio & Powell, 1983), organizations pursue legitimacy and prestige by mimicking the curricular offerings of prestigious universities (Aldersley, 1995; Morphew, 2002; Toma, 2009). Second, drawing on resource dependence theory (Pfeffer & Salancik, 1978), organizations expand curricula to grow revenues and diversify clientele (Baker, et al., 2007; Morphew, 2002). Empirical contributions document patterns of mission drift but do not identify causes. One problem is methodological; the quantitative studies have two data points – before and after – and use cross-sectional methodologies (Aldersley, 1995; Baker, et al., 2007; Morphew, 2002), so it is impossible to show how changes in independent variables affect the dependent variable. Another problem is conceptual; neo-institutional explanations are not mutually exclusive from resource dependence explanations because revenue and prestige reinforce one another (Winston, 1999).

To summarize the literature review, liberal arts colleges make important and unique contributions to society (Breneman, 1994). Breneman notes that most liberal arts colleges have transformed into "small professional colleges," but does not analyze the curricular changes at the heart of this transformation. Kraatz and Zajac (1996) analyze curricular change, but argue that liberal arts colleges are becoming more heterogeneous, as opposed to becoming a different kind of organization. Contributions to the mission drift literature do not analyze the causes of organizational change. Further, pitting two theoretical traditions – resource dependence and institutional theory – is unlikely to result in novel insights about mission drift.

I analyze mission drift in liberal arts colleges by integrating several literatures within a single theoretical tradition, neo-institutional theory. I argue that liberal arts colleges and comprehensive universities have distinct "organizational templates" (Greenwood & Hinings, 1996) and mission drift occurs when an organization adopts a different organizational template. I argue that liberal arts colleges signal a change to the comprehensive university template by changing their name to include the word "university." In the next section I develop this theoretical framework and present testable hypotheses.

Theory and Hypotheses

Organizational Templates

Although recent contributions to neo-institutional theory focus on organizational change, earlier contributions explain isomorphism, the process by which organizations within a field become more similar over time (DiMaggio & Powell, 1983; Meyer, 1977). Aside from technical efficiency, organizational survival depends on observing the taken-for-granted rules that define appropriate action within an organizational field. For example, whereas a university must have a president to appear legitimate, a law firm must have partners. In the nascent stages of an organizational field, organizations exhibit considerable diversity because institutionalized rules are sparse or weakly enforced. Over time, there is an increase in the number of rules that must be observed by organizations in the field. Organizational diversity decreases as individual organizations begin to behave according to these rules; the field becomes isomorphic.

Greenwood and Hinings (1996) define an "organizational template" as the set of rules that define permissible and prohibited behaviors an organization. In the "old institutionalism," organizational templates emerge from unique organizational histories (Clark, 1972; Selznick, 1949, 1957). In neo-institutional theory, organizational templates originate outside the organization, but have force over all organizations within the field. In other words, the institutional environment provides the template for organizing. Organizational templates are created, reinforced, and modified through repetitive interactions between actors in the field. For example, due to the competitive and repetitive process of admissions, the "no-loan" tuition policies adopted by Princeton and Harvard diffused through the population of elite colleges and universities (McLendon, Flores, & Park, 2010), becoming a requisite component of the organizational template.

The organizational template concept is useful for analyzing organizational change. "Convergent change" occurs within the parameters of an existing organizational template, as in the diffusion of no-loan tuition policies (Greenwood & Hinings, 1996). "Divergent change" occurs when an organization moves from one organizational template to another. Divergent change enables organizations to engage in behaviors that were discouraged in their old organizational template. Convergent change is typical during "normal" periods in an industry. Divergent change occurs during periods of heightened opportunities and threats, such as the introduction of destabilizing technologies (Schumpeter, 1942), dramatic regulatory change (Davis, Diekmann, & Tinsley, 1994), or adverse market conditions (Kraatz & Zajac, 1996).

The organizational template concept can be applied to the study of liberal arts colleges. The liberal arts college template, as described by Breneman (1990), states that liberal arts colleges should observe the following rules: award bachelor's degrees in liberal arts majors; do not award graduate degrees; enroll-full time, residential students between 18 to 24 years old; and keep enrollments below 1,800 students.

I argue that adverse market conditions – changing student preferences, declining college-age population, and the growing public sector – rendered the liberal arts college template unsuitable to the basic goal of organizational survival. Liberal arts colleges are highly tuition dependent, but in the 1970s and 1980s, many colleges faced declining enrollments due to these adverse market conditions. The liberal arts college template prohibited many solutions that would increase enrollments. Faced with an organizational template incongruent with market conditions, I argue that many liberal arts colleges adopted the comprehensive template. The comprehensive university template encourages enrollment growth, encourages the adoption of professional undergraduate and graduate degree programs, and encourages organizations to enroll part-time students, older-students, and commuter students.

Organizational Name Changes and Legitimacy

I argue that changing the organizational name to include the word "university" is a signal that the liberal arts college template has been abandoned in favor of the comprehensive university template. Glynn and Abzug (2002) define "symbolic isomorphism" as the resemblance of an organization's symbolic attributes to those of other organizations within its institutional field. Symbolic isomorphism increases organizational legitimacy. An organizational name is one attribute of symbolic isomorphism. A credible name signals conformity to the institutional field the organization seeks to identify with, resulting in increased legitimacy vis-à-vis peer organizations and potential customers (Glynn & Abzug, 2002).

Drawing on Greenwood and Hinings (1996), Glynn and Marquis (2007) argue that name changes are likely when organizations change templates as the result of dramatic changes in the external environment. During periods of opportunity and threat, such as the dot-com boom and bust (Glynn & Marquis, 2004), organizations change names to signal the transition from a template no longer fit with the environment to a template more compatible with the environment. Further, Glynn and Marquis (2007, p. 4) argue that name changes are "typically part of a deeper set of organizational changes, involving shifts in strategy, structure, and leadership."

Given the literature on ceremonial policy adoption (Weber, Davis, & Lounsbury, 2009; Westphal & Zajac, 1994, 1998), are name changes substantive or ceremonial changes? Although name changes signal "ceremonial conformity" (Meyer & Rowan, 1977) to an organizational template, they may have real effects. By changing names, organizations decrease "identity ambiguities" (Glynn & Marquis, 2007) vis-à-vis internal stakeholders, who are given a clearer sense of organizational direction, and potential customers, who see the organization participating in new market segments.

Morphew (2002) suggests that colleges become universities to send signals to customers in new market segments:

> As the president of a former college put it, "When you say 'college,' a lot of people attribute that [term] to a relatively small, limited type of institution. . . . For

> better or worse, the university designation conjures up in people's minds a much more extensive academic program."….The chair of faculty senate at Quinnipiac University, Hamden, Connecticut, which changed its name from "Quinnipiac College" in June 2000 [said]: "Quinnipiac had very solid academic programs, especially in business and health, but it was not marketed well. We were not too well-known outside of Connecticut. . . . By changing the name to Quinnipiac University, we're telling the world we no longer are a little tiny college." (Morphew, 2002, p. 210)

Another rationale for becoming a university is to signal the future strategic direction of the organization to internal stakeholders. Many enrollment generating activities – e.g., graduate programs, plans for enrollment expansion, and larger student to faculty ratios – are perceived as illegitimate to internal stakeholders when the organization is identified with the liberal arts college template. Changing the organizational name to include the word "university" signals to internal stakeholders that a new set of organizational behaviors are permissible or can increase in scale.

Market Factors Causing Divergent Change

The empirical literature finds that divergent change is precipitated by market factors (Davis, 2005). Changes in customer preferences, regulation, and technology may result in a market that can no longer support the existing number of organizations (D'Aunno, et al., 2000; Schumpeter, 1942). Faced with threats to survival, organizations may change templates.

The probability that an organization changes templates in response to adverse market conditions depends on the organization's market position. Even as market conditions worsen, organizations holding favorable positions relative to their competitors can perform sufficiently well without engaging in divergent change (D'Aunno, et al., 2000; Greve, 1996). Kraatz and Zajac (2001) argue that organizations with substantial stock of distinctive, valuable resources (e.g., reputation, endowment, physical capital) are partially buffered from adverse market conditions.

Organizations with unfavorable market positions are especially likely to change templates when market conditions worsen (Greve, 1996; Hirsch, 1986). Organizations with weak reputation and brand identity have less to lose by engaging in divergent change (Kraatz & Zajac, 2001). Summarizing the literature on “deviant” innovation, Davis (2005, p. 488) writes, “there appears to be a common dynamic to how markets trump legitimacy… in which marginal players find an innovative but often illegitimate means of making money, which is then emulated by core players who thus bring legitimacy to the practice." For example, Hirsch (1986) shows that hostile takeovers were first adopted by “outsider” firms and were initially deemed illegitimate by large corporations.

I apply the literature on organizational change and market factors to the case of liberal arts colleges. Three factors contributed to adverse economic conditions for liberal arts colleges in the late 1970s and the 1980s: a change in student preferences away from the liberal arts and towards professional curricula (Turner & Bowen, 1990); a decline in the population of “traditional” college freshmen (NCES, 2010, Table 15); and an increase in the enrollment capacity at lower-tuition public universities (Thelin, 2004), meaning that liberal arts colleges faced more competition for fewer students. These three market changes negatively affected enrollments at liberal arts colleges (Kraatz & Zajac, 1996). Liberal arts colleges – especially non-selective colleges – are sensitive to declines in enrollments because they generate most of their revenue from tuition. Therefore, I hypothesize that liberal arts colleges are likely to change organizational templates after experiencing enrollment decline:

H1: Declines in freshman enrollments increase the probability that a college will become a university.

H1 focuses on freshman enrollments, rather than total undergraduate enrollments, for two reasons. First, freshman enrollments are a leading indicator of enrollment difficulties that administrators pay close attention to. Second, organizational name change may occur after the organization has begun the process of divergent change by adding professional degrees, recruiting part-time students, recruiting older students, etc. These changes are likely to be cause an increase in total undergraduate enrollments prior to changing organizational names.

I hypothesize that liberal arts colleges with strong organizational resources and a strong market position will be less likely to become a university despite adverse market conditions. Colleges with strong financial resources (e.g., endowment revenue, private giving) are more insulated from changes in market conditions than colleges that depend principally upon tuition revenue. Furthermore, demand for liberal arts education at prestigious liberal arts colleges remains strong amongst high-achieving, high income households, even as professional education becomes more popular nationally. Therefore, I hypothesize that:

H2: Liberal arts colleges with strong organizational resources and strong market position will be less likely to become universities.

Institutional Factors Causing Divergent Change

Organizational age. "Institutional factors" also affect the probability of divergent change. Proponents of the old institutionalism argue that strong organizational histories can buffer organizations from field-level factors (Kraatz, et al., 2010; Kraatz & Zajac, 2001; Selznick, 1949, 1957). Clark (1972) analyzes the concept of "organizational saga" through his case study of three liberal arts colleges – Reed, Swarthmore, and Antioch. An organizational saga is defined as a set of publicly expressed beliefs about an organization that is (a) rooted in history, (b) claims unique accomplishment, and (c) is held with sentiment by the group. The organizational saga often includes a founding myth that is embellished over time and "includes affect that turns a formal place into a beloved institution, to which participants may be passionately devoted" (Clark, 1972, p. 178).[43] Clark (1972, p. 183) concludes that,

> An organizational saga is thus a valuable resource, created over a number of years out of the social components of the formal enterprise. As participants become ideologues, their common definition becomes a foundation for trust and for extreme loyalty. Such bonds give the organization a competitive edge in recruiting and maintaining personnel and help it to avoid the vicious circle in which some actual or anticipated erosion of organizational strength leads to the loss of some personnel, which leads to further decline and lose.

Therefore, an organizational saga is valuable, distinctive resource (Barney, 1991). Kraatz and Zajac (2001) posit a "resources as commitments" perspective. Distinctive resources are a source of prolonged competitive advantage, but require a prolonged commitment to obtain. Therefore, organizations possessing such resources will be reticent change templates in response to potentially fickle market changes. I argue that

[43] For example, William T. Foster founded Reed College based on the principles of academic excellence and nonconformity, themes that have been retained to the present day (Clark, 1972). Though from the Northeast, Foster founded Reed in the Northwest so that Reed would not be "corrupted" by established institutions.

liberal arts colleges possessing a strong organizational saga will be unlikely to change organizational templates. Becoming a university undermines an organizational saga because continuity between the contemporary organization and its founding myth is the basis of an organizational saga.

I argue that the strength of an organizational saga is positively correlated with organizational age because organizational saga is, by definition, rooted in past deeds. Furthermore, organizational age is itself an important component of organizational saga, independent of mythical deeds accumulated over time; colleges and universities market themselves based on founding dates and even question the veracity of colleges claiming to have an earlier founding date (Thelin, 2004). Building on these ideas, I hypothesize that:

H3: Older liberal arts colleges will be less likely to become universities.

Geographic Region. Culture varies by geographic region. Elazar (1972) locates inter-regional cultural variation in the historical migratory patterns of different ethnic and religious groups. Regional cultural variation, in turn, affects organizational behavior. The geographic region of corporate headquarters affects whether corporations donate to liberal or conservative political action committees (Burris, 1987). Geographic region also affects the extent to which non-profit organizations form networks with one another (Hall, 1992) and the growth rate in the number of non-profit organizations (Marquis, Davis, & Glynn, 2011).

I argue that the probability a liberal arts college becomes a university differs by geographic region. The Northeast contains a high density of liberal arts colleges, many with rich organizational histories. I argue that the concentration of Northeastern liberal arts colleges contributes to a greater appreciation amongst the local population of the distinctiveness of liberal arts colleges. Therefore, becoming a university may undermine brand identity, independent of the organization's own organizational saga. In regions with a low density of liberal arts colleges (e.g., Southwest) the population may have less appreciation for the distinctive mission of liberal colleges. Therefore, a change in organizational template is likely to have minimal effects on organizational identity.

H4: Liberal arts colleges in the Northeast will be less likely to become universities than liberal arts colleges in other regions.

Prior illegitimate acts. Analyzing the emergence of stock-option pay in German corporations, Sanders and Tuschke (2007, p. 37) argue that "experience dealing with stakeholders in the institutional environments that oppose certain practices…allows a firm to learn how to deal with these obstacles, and knowledge and experience gained from past situations give the firm adroitness when dealing with similar hotly contested situations in the present or the future." Two potential mechanisms exist for this argument. First, prior success adopting controversial behaviors increases confidence that future controversial practices can be adopted successfully. Second, the adoption of behaviors linked to a new organizational template increases the likelihood that the organization will complete the transition to the new template.

I argue that colleges are more likely to become universities if they have previously engaged in practices perceived as illegitimate with respect to the liberal arts college template. Hannan and Freeman (1984, p. 156) state that a dramatic change in university curricula is an illegitimate act because the curriculum "represents the core of the university's organizational identity." Kraatz and Zajac (1996) define adoption of professional bachelor's degrees as an illegitimate act for liberal arts colleges. I hypothesize that:

H5: Liberal arts colleges that have previously adopted "illegitimate" curricular practices in the past are more likely to become universities.

I define illegitimate curricular practices as prior adoption of professional bachelor's degrees and an increase in the proportion of total bachelor's degrees awarded in professional fields. However, the adoption and production of professional bachelor's degrees by liberal arts colleges was quite high even in 1966, implying that professional baccalaureate degrees may be consistent with the liberal arts template.[44] Professional master's degrees, however, are clearly inconsistent with the liberal arts college template. Therefore, prior adoption of professional liberal arts degrees is a third measure of illegitimate curricular change.

Network Factors Affecting Divergent Change

Changing the organizational name to include the word "university" can be likened to the adoption of an innovation (Rogers, 2003). Innovations diffuse from prior to potential adopters through social networks. Network ties – tangible communication links between prior and potential adopters (Mizruchi, 1994) – are often conduits for diffusion. The nature of an innovation may affect the extent to which it diffuses through network ties. Innovations that are consistent with the organizational template may diffuse rapidly throughout the organizational field (Strang & Meyer, 1993). When an innovation is inconsistent with the organizational template, network ties between organizations in a population may impede diffusion.

[44] Author's calculations.

In this section I first hypothesize network ties as a source of constraint, impeding adoption. Second, I hypothesize network ties as a source of diffusion that contributes to adoption depending on whether the relationship between network contacts is cohesive or competitive. I study the effect of two network ties – geographic proximity and time-varying membership in inter-organizational consortia (e.g., Great Lakes College Association) – on the dependent variable, becoming a university.

Network ties as a source of constraint. Early contributions to neo-institutional theory stress field-level pressures for conformity (DiMaggio & Powell, 1983). Repetitive interactions between actors in the organizational field create the set of rules that define an organizational template. Network ties are potential channels by which these repetitive interactions occur. Network ties enable network contacts to sanction or signal disapproval when a focal organization behaves contrary to the organizational template. Conversely, the focal organization is relatively free to engage in prohibited practices in the absence of network ties to other organizations in the field. Therefore, I argue that when an innovation breaks the rules of an organizational template, the presence of network ties decreases the probability of adoption.

Following Kraatz (1998), I use membership in inter-organizational consortia as a network tie linking liberal arts colleges. Individual liberal arts colleges exist within the population of liberal arts colleges and are beholden to the rules of the liberal arts template. Becoming a university represents a transition from the liberal arts template to the comprehensive university template, an action that runs contrary to the rules of the liberal arts template. I hypothesize that network contacts retaining the liberal arts college organizational template will discourage – through persuasion or sanction – focal organizations from changing organizational templates. Colleges with no network ties enjoy more autonomy in their decision to change organizational templates or not.

H6: Liberal arts colleges that are never members of an inter-organizational consortium will be more likely to become universities.

H6 implies that the network ties impede colleges from engaging in divergent change. I hypothesize colleges may dissolve network ties in order to gain sufficient autonomy to change organizational templates. In other words, membership in the network may be so constraining that the focal organization leaves the network in order to engage in divergent change.

H7: Departure from a network increases the probability that a liberal arts college will become a university.

Network ties as a source of diffusion. In most studies of adoption network ties contribute to, rather than impede, the diffusion of a practice. I develop hypotheses about the diffusion of organizational name changes via network ties, drawing primarily on Rao, Davis, and Ward (2000) and Greve (1995).

Rao, et al. (2000) study whether corporations leave NASDAQ for the NYSE, which I liken to becoming a university. Rao, et al. (2000) build their theoretical framework on social identity theory (Albert & Whetten, 1985; Tajfel & Turner, 1979). Actors construct a social identity by categorizing themselves as belonging to a certain group and by comparing their group (the in-group) to other groups (out-groups). Favorable comparisons increase social identity. A member departure from the in-group (e.g., NASDAQ) to an out-group (e.g., NYSE) is an "identity discrepant cue," negatively affecting social identity. As the number of identity-discrepant cues accumulates, actors find it difficult to maintain a positive social identity and may defect to an out-group. For example, the departure of a high-profile faculty member from a department may compel other faculty members to depart.

Rao, et al. (2000) define the defection of a network contact – based on corporate board interlocks – from NASDAQ to NYSE as an identity-discrepant cue. They hypothesize that the larger the number of ties that a focal organization has with prior defectors, the more likely it is that the focal organization will defect to the out-group. Similarly, I define becoming a university as an identity discrepant cue. I hypothesize that the probability a college becomes a university increases as the number network contacts that become universities increases.

Greve (1995) studies the diffusion of strategy abandonment in the radio industry, specifically the abandonment of the Easy Listening radio format. Abandonment may be jointly driven by forces of contagion (DiMaggio & Powell, 1983) and competition (Hannan & Freeman, 1977). The concept of contagion implies that a focal organization will mimic the decisions of a socially proximate other. Under contagion, strategy abandonment by network contacts suggests that peers have formed a negative opinion of the strategy, leading to strategy abandonment by focal organizations.

Competition also affects the diffusion of strategy abandonment. Organizations compete when they use a common, scarce resource. In the radio industry, stations compete for listeners within a geographic region. From 1984 to 1993 the number of Easy Listening listeners declined, leading to widespread strategy abandonment because the market could not support so many competitors. However, even as a market-segment declines, strategy abandonment by a direct competitor may increase the attractiveness of strategy retention for remaining organizations; "the focal organization will have more room in its niche, so abandonment by a same-strategy competitor can be seen as winning a war of attrition" (Greve, 1996, p. 451). Similarly, in their study of divergent change amongst rural hospitals, D'Aunno, et al. (2000) argue that organizations are unlikely to mimic direct competitors who engage in divergent change.

I apply ideas about contagion and competition to the case of liberal arts colleges. Becoming a university can be viewed as a defection (Rao, et al., 2000), the abandonment of strategy (Greve, 1995), or a divergent change (D'Aunno, et al., 2000). Previous adoption by network contacts affects adoption by a focal organization. I posit two network ties: (1) membership in inter-organizational consortia and (2) geographic proximity. Members of inter-organizational consortia typically meet on a regular basis to discuss issues of strategic importance (Patterson, 1979), potentially including decisions about organizational name-changes. Geographically proximate organizations compete in the same market, observe the behaviors of one another, and may meet informally to discuss strategic actions (Strang & Soule, 1998).

From a contagion – or social cohesion – perspective, focal organizations mimic the adoption decision of network contacts. From a competition perspective, geographically proximate adopters decrease the probability of adoption by a focal organization because defections by competitors leave more market space for remaining organizations.[45] I present contagion and competition hypotheses:

[45] I am assuming that liberal arts colleges and comprehensive universities are substitutes for some students, but there are some students (e.g., those desiring a small college, low student-to-faculty ratios) that will only consider attending liberal arts colleges.

H8: A liberal arts college is more likely to become a university when (a) fellow consortium members become universities and (b) geographically proximate colleges become universities.

H9: A liberal arts college is less likely to become a university when geographically proximate colleges become universities.

Note the conflict between **H8b** and **H9**. Geographically proximate prior adopters may increases the probability of adoption, lending support to contagion **(H8b)**, or may decrease the probability of adoption, lending support to competition **(H9)**.

The concept of social learning implies that actors learn from the experiences of their peers (Rogers, 2003). When a network contact improves performance as the result of adoption, focal organizations are likely to follow suit. Furthermore, network ties can facilitate the communication of "know-how," such that successful previous adopters can help potential adopters adopt successfully (Weber, et al., 2009). Kraatz (1998) finds that liberal arts colleges were more likely to mimic the curricular adoptions of their network contacts if previous adopters increased enrollments as the result of adoption. Similarly, I hypothesize that:

H10: A liberal arts college is more likely to become a university when (a) fellow consortium members improve performance after becoming a university and (b) geographically proximate colleges improve performance after becoming a university.

The Effects of Divergent Change

While the preceding hypotheses have all focused on the causes of divergent change, the final hypothesis focuses on the effects of divergent change. When liberal arts colleges began losing enrollments as the result of adverse market conditions, the liberal arts college template hindered the ability of organizations to generate enrollments necessary for organizational survival. I argue that liberal arts colleges adopt the comprehensive university template to engage in behaviors that increase organizational stability. I hypothesize that becoming a university affects organizational outcomes.

H11: Liberal arts colleges that become universities will be more likely to increase total enrollments, adopt professional bachelor's and master's degrees, and increase the percentage of part-time students.

I test **H11** by modeling the effect of becoming a university on organizational outcomes that, according to Breneman (1990), distinguish liberal arts colleges from comprehensive universities. These outcomes include: total enrollments (all levels), adoption and production of professional bachelor's degrees, adoption and production of professional master's degrees, and part-time students as a percent of all students. The comprehensive university template identifies with larger values of on these outcomes. If becoming a university does not affect organizational outcomes then becoming a university is merely a ceremonial change. If becoming a university affects organizational outcomes then analyzing why colleges become universities can contribute important knowledge about change over time in the system of higher education.

Data and Methods

Sample and Analysis Period

The initial sample includes all 704 liberal arts colleges identified by the 1970 Carnegie Classification. The 1970 Carnegie Classification, based on data from the 1970-71 Higher Education General Information Survey (HEGIS), places 2,827 organizations into the following categories: research universities; doctoral granting universities; comprehensive universities and colleges; liberal arts colleges; two-year institutions; and professional schools and other specialized institutions. Organizations are placed into categories based on enrollment size and the scope and level of degree programs. However, the attributes distinguishing comprehensive from liberal arts institutions are not clear cut.[46]

I eliminated all 28 public institutions from the analysis sample for two reasons. First, some public organizations – for example, UC Santa Cruz, UMass Boston, and the University of Michigan at Dearborn – fulfilled the liberal arts college criteria because they had been recently founded as of 1971. Second, whereas private organizations have discretion about becoming a university, the decision may be determined by state-level political factors at public institutions. Of the remaining 676 private liberal arts colleges, 52 were "left censored" from the analysis sample because their name included the word "university" in 1971. Therefore, 624 organizations are included in the 1971 analysis sample.

The analysis period depends on data availability. HEGIS and its successor the Integrated Postsecondary Education Data System (IPEDS) provide the core data. Data on degree completions and organizational name are available beginning in 1965-66 (1966). Data on enrollments, finances, and institutional characteristics are generally available

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[46] According to the Carnegie Foundation (1973, p. 2): Comprehensive Universities and Colleges 1…includes institutions that offered a liberal arts program as well as several other programs, such as engineering and business administration. Many of them offered master's degrees, but all lacked a doctoral program or had an extremely limited doctoral program….Comprehensive universities and colleges II… offered a liberal arts program and at least one professional or occupational program such as teacher training or nursing….Private institutions with fewer than 1,500 students…are not included even though they may offer a selection of programs, because they were not regarded as comprehensive with such small enrollments. Such institutions are classified as liberal arts colleges…..The distinction between a liberal arts college and a comprehensive college is not clear-cut. Some of the institutions in this group have modest occupational programs but a strong liberal arts tradition.

beginning in 1968-69 (1969). However, key variables (e.g., freshman enrollments) are unavailable until 1974. Therefore, although the dependent variable is available beginning in 1966, the analysis period is 1974 to 2009. Furthermore, because time-varying independent variables are lagged two years, the analysis period becomes 1976-2009. I discuss lags in the variables section. Finally, consortia data are intermittently available from 1971-2000. Therefore, models using consortia variables, with lagged variables, are based on an analysis period of 1976-2000.

Variables

Dependent variable. The dependent variable, becoming a university, is a time-varying, dichotomous measure indicating that the organization deleted the word "college" and added the word "university" to its name. For example, Oglethorpe College in Atlanta, GA changed its name to Oglethorpe University in 1976. The dependent variable was created by applying word search functions to the organizational name variable included in annual HEGIS and IPEDS surveys. I manually checked the dependent variable for accuracy.

Figure 4.1 shows change over time in the dependent variable from 1966 to 2010 for the population of private liberal arts colleges. In 1966 HEGIS included 625 private liberal arts colleges, but 44 were already universities, meaning that 581 organizations were at risk of becoming a university. In 1971 – the data year used to create the 1970 Carnegie Classification – a total of 676 private liberal arts colleges existed, with 624 at risk of adoption. From 1966 to 2010, 172 organizations adopted, not including the 44 that had already adopted by 1966.

Organizational death is another reason organizations leave the analysis sample. I define mergers, when one organization eats another, as death. Figure 4.1 shows death rates of liberal arts colleges from 1966 to 2010.[47] Many scholars predicted high death rates for liberal arts colleges in the 1980s (e.g., Mayhew, 1979), but extant scholarship finds that only a handful of colleges died (Breneman, 1994; Kraatz & Zajac, 1996). I find much higher death rates. From 1966 to 2010, 124 out of 676 colleges died, representing 18% of the population of 676 colleges.

I summarize the trends for adoption and death from 1966 to 2010. Of the total population of 676 private liberal arts colleges, 44 were universities in 1966, 172 colleges became universities, and 124 died. Therefore, as of 2010, 336 liberal arts colleges remain and 340 are either universities or have died.

Independent variables. Independent variables were created for each hypothesis. I assume that past experiences affect the decision to become a university in the current period. All time varying measures were lagged two years, implying that changes in independent variables influence the decision to become a university two years later. I obtained similar results for models with one and three year lags (results available upon request), implying the results are robust. Some variables (e.g., total undergraduate enrollments) are right-skewed and exhibit high levels of kurtosis, meaning that more of the variance is the result of infrequent extreme deviations, as opposed to frequent modestly sized deviations. I apply a natural log transformation to variables with high skew/kurtoses, so that inferences are not based on outliers.

H1 states that declines in freshman enrollments increase the probability of adoption. I use logged FTE freshman enrollments, lagged two years. Freshman

[47] I manually checked each instance of organizational death.

enrollments are available beginning in 1974, meaning that the lagged measure is available beginning in 1976. Note that total undergraduate enrollments are included as a control variable.

H2 states that colleges with strong organizational resources and a strong market position will be less likely to engage in radical change. I include organizational resources and market position in the same hypothesis because neither the underlying concepts nor the available measures are mutually exclusive. Non-tuition revenue as a percent of total revenue is a measure of organizational resources because colleges less reliant on tuition revenue – typically due to high endowment and private grant revenue – are buffered from market forces (Kraatz, et al., 2010; Kraatz & Zajac, 2001). Other potential measures of organizational resources include endowment revenue per student, private grant revenue per student, or total revenue per student. However, accounting changes initiated in 1997 render measures of endowment revenue, private grants revenue, and therefore total revenue incomparable before and after accounting changes. Accounting changes have a more modest effect on the percent of non-tuition revenue measure.

I use selectivity, tuition price, and in-state freshmen as a percentage of all freshmen as measures of market position. The selectivity measure, based on the 1972 iteration of Barron's Profiles of American Colleges (Barron's, 1971), is a categorical variable ranging from 1=unranked to 6=most competitive. Unfortunately, the measure of selectivity is *too* predictive. No colleges in selectivity category 5 or 6 became universities, so these categories are dropped from the model. In the future I hope to find a continuous measure of selectivity (e.g., average SAT score).

The measure of in-state freshmen was dropped from the final model. This measure is available in intermittent years. Using data imputations to fill in missing years results suspect within-panel variation. Furthermore, percent of in-state students is not a reliable measure of market position because variation is affected by the size of the state (e.g., Rhode Island vs. Texas). Model results with the in-state measure are included in Appendix Table 4.3 and Appendix Table 4.4.

H3 states the older colleges will be less likely to become universities. I calculate age as the number of years since the organization was founded, as opposed to a time-constant measure of the year the organization was founded. **H4** states that colleges in the Northeast will be less likely to adopt. I consider two measures of region. The six-category measure includes Northeast, Mid-Atlantic, South, Midwest, Southwest, and West. The four-category measure includes Northeast, Midwest, South, and West.

H5 states that colleges that have previously adopted "illegitimate" curricular practices are more likely to adopt. I use three measures of "illegitimate" curricular practices: the total number of professional bachelor's degrees adopted since 1966; the total number of professional master's degrees adopted since 1966; and the proportion of bachelor's degrees in professional majors.

HEGIS/IPEDS data classify degrees according to the Classification of Instructional Programs (CIP). The degree adoption measures are based on 2-digit CIP codes (e.g., 13=education, 52=business) as opposed to 4-digit CIP codes (e.g., 13.04=educational administration, 52.09=Hospitality Administration/Management) or 6-digit CIP codes (e.g., 13.406= higher education administration, 52.0904= Hotel/Motel Administration/Management). Therefore, the adoption measures identify when a college first begins awarding degrees in a broad curriculum area. I consulted relevant empirical literature prior to categorizing degrees as liberal arts vs. professional (e.g., Breneman, 1990; Turner & Bowen, 1990).[48]

Hypotheses 6-10 utilize consortium data. Data on inter-organizational consortia were collected in 1971, 1973, 1975, 1977, 1981, 1983, 1986, 1989, 1991, 1996, and 2000 by the Association for Consortium Leadership.[49] There were 276 unique consortia from 1971 to 2000. When a particular consortium spanned two consecutive years of data collection (e.g., 1991 and 1996), I assumed the consortium existed in intervening years. **H6** states that liberal arts colleges that are never members of inter-organizational consortia will be less likely to adopt. Of the 624 colleges in the analysis sample, 77% are members of a consortium at some point.

H7 states that departure from a network increases the probability that a college will become a university. When a college was a member of a particular consortium in consecutive years of consortium data collection (e.g., 1983, 1989, 1991), I assumed the college was a member of the consortium during intervening years. Departure from a

[48] Although I use the duality of liberal arts versus professional degrees, a more accurate duality is liberal arts versus non-liberal arts degrees. Degrees granted in the following 2-digit CIP programs are categorized as liberal arts degrees: 16=foreign languages, literatures, and linguistics; 23=English language and literature/letters; 24=liberal arts and sciences, general studies, and humanities; 26=library science; 27=mathematics and statistics; 38= philosophy and religious studies (academic); 40= physical sciences; 42=psychology; 45= social sciences; 50= visual and performing arts; 54=history. Degrees granted in the following 2-digit CIP programs are categorized as non-liberal arts degrees: 1=Agriculture, agriculture operations, and related sciences; 3=Natural resources and conservation; 4=architecture and related services; 5=Area, ethnic, cultural, and gender studies; 9=communication, journalism, and related programs; 10=communication technologies/technicians and support services; 11=computer and information sciences and support services; 12=personal and culinary services; 13=education; 14=engineering; 15=engineering technologies/technicians; 19=family and consumer sciences/human sciences; 21=technology education/industrial arts; 22=legal professions and studies; 25=library science; 30=multi/interdisciplinary studies; 31=parks, recreation, leisure and fitness studies; 39=theology and religious vocations; 41=science technologies/technicians; 43=security and protective services; 44=public administration and social service professions; 46=construction trades; 47=mechanic and repair technologies/technicians; 48=precision production; 49=transportation and materials moving; 51=health professions and related clinical sciences; and 52=business, management, marketing, and related support services.

[49] Consortium data were also collected in 2004, but I have not had time to code these data yet.

consortium is defined as a college ceasing to be a member of a consortium that still exists. For example, if Consortium A exists in 1983, 1989, 1991, and 1996, and College Y is in Consortium A in 1983 and 1989, then I define 1990 as the year of consortium departure. I test **H7** using a time-varying measure that indicates whether the college has ever previously departed from a consortium.

H8 states that colleges are more likely to adopt when (a) fellow consortium members adopt and (b) geographically proximate colleges adopt. I test **H8a** using a measure of the percent of colleges in the consortium that have previously become universities, lagged two years. Models testing **H8a** only include those organizations that have ever been in a consortium and only include the years 1971 to 2000, during which consortium data were available.[50] I test **H8b** using a measure of the percent of colleges located within 100 miles of the focal college that have previously become universities, lagged two years. I will test different definitions of geographic proximity (e.g., 50 miles, 75 miles, and 125 miles) in future iterations of the paper. **H9** uses the same measure as **H8b**, but with a different predicted direction of the coefficient.

H10 states that a focal college is more likely to become a university when (a) fellow consortium members have increased performance after becoming a university and (b) geographically proximate colleges have increased performance after becoming a university. I test **H10a** using a lagged measure of the average percent change in total enrollments, relative to the year of adoption, for previously adopting colleges in the consortium. I test **H10b** using a lagged measure of the average percent change in total

[50] Testing H8a requires the inclusion of an indicator of whether the college is in a consortium in that year.

enrollments, relative to year of adoption, for previously geographically proximate prior adopters.[51]

Control variables. I include the same set of control variables in all models: total undergraduate FTE enrollments, lagged two years; a dichotomous indicator of religious affiliation; the cumulative number of adopters up to the present year, a standard measure in diffusion studies; a measure of the time in years since 1966 and also a square of this measure; and a categorical measure of city-size. Table 4.1 shows descriptive statistics and the first year of data availability for each variable. Time constant variables (e.g., ever member of a consortium) are available beginning in 1966 even if the measure was derived from a later year of data.

It is important to note, however, that the analyses may be missing important controls. In particular, Kraatz and Zajac (Kraatz & Zajac, 1996) include a budget deficit measure and Kraatz et al. (2010) include measures of college president characteristics, the number of tenure-track faculty. I have not yet added these variables to my panel dataset. To the extent that the missing variables are correlated with both the included covariates and the dependent variable, the analyses may suffer from omitted variable bias.

Method

I test hypotheses 1-10 using random effects logit panel models. Logit panel models are equivalent to discrete-time event history models, in which the analyst knows whether an event happened during a particular interval (e.g., year), but not the exact

[51] Testing H10 requires a lagged indicator of whether previously adopting colleges exist in the network in that year.

timing of the event (DesJardins, 2003).[52] Allison (1982) shows that discrete-time hazard models can be estimated using logit panel models where all post-adoption observations are removed from the analysis sample.

Equation (1) shows a general logit panel model for the probability that institution i becomes a university in year *t*. x_{it} is a matrix of time-invariant and lagged time-varying variables; β is the associated vector of coefficients; v_i is the "individual-specific error term," which varies across units but not over time; and ϵ_{it} – not shown in Equation (1) – is the "idiosyncratic error term," which varies across units and over time.[53]

$$\Pr[y_{it} = 1|x_{it}, \beta, v_i] = \frac{\mathrm{e}^{v_i + x'_{it}\beta}}{(1+e^{v_i + x'_{it}\beta})} \quad (1)$$

$$E[\epsilon_{it}|v_i, x_{i1}, \dots, x_{it}] = 0, \;\; t = 1, \dots, T, \qquad \text{(2) (Strict exogeneity assumption)}$$

$$E[v_i|\, x_{it}, z_i] = E[v_i] = 0, \;\; t = 1, \dots, T, \qquad \text{(3) (Random effects assumption)}$$

Drawing inferences from Equation (1) depends on assumptions. Equation (2) shows the strict exogeneity assumption that the idiosyncratic error term is unrelated to the individual specific error term, v_i, and the regressors, x_{it}, in all time periods. Equation (3) shows the random effects assumption that the individual-specific effect, v_i, is uncorrelated with independent variables x_{it}. If we believe the random effects

[52] The exact equivalent to a discrete-time hazard models is a binary panel model assuming a complementary log-log distribution. In the models to follow, I assume a logistic distribution. There is no reason to prefer the complementary log-log distribution over the logistic distribution, or vice-versa.
[53] For non-linear panel models, as opposed to linear panel models, there is less motivation for introducing the error term ϵ_{it} because it is more natural to directly model the conditional density or the conditional mean. Nevertheless, inferences depend on assumptions about ϵ_{it}.

assumption then we can model v_i as part of the error term because it is not correlated with the regressors. If we do not believe the random effects assumption, then we must find some sufficient statistic, such that Equation (3) becomes true after conditioning on this sufficient statistic (Cameron & Trivedi, 2005).

The most common method of eliminating the potential correlation between v_i and x_{it} is to use a fixed-effects estimator, which eliminates v_i through a mean-differenced transformation of the data. The fixed effect transformation for logit panel models requires within-panel variation in both the dependent and independent variables. In other words, colleges that never become universities are dropped from the analyses. Fixed effects estimators are problematic because I am interested in both the causes of adoption and non-adoption. Therefore, the model results to follow are based on random effects estimators and make the random effects assumption shown in Equation (3).

Random effects estimators using continuous dependent variables allow analysts to account for heteroskedasticity and serial correlation. However, cluster robust standard errors are unavailable in random effects logit panel models. Instead, Cameron and Travedi (2005) recommend that users calculate bootstrap standard errors. A general rule of thumb states that 50-200 replications are adequate for estimates of standard errors. I perform 100 replications.

Limitations

The analyses have several limitations. First, I argue that liberal arts colleges become universities because adverse market conditions prevent colleges using the liberal arts template from generating sufficient enrollments. I posit three changes in the external environment contributing to adverse market conditions: a change in student preferences;

a decline in the college-age population; and increased competition from public institutions. At present, these adverse market conditions are factors in my conceptual argument, but do not enter actual analyses. In future iterations of this paper, I hope to include adverse market conditions in the analyses by modeling their effect on enrollments which, in turn, affects the probability of becoming a university.

From the perspective of the individual liberal arts college, changes in student preferences represent an important environmental change. This paper largely assumes that organizations change mission because of financial resource scarcity. Another reason an organization changes mission is because society no longer values what the organization produces (Clark, 1956). A change in student preferences away from liberal arts education and towards professional education implies that society no longer values the traditional mission of liberal arts colleges. From this perspective, organizational values depend simultaneously on cultural support for the mission from broader society, which in turn affects financial resources (Parsons, 1956). Therefore, future versions of this chapter may include measures of change over time in student preferences using data from the Cooperative Institutional Research Program (CIRP).

Second, models of the effect of becoming a university (**H11**) must account for non-random selection into the treatment. Colleges are not randomly selected to become universities. Rather, the treatment is a pure choice variable. Therefore, it is likely that the coefficient on becoming a university is biased by unobserved variables that are correlated with both becoming a university and organizational outcomes (e.g., total enrollments).

In many cases, multiple events happen at once. For example, a newly hired president may implement a strategic plan that calls for the expansion of graduate degree programs, aggressive marketing to older and part-time students in order to increase total enrollments, and a name-change from "college" to "university." Regression models categorize one of these events – e.g., total enrollments, adoption of professional master's degrees – as the dependent variable and another of these events – becoming a university – as an independent variable. The regression results may suggest that becoming a university positively affects the dependent variable, when in fact both the dependent and independent variables move together as part of a larger process (e.g., a strategic plan). Failure to account for multiple events happening at once may lead to upwardly biased coefficients for becoming a university on organizational outcomes.

Given problems of omitted variables and multiple events happening at once, models of the effect of becoming a university should attempt to isolate exogenous variation in becoming a university. One approach is to jointly model becoming a university and the effect of becoming a university. At present these behaviors are modeled separately. However, joint modeling is unlikely to control for all unobservable variables. Isolating exogenous variation in the treatment – for example, by finding an instrument – will be difficult because becoming a university is a pure choice variable for private institutions.

Third, a related issue is that the changes in enrollments may be due more to changes in demographics than changes in organizational behavior. Figure 4.2 shows that the U.S. population of 18-19 year olds declined dramatically from 1979-1992 and increased dramatically from 1992-2009. When the college-age population increases, institutions enjoy stronger enrollment demand. Many colleges became universities in the 1990s, a period of growth in the traditional college-age population. Therefore, in models where the dependent variable is total enrollments (or undergraduate enrollments) the coefficient on becoming a university may be correlated with increases in the population, which are not included in the model. Therefore, models of the effect of becoming a university – and models where becoming a university is the dependent variable – should include measures of demographic change.

Fourth, random effects logit panel models can incorporate a very finite number of categorical variables. The models fail to converge when there is no variation in the dependent variable for a given cell. For example, one cell could be the number of highly selective liberal arts colleges in the Southwest. Therefore, random effects logit panel models must be parsimonious. Calculating bootstrap standard errors require greater parsimony because each replication is based on a smaller sample than the analysis sample. Calculating bootstrap standard errors in models with consortium variables – which utilize a smaller sample and a shorter analysis period – require even greater parsimony.

Due to the parsimony required by random effects logit panel models with bootstrap standard errors I have excluded the following categorical variables from the final models: the six category measure of selectivity; the six-category measure of city size; and the six-category measure of geographic region (a four-category measure was used instead). Model results that include these categorical variables, but calculate conventional standard errors, are shown in Appendix Tables 3 and 4.

Fifth, random effects logit panel models are calculated using quadrature, an approximation whose accuracy depends on the number of integration points used (Cameron & Trivedi, 2005). I compared my results, using the default 12 points of quadrature, to models using 8 and 16 points of quadrature (models not shown). Coefficients in some models were somewhat sensitive to the number of integration points used. I believe that the number of integration points does not affect whether coefficients are significant. However, I must perform additional checks.

A sixth limitation concerns measurement error in consortium variables. Data on consortium membership were collected in 1971, 1973, 1975, 1977, 1981, 1983, 1986, 1989, 1991, 1996, and 2000. Departure from a consortium is defined as a college ceasing to be a member of a consortium that still exists. For example, if Consortium A exists in 1983, 1989, 1991, and 1996, and College Y is in Consortium A in 1983 and 1989, then I define 1990 as the year of consortium departure. However, departure could have occurred in 1991, 1992, 1993, 1994, or 1995. Given this measurement error, it is difficult to isolate the relationship between the timing of consortium departure and the timing of becoming a university. Therefore, models of adoption use a measure of "previous departure from a consortium" rather than the measure of departure from a consortium.[54] The previous departure measure is also problematic if, for example, departure from a consortium occurs in 1973 but the college becomes a university in 2003. In summary, coefficients on consortium measures should be viewed with some skepticism because of measurement error.

[54] I also tested the measure of departure from consortium (models not shown). The associated coefficient was not significant.

Another problem related to consortium data is that consortia are quite diverse. Some consortia – e.g., The North Carolina Association of Independent Colleges and Universities – may provide an opportunity for college presidents to discuss strategic issues. Some consortia focus on a particular issue – e.g., The Association of Colleges and Universities for International Intercultural Studies. Other consortia are merely purchasing groups – e.g., The Connecticut Colleges Purchasing Groups. Consortia led by presidents and focusing on strategic issues are likely to influence the dependent variable more than a purchasing group consortium. At present, the analyses do not differentiate between types of consortia, which may dampen the effect of consortia variables.

Results

Causes of Adoption

Table 4.2 shows the results for random effects logit panel models of adoption (becoming a university), with market, institutional, and geographic proximity variables. I calculated bootstrap standard errors using 100 replications. Appendix Table 4.1 shows results for the same models, but with conventional standard errors. Appendix Table 4.3 shows model results with conventional standard errors and additional covariates, specifically percent of in-state freshmen, a six-category measure of region (as opposed to the four-category measure included in Table 4.1), religious affiliation, and cumulative number of adopters.

Model (1) of Table 4.2 includes “market” variables and controls. As expected, gains in undergraduate FTE enrollments increase the probability of becoming a university. After controlling for total undergraduate enrollments, gains in freshman enrollments decrease the probability with becoming a university, consistent with **H1**. Higher proportions of non-tuition revenue decrease the likelihood of adoption. This result is consistent with **H2** that colleges with strong organizational resources are less likely to become universities. **H2** also states that organizations with strong market position are less likely to become universities. The associated measure of tuition price is on the cusp of significance. Another measure of market position, the percent of in-state freshman (shown in Appendix Table 4.3), is not significantly related to adoption.

Results for Barron's 1972 measure of selectivity are not shown in Table 4.2 or the appendices, but are available upon request. However, Figure 4.3 shows rates of adoption and death by selectivity. Note that only 23% of unselective/unranked colleges (selectivity=1) are currently alive as colleges; 20% adopted and 57% died. Rates of adoption are highest for less selective colleges (selectivity=2), with 39% adopting, 18% dying, and 43% remain living non-adopters. Rates of adoption are lower for competitive colleges (selectivity=3) and lower still for very competitive colleges (selectivity=4). No highly or most selective colleges (categories 5 or 6) adopt, which is why these selectivity categories are dropped from models of adoption. Although my current measure of selectivity is not well suited for regression models, it is clear that selectivity affects adoption decisions, and also the survival, of liberal arts colleges.

Institutional variables are added in model (2) of Table 4.2. The significantly negative coefficient on age supports **H3,** that colleges with longer organizational histories are less likely to adopt. The significantly positive coefficients on the region variables support **H4**, that colleges located in the Northeast will be less likely to adopt. Rates of adoption are particularly high for colleges in the South and the West.

H5 states that colleges that have previously adopted illegitimate curricular practices in the past are more likely to become universities. I use three measures of illegitimate curricular practices. First, the cumulative count of professional bachelor's degrees (e.g., education, business, engineering) ever adopted is not significantly related to probability of becoming a university. Second, the cumulative count of the number of professional master's degrees ever adopted is strongly related to the probability of becoming a university. Third, the annual proportion of professional bachelor's degrees awarded is strongly related to the probability of becoming a university. These results imply that adopting professional bachelor's degrees is consistent with shifts in the liberal arts college template, as discussed by Kraatz and Zajac (1996). However, increases in the proportion of professional bachelor's degrees awarded and the adoption of professional master's degrees are linked with the comprehensive university template.

The inclusion of curriculum variables in model (2) decreases the coefficients on market variables, relative to the model (1), which does not include curriculum variables. These results imply that variation in curricular practices accounts for a large proportion of variation in the dependent variable. Additionally, market variables, such as declines in freshman enrollments, may affect becoming a university through their effect on curricular practices, an idea that is consistent with research on the adoption of professional bachelor's degrees (Kraatz & Zajac, 1996) and master's degrees (Jaquette, 2010).

The literature implies conflicting hypotheses on the effect of geographic proximity (Burt, 1987; Coleman, Katz, & Menzel, 1966; D'Aunno, et al., 2000). Drawing from the literature on contagion and social cohesion, geographically proximate prior adopters are an observable model to mimic during periods of uncertainty; **H8b** states that prior adoption by geographically proximate colleges increases the likelihood of adoption by focal colleges. Drawing from the literature on competition, prior adoption by geographically proximate colleges increases the market share for colleges retaining their current strategy; **H9** states that prior adoption by geographically proximate colleges decreases the likelihood of adoption by focal colleges. Model (3) of Table 4.2 shows support for **H8b**, a finding that persists even after adding institutional factors in model (4).

H10b states that focal colleges are more likely to adopt when geographically proximate prior adopters increase performance after adoption. I measure performance as the average percent change in total enrollments for prior adopters, relative to the year of adoption. This coefficient is insignificant in model (5), with market factors, and in model (6), with institutional factors. To summarize, geographic proximity to a large number of prior adopters increases the likelihood of adoption, but the enrollment performance of those prior adopters does not increase the likelihood of adoption.

I test hypotheses relating to membership in inter-organizational consortia. Drawing from the perspective that network ties are mechanisms for isomorphism within an organizational field (DiMaggio & Powell, 1983), **H6** states that liberal arts colleges are more likely to adopt when they are never members of a consortium. The coefficient is on the cusp of significance in model (1) of Table 4.2, but not when institutional variables are added in model (2). I also test **H6** in Table 4.3, using a time-varying indicator of presence in a consortium. The hypothesis is not supported.

Table 4.3 shows the results for the remaining consortia hypotheses, with models 1-4 including consortium measures and models 5-8 including both consortia and geographic proximity measures. The models in Table 4.3 are run only for those colleges that were ever members of a consortium and only for 1971-2000, the years when consortia data are available. Therefore, the analysis samples in Table 4.3 are smaller than those in Table 4.2.

Membership in consortia may constrain organizational behavior to the extent that organizations dissolve network ties in order to adopt. Drawing on this idea, **H7** states that departure from a network increases the probability of adoption. This hypothesis is not supported.

Contagion hypothesis **H8a** states that prior adoption by consortia members increases the probability of adoption. This hypothesis is supported in models with market variables (model 1) and in models with market and institutional variables (model 2). **H10a** states that strong enrollment performance by previously adopting consortium members increases the likelihood of adoption. This hypothesis receives strong support in model (3), which includes market variables only, but support dissipates once institutional variables are included in model (4).

Models 5-8 of Table 4.3 include both consortium and geographic proximity measures. These models use show conventional standard errors. The smaller sample size of consortium models, coupled with the additional geographic proximity variables, led to convergence problems when attempting to calculate bootstrap standard errors. Prior adoption by consortia members (**H8a**) retains its significance in model (5), the market model, and when institutional variables are added in model (6). Geographic proximity to previous adopters is significant in the market model (5), but not in the institutional model (6). It is unclear whether the insignificance of geographically proximate prior adopters in institutional model (6) is due to the presence of consortium variables or the smaller sample size in the consortium models.

Finally, the enrollment performance of previously adopting consortium members (**H10a**) significantly increases the probability of adoption in both market model (7) and institutional model (8). Note that this coefficient was not significant in institutional model (4), which did not contain geographic proximity variables. On the whole, the results suggest support, albeit tentative, for **H10a**.

Effects of Adoption

Analyzing the determinants of becoming a university is a worthwhile exercise only if becoming a university affects important organizational outcomes (**H11**). I model the effect of becoming a university on organizational outcomes, identified by Breneman (1990), that distinguish liberal arts colleges from comprehensive universities: total FTE enrollments; graduate FTE enrollments; annual master's degrees production; undergraduate FTE enrollments; annual bachelor's degree production; the proportion of professional bachelor's degrees; the percent of part-time students; adoption of professional master's degrees; and adoption of professional bachelor's degrees. I also model gross tuition revenue and total current revenue, which are outcomes of importance to administrators.

Table 4.4 presents, for each outcome, the coefficient on two variables: (1) the organization becomes a university, where the variable equals one only in the year of adoption; and (2) previously becoming a university, where the variable equals one in the year of adoption and all subsequent years. The adoption variable isolates short-run effects whereas the previous adoption variable isolates lasting effects. I assume that becoming a university affects subsequent outcomes. I use two-year lags for both adoption variables, but found similar results for one-year and three-year lags (results available upon request).

All dependent variables, except master's degree and bachelor's degree adoption, are based on fixed effect linear panel models with cluster, robust standard errors. Coefficients for random effects models, available upon request, were virtually identical due to the large number of time periods for each panel (Cameron & Trivedi, 2005). The dependent variables in all linear panel models are logged to normalize their distributions. All models use a very strong set of covariates, including dummies for time, listed on the bottom of Table 4.4. For example, the model of total FTE enrollments includes covariates measuring prior adoption of master's and bachelor's degrees, which are variables that could be affected by becoming a university; therefore, to be significant, becoming a university must affect total FTE enrollments even after controlling for prior degree adoption.

In general, the results lend strong support to **H11**, that becoming a university leads to an increase in behaviors associated with the comprehensive university template. In column (1), both adoption and previous adoption have a significant, positive relationship with total enrollments. Becoming a university, lagged two years, is associated with a 5.4% increase in total enrollments. Previously becoming a university, lagged two years, is associated with an 11.1% increase in total enrollments. In column (2), becoming a university is associated with a 33.3% increase in graduate enrollments and previously becoming a university is associated with a 30.8% increase in graduate enrollments. In column (3), becoming a university does not significantly affect the annual production of master's degrees, but previously becoming a university is associated with a 32.0% increase in master's degree production. Both becoming a university and previously becoming a university have positive, significant effect on undergraduate enrollments and bachelor's degree production.

Breneman (1990) states that a high proportion of professional bachelor's degrees (column 6) and having a high proportion of part-time students (column 7) are characteristics linked with the comprehensive university template. However, neither becoming a university nor previously becoming a university has a significant effect on these outcomes. Table 4.2 shows that increases in the proportion of professional bachelor's degrees awarded increase the probability of becoming a university, but column (6) of Table 4.4 shows that becoming a university does not increase the proportion of professional bachelor's degrees awarded.

The adoption of professional master's degrees and bachelor's degrees was modeled using random effects Poisson panel models, with bootstrap standard errors calculated using 100 replications.[55] In column 8, becoming a university and previously becoming a university increases the adoption of professional master's degrees. Interestingly, in column 9, becoming a university has a significantly negative affect on the adoption of professional bachelor's degrees. This result implies that liberal arts colleges become universities after the scope of baccalaureate curricula broadens to mature levels.

Columns (10) and (11) present results for revenue outcomes. Liberal arts college revenues are driven by enrollments. I previously argued that liberal arts colleges become universities because adverse market conditions undermined their ability to generate

[55] Fixed effects Poisson panel models are undesirable because non-adoption is of substantive interest but the fixed effect transformation drops all panels without variation in the dependent variable.

sufficient enrollments using the liberal arts template. Therefore, I argue that the decision to become a university is principally motivated by the desire to increase tuition revenue. Column (10) shows that becoming a university is associated with a 5.0% increase in gross tuition revenue and previously becoming a university is associated with an 11.8% increase in gross tuition revenue. Similarly, column (11) shows that becoming a university is associated with a 4.9% increase in total current revenues and previously becoming a university is associated with an 11.1% increase in total current revenues. These results indicate that becoming a university is a wise decision for colleges concerned with financial stability. Note that coefficients for the effect on tuition revenue (column 10) are nearly identical to coefficients for the effect on total current revenues, implying that effect of becoming a university on total current revenues is driven by its effect on tuition revenues.[56]

Discussion and Conclusion

Summary

I argue that becoming a university symbolizes the abandonment of the liberal arts college template in favor of the comprehensive university template. Liberal arts colleges make this decision against a backdrop of market conditions unfavorable to the liberal arts college template: a shift in student preferences away from liberal arts curricula; increased competition from low-price public organizations; and a decline in the traditional college population.

[56] Note that the measure of total current revenues excludes private grant and endowment revenue due to changes in accounting standards (see notes in Table 4). However, endowment and private grant revenues are modest for liberal arts colleges that become universities.

Results from panel models of adoption show strong support for the hypotheses. Colleges are more likely to become universities following declines in freshman enrollments (**H1**), a leading indicator of enrollment problems. Colleges with a high proportion of non-tuition revenue and a strong market position (high tuition price, highly selective) can generate sufficient revenue from multiple sources in order to survive without abandoning the liberal arts template (**H2**).

Organizational age is a strong predictor of non-adoption (**H3**), implying that a historically grounded organizational saga makes colleges resistant to external pressures (Clark, 1972) and that a historically grounded mission is a valued source of competitive advantage (Kraatz & Zajac, 2001). Rates of adoption differ dramatically by region (**H4**) implying that regional culture affects the attractiveness of the liberal arts versus the comprehensive university template.

Curriculum plays a central role in the process of becoming a university (**H5**). Prior adoption of professional bachelor's degrees does not increase the probability of becoming a university, which is consistent with the finding that professional baccalaureate curricula have become part of the liberal arts template (Kraatz & Zajac, 1996). However, the proportion of professional bachelor's degrees awarded does increase the probability of becoming a university, as does prior adoption of professional master's degrees. Collectively, the findings on curricula imply that becoming a university is an evolutionary process rather than a revolutionary process (Greenwood & Hinings, 1996), where colleges transition through several stages of curriculum change before becoming a university.

Becoming a university is affected by the behavior of peer organizations. Theories of institutional constraint argue that networks provide mechanisms for peer organizations to prohibit divergent change (**H6**)(**H7**). These hypotheses are not supported. I also find no support for **H9**, that colleges do not mimic geographically proximate prior adopters because competitors avoid occupying the same market space at the same time. In support of contagion, focal organizations are more likely to become universities when they have share consortium membership (**H8a**) and geographic proximity (**H8b**) with prior adopters.

The enrollment performance of previously adopting network contacts has a mixed relationship with adoption by focal organizations. Colleges are significantly more likely to adopt when prior adopting consortium members increased total enrollments after adoption. However, enrollment growth of geographically proximate prior adopters has no effect. One potential explanation for these findings is that whereas focal organizations can ask consortium members whether adoption increased enrollments, focal organizations only observe adoption but not subsequent enrollment growth of geographically proximate colleges.

Finally, consistent with **H11**, becoming a university has important effects on organizational outcomes, resulting in higher total enrollments, higher production of master's degrees and bachelor's degrees, subsequent adoption of professional master's degrees, higher tuition revenue, and higher total revenue. In short, becoming a university creates an organizational trajectory of growth and diversification.

Discussion

Viewed holistically, the results show that liberal arts colleges change organizational templates to increase enrollments. The positive significant coefficient on total undergraduate enrollments indicates that colleges become universities after the initiation of an enrollment growth strategy. Yet the negative significant coefficient on freshman enrollments indicates that colleges are especially likely to become universities when enrollments from their traditional customer base decline. Colleges that rely heavily on tuition funding are more likely to become universities, implying that the decision is motivated by the desire to increase tuition revenue by increasing enrollments. Indeed, the models for **H11** show that two effects of becoming a university are growth in total enrollments and tuition revenue.

Scholars argue that mission drift is motivated by the desire to increase prestige (Aldersley, 1995; Toma, 2009). I find that selective colleges do not become universities. For already prestigious institutions, becoming a university will actually decrease prestige, since it involves sacrificing the distinctive resource of organizational saga (Clark, 1972; Kraatz & Zajac, 2001). For non-selective institutions, becoming a university may be motivated by the pursuit of prestige. However, I interpret the results differently. Contrary to extant scholarship (Breneman, 1994; Kraatz & Zajac, 1996), I show that the possibility of organizational death was quite real, especially for non-selective colleges. These non-selective colleges faced weak demand from their core constituency of traditional college-age students, but the liberal arts template discouraged several enrollment growth strategies.

Rather than pursue prestige, the coefficients on curriculum measures imply that colleges become universities in order to engage in behaviors that grow enrollments and diversify clientele. At an early stage of template change, colleges adopt professional bachelor's degrees to grow enrollments (Kraatz & Zajac, 1996). At a later stage of template change, growth in the proportion of professional bachelor's degrees awarded increases the probability of becoming a university. Finally, colleges are more likely to become universities after adopting professional master's degrees. The adoption of professional master's degrees enables colleges to pursue enrollment growth from non-traditional customer bases. Indeed, the models for **H11** show that becoming a university leads to higher graduate student enrollments, higher production of master's degrees, and the subsequent adoption of professional master's degrees. In summary, the results are consistent with the idea that colleges become universities to increase brand identity with new customer bases (Morphew, 2002), but the primary goal is to increase enrollments rather than pursue prestige.

Colleges that become universities are successful in growing enrollments, as shown in Figure 4.4b.[57] Breneman (1990, p. 6) states that liberal arts colleges are "becoming something else – for want of a better term, a small professional college," in that they are not large enough to be comprehensive universities. Figure 4.4b highlights Breneman's failure to predict that the "small professional college" was merely a transitional period during which liberal arts colleges were became comprehensive universities.

If growing enrollments is the motivation behind organizational change, how have liberal arts colleges changed their behavior to increase enrollments? Kraatz and Zajac

[57] Figures 4 and 5 exclude the 44 liberal arts colleges that had the word university in their name in 1966.

(1996) study the adoption of professional bachelor's degrees. Figure 4.4c shows that the proportion of professional bachelor's degrees increased from 35% in 1970 to 66% in 1987, but has gradually declined since then. Colleges that became universities award a higher proportion of professional degrees, but the proportion has declined since 1988 for these organizations too. Another growth strategy is to increase enrollments from part time students. Figure 4.4d shows that the proportion of part-time enrollments at all colleges (based on headcounts from all-degree levels), increased from 6% in 1969 to 20% in 1992 but has declined since then, even – albeit erratically – for colleges that became universities. Finally, Figure 4.5 shows (a) the median ratio of master's degrees awarded to bachelor's degrees and (b) median graduate FTE enrollments as a proportion of total FTE enrollments. Reliance on master's degrees and graduate enrollments increases dramatically for colleges that become universities, but modestly for liberal arts colleges

Taken as a whole, Figures 4 and 5 paint a picture of increased reliance on professional bachelor's degrees from 1969-1987, increased reliance on part-time students from 1969 to 1992, and increased reliance on graduate education – master's degrees in particular – in the 1990s and 2000s. Liberal arts colleges and those that became universities differ modestly with respect to the proportion of professional baccalaureate degrees and part-time enrollments. They differ dramatically with respect to graduate enrollments. Professional bachelor's degrees and part-time students became institutionalized as part of the liberal arts template, but colleges attempting to grow enrollments through graduate education leave the liberal arts template to become universities.

Conclusion: Rise of the Enrollment Economy

Clark's (1956) analysis of California adult education shows that when an organization has (a) precarious values and (b) lacks dependable resources, it will adjust its mission to one that maximizes the probability of survival. Whereas Clark (1956) studies a population with precarious values, the case of liberal arts colleges shows that resource scarcity causes value adaptation even when values are deeply held. The Catch-22 facing liberal arts colleges in the 1970s and 1980s was that low enrollments threatened organizational survival, but important enrollment growth strategies (e.g., graduate education) were prohibited by the values associated with the liberal arts template. Colleges responded by adopting an organizational template with more flexible values.

In the case of adult education, organizations rationalized the transformation from education to customer-service in terms of populist ideals; "it is `the public' and not the professional ruling by fiat, that should decide what is to be done" (Clark, 1956, p. 335). In the case of liberal arts colleges, adopting the comprehensive university template is rationalized in terms of the "access and equity" paradigm that dominates higher education research and policy.

The comprehensive university template has several advantages over the liberal arts template, especially during periods of adverse and uncertain market conditions. First, whereas the liberal arts template eschews the goal of enrollment growth, the comprehensive university template encourages enrollment growth. Second, all enrollment growth strategies (e.g., part-time students, professional degrees, graduate degrees, etc.) are acceptable under the comprehensive university template. Third, reliance on full-time traditional-college-age students and private donations leaves traditional liberal arts colleges in a state of vulnerability should one resource falter (Pfeffer & Salancik, 1978). By contrast, the comprehensive university template encourages resource diversification such the organization is not overly reliant on a single resource.

The ascendance of the comprehensive university template symbolizes the dominance of the "enrollment economy" (Clark, 1956) over historically institutionalized organizational values. Increasingly, the enrollment economy dominates all divisions and levels of the university. Kraatz (2010) argues that the adoption of enrollment management offices subvert the values of liberal arts colleges because the core processes of admissions, financial aid, and the registrar are reorganized under the service of growing enrollments from the right students. The adoption of responsibility centered management offices creates internal markets where academic units are allocated funds on the basis of enrollments in the unit (Priest, Becker, Hossler, & St. John, 2002). Within units, deans allocate tenure lines on the basis of whether the department can generate sufficient enrollment revenues to pay for the faculty member. Increasingly, enrollment management software flags professors with consistently low course enrollments.

What is lost when the enrollment economy overruns the historic organizational values of liberal arts colleges? Flag bearers of the old institutionalism state that while organizations cannot survive without resources from society, societal values require nurture from specialized organizations (Clark, 1956; Kraatz, et al., 2010; Selznick, 1957). When organizational values are replaced by a customer service ideology, organizations cease to contribute those values to society. Breneman (1990) describes the unique contributions of liberal arts colleges: a setting that rewards good teaching; the education of future scholars; the promotion of religious and moral values; and small enrollments and small class sizes, which create a sense of community amongst students, faculty, and staff. The liberal arts template assumes that educators, not students determine the curricula. In the comprehensive university template, as in the case of adult education, students determine the curricula by voting with their feet and the unique contributions of liberal arts colleges become faint.

The coming decades will likely bring continued value erosion as the enrollment economy remains ascendant. Comprehensive universities will continue to grow graduate enrollments and liberal arts colleges will continue to become comprehensive universities in order to grow graduate enrollments. Yet, there is probably a limit to the enrollments that can be generated through graduate education at private, non-selective institutions. Therefore, I expect organizations will increase efforts in distance education, the recruitment of foreign students, and the creation of satellite campuses abroad. The significant findings on network tie variables suggest that these new strategies to increase enrollments will diffuse from prior to potential adopters.

Paradoxically, the pursuit of prestige provides a check against value erosion. Prestige is largely determined by the academic characteristics of enrolled students. Prestigious colleges and universities pursue prestige by competing with one another for the best students (Winston, 1999). Prestigious institutions remain cautious about enrollment growth. Enrollment growth leads to a decline in academic profile, which causes prestige to decline, leading to a decline in student demand (Bowman & Bastedo, 2009).

A more recent phenomenon is that non-prestigious institutions increasingly use enrollment management strategies – primarily the strategic use of institutional aid – to increase their academic profile (Doyle, 2010; Kraatz, et al., 2010). Institutions desiring to raise their academic profile will be cautious about who they admit, thereby slowing enrollment growth. However, organization level prestige is typically determined by the academic profile of undergraduate students (Bastedo & Bowman, 2010; Winston, 1999). Therefore, institutions may increasingly pursue enrollment growth in graduate education and prestige in undergraduate education.

Tables

Table 4.1 Descriptive statistics[a]

	1st year	Mean	Std.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Become a university	1967	0.008	0.091	1.00													
2. Undergrad FTE (000s)	1969	1.160	0.792	0.03	1.00												
3. Freshmen FTE (000s)	1974	0.276	0.185	0.01	0.85	1.00											
4. Pct. Non-tuition revenue	1969	0.468	0.351	-0.02	-0.16	-0.09	1.00										
5. Tuition price ($000s)	1969	13.457	6.978	0.00	0.31	0.32	-0.12	1.00									
6. Pct. Freshmen in-state	1972	0.611	0.252	0.02	-0.03	-0.14	-0.11	-0.27	1.00								
7. Organization Age	1966	102	44	-0.02	0.09	0.16	0.04	0.35	-0.08	1.00							
8. Cum total adoption of professional BA degrees	1966	5.379	2.901	0.05	0.30	0.20	-0.14	0.26	0.07	0.05	1.00						
9. Cum total adoption of professional MA degrees	1966	1.182	1.890	0.07	0.31	0.13	-0.18	0.24	0.09	-0.08	0.34	1.00					
10. Pct of BA degrees in professional majors	1966	0.548	0.258	0.06	0.01	-0.13	-0.12	-0.31	0.35	-0.27	0.28	0.17	1.00				
11. Ever member of a consortium	1966	0.850	0.357	-0.01	0.08	0.11	-0.03	0.12	-0.04	0.10	0.14	-0.06	-0.01	1.00			
12. Pct of geographically proximate adopters	1966	0.112	0.169	0.04	0.17	0.11	-0.06	0.26	0.03	0.07	0.29	0.21	0.10	-0.11	1.00		
13. Enrollment perf of local adopters	1970	0.207	0.592	0.01	0.04	0.03	-0.03	0.29	-0.11	0.12	0.15	0.09	0.05	0.02	0.27	1.00	
14. Religious affiliation	1966	0.662	0.473	0.03	-0.10	-0.14	0.00	-0.27	0.21	-0.07	0.07	0.03	0.32	-0.01	0.04	-0.05	1.00

[a] Some variables not included because they would not fit on a single page without decreasing font too much.

Table 4.2 Basic adoption model with market, institutional, and geographic proximity variables, bootstrap standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
Ln Undergrad FTE enroll	1.711***	1.341***	1.724***	1.259***	1.743***	1.319***
	(0.320)	(0.325)	(0.347)	(0.276)	(0.349)	(0.334)
Ln Freshmen FTE enroll (H1)	-0.729***	-0.305	-0.723***	-0.295	-0.743***	-0.310
	(0.174)	(0.163)	(0.181)	(0.155)	(0.182)	(0.160)
Pct non-tuition revenue (H2)	-1.347***	0.046	-1.379***	-0.082	-1.351***	0.082
	(0.290)	(0.533)	(0.362)	(0.638)	(0.300)	(0.525)
Ln Tuition price (H2)	-0.762	-0.300	-0.676	-0.238	-0.768	-0.291
	(0.404)	(0.354)	(0.369)	(0.213)	(0.432)	(0.352)
Age (H3)		-0.011**		-0.009**		-0.011**
		(0.004)		(0.003)		(0.004)
Region=Midwest (H4)		1.752**		1.483**		1.718**
		(0.578)		(0.520)		(0.603)
Region=South (H4)		2.144***		1.862***		2.083**
		(0.604)		(0.493)		(0.642)
Region=West (H4)		2.351***		1.973***		2.400***
		(0.683)		(0.524)		(0.707)
Total professional BA adopted (H5)		0.055		0.055		0.056
		(0.058)		(0.052)		(0.058)
Total professional MA adopted (H5)		0.424**		0.420***		0.420**
		(0.137)		(0.128)		(0.140)
Pct professional BA awarded (H5)		3.779***		3.864***		3.848***
		(0.711)		(0.643)		(0.729)
Ever in consortium (H6)	-0.562	-0.081	-0.601	-0.089	-0.597	-0.070
	(0.331)	(0.421)	(0.355)	(0.352)	(0.346)	(0.427)
Previous adopters in region (H8b) (H9)			2.044**	1.771**		
			(0.627)	(0.636)		
# of Prev adopters in region > 0					0.320	0.551*
					(0.258)	(0.276)
FTE chg of prev adopt in region (H10b)					-0.119	-0.228
					(0.139)	(0.201)

	(1)	(2)	(3)	(4)	(5)	(6)
Time (years)	0.235**	0.191	0.234**	0.180	0.220*	0.160
	(0.090)	(0.098)	(0.082)	(0.104)	(0.092)	(0.097)
Time squared (years)	-0.002	-0.002	-0.003*	-0.002	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Number of panels	596	583	587	574	596	583
Number of observations	16,484	16,325	16,167	16,008	16,484	16,325
Max number of time periods	35	35	35	35	35	35
Avg number of time periods	27.66	28.00	27.54	27.89	27.66	28.00
chi2	67.80	57.50	69.64	82.25	61.84	56.33
Log likelihood	-850.73	-765.39	-829.93	-748.13	-849.61	-762.50
std dev of v_i	1.14	1.13	1.17	1.04	1.19	1.09
Pct of variance contributed by v_i	0.28	0.28	0.29	0.25	0.30	0.26

* p<0.05, ** p<0.01, *** p<0.001

Table 4.3 Basic adoption model with market, institutional, consortium, and geographic proximity variables

	Bootstrap SE (100 replications)				Non-Bootstrap SE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Undergrad FTE enroll	1.196**	1.005*	1.130**	1.082*	1.068**	0.869**	1.052**	1.033***
	(0.417)	(0.491)	(0.395)	(0.449)	(0.404)	(0.283)	(0.361)	(0.274)
Ln Freshmen FTE enroll (H1)	-0.617**	-0.266	-0.613**	-0.326	-0.560**	-0.247	-0.597***	-0.332
	(0.222)	(0.242)	(0.213)	(0.224)	(0.207)	(0.174)	(0.178)	(0.171)
Pct non-tuition revenue (H2)	-3.488**	-0.012	-3.443**	0.130	-3.944**	-0.340	-3.379**	0.151
	(1.286)	(1.553)	(1.252)	(1.460)	(1.327)	(1.270)	(1.173)	(0.988)
Ln Tuition price (H2)	-1.136*	-0.367	-1.049*	-0.383	-0.968**	-0.311	-0.938**	-0.358
	(0.540)	(0.491)	(0.519)	(0.502)	(0.370)	(0.276)	(0.312)	(0.280)
Age (H3)		-0.013		-0.012		-0.011**		-0.012***
		(0.009)		(0.009)		(0.004)		(0.003)
Region=Midwest (H4)		2.486		2.431		2.374***		2.425***
		(1.686)		(1.421)		(0.600)		(0.610)
Region=South (H4)		2.622		2.517		2.412***		2.384***
		(1.842)		(1.497)		(0.609)		(0.615)
Region=West (H4)		2.993		2.908*		2.839***		2.905***
		(1.532)		(1.328)		(0.654)		(0.648)
Total professional BA adopted (H5)		0.033		0.019		0.044		0.029
		(0.141)		(0.131)		(0.048)		(0.049)
Total professional MA adopted (H5)		0.360		0.376*		0.353***		0.377***
		(0.245)		(0.179)		(0.053)		(0.053)
Pct professional BA awarded (H5)		2.473**		2.515**		2.507**		2.510**
		(0.879)		(0.869)		(0.814)		(0.803)
In a consortium (time varying) (H6)	-0.008	-0.092			-0.046	-0.099		
	(0.316)	(0.369)			(0.323)	(0.311)		
Prev depart from consortium (H7)	0.159	0.364	0.295	0.401				
	(0.387)	(0.359)	(0.364)	(0.345)				
Pct of consort members adopting (H8a)	6.492**	5.026*			6.162***	5.082***		
	(2.150)	(2.524)			(1.779)	(1.489)		
# of consort members adopting > 0			0.615	0.395			0.671*	0.352

	Bootstrap SE (100 replications)				Non-Bootstrap SE			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			(0.358)	(0.319)			(0.339)	(0.338)
FTE chg of prev adopt in consort (H10a)			2.230**	1.861			2.112**	2.052**
			(0.823)	(1.068)			(0.725)	(0.669)
Previous adopters in region (H8b) (H9)					2.486*	1.117		
					(1.157)	(0.858)		
# of Prev adopters in region > 0							-0.320	0.193
							(0.270)	(0.281)
FTE chg of prev adopt in region (H10b)							-0.035	-0.234
							(0.283)	(0.393)
Time (years)	0.419*	0.392	0.411*	0.366	0.413*	0.364*	0.411*	0.335
	(0.181)	(0.378)	(0.172)	(0.371)	(0.178)	(0.175)	(0.174)	(0.175)
Time squared (years)	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.005
	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)	(0.003)	(0.003)	(0.003)
Number of panels	483	481	483	481	477	475	483	481
Number of observations	10,830	10,760	10,830	10,760	10,679	10,609	10,830	10,760
Max number of time periods	25	25	25	25	25	25	25	25
Avg number of time periods	22.42	22.37	22.42	22.37	22.39	22.33	22.42	22.37
chi2	46.82	41.30	66.18	53.89	28.13	143.33	46.29	151.54
Log likelihood	-410.47	-364.87	-406.31	-361.34	-399.49	-357.72	-405.94	-361.81
std dev of v_i	1.36	0.01	1.10	0.00	1.28	0.01	0.76	0.00
Pct of variance contributed by v_i	0.36	0.00	0.27	0.00	0.33	0.00	0.15	0.00

* p<0.05, ** p<0.01, *** p<0.001

Table 4.4 The effect of becoming a university on organizational outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Tot FTE[a]	Grad FTE[b]	Tot MA[c]	UG FTE[d]	Tot BA[e]	% Nonlib BA[f]	Pct Part[g]	Adopt Nonlib MA[h]	Adopt Nonlib BA[i]	Gross Tuit Rev[j]	Current Rev[k]
L2 col-to-univ	0.054*	0.333**	0.092	0.056**	0.047*	0.006	-0.005	0.972**	-0.168*	0.050*	0.049*
	(0.022)	(0.107)	(0.091)	(0.020)	(0.024)	(0.006)	(0.007)	(0.352)	(0.070)	(0.022)	(0.020)
L2 prev col-to-univ	0.111***	0.308*	0.320*	0.059*	0.082*	-0.011	-0.003	0.414*	-0.256	0.118***	0.111**
	(0.033)	(0.152)	(0.136)	(0.029)	(0.036)	(0.010)	(0.010)	(0.205)	(0.245)	(0.035)	(0.035)

[a] Fixed effects linear panel regression of logged total FTE enrollments. Covariates: tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[b] Fixed effects linear panel regression of logged total graduate FTE enrollments. Covariates: undergraduate FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[c] Fixed effects linear panel regression of logged total MA degrees produced. Covariates: undergraduate FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[d] Fixed effects linear panel regression of logged total undergraduate FTE enrollments. Covariates: graduate FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[e] Fixed effects linear panel regression of logged total BA degrees produced. Covariates: graduate FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[f] Fixed effects linear panel regression of proportion of professional BA degrees produced. Covariates: total FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies)

[g] Fixed effects linear panel regression of part time student headcount as a proportion of total headcount. Covariates: total FTE enrollments; tuition price; % in-state freshmen; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies).

[h] Random effects Poisson panel regression of number of professional MA degrees adopted in the year, bootstrap standard errors based on 100 replications. Covariates: undergraduate FTE enrollments; undergraduate freshman enrollments; tuition price; % in-state freshmen; % part-time undergraduate students; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies).

[i] Random effects Poisson panel regression of number of professional BA degrees adopted in the year, bootstrap standard errors based on 100 replications. Covariates: undergraduate FTE enrollments; undergraduate freshman enrollments; tuition price; % in-state freshmen; % part-time undergraduate students; # of lib arts colleges within 100 miles; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies).

[j] Fixed effects linear panel regression of logged gross tuition revenue. Covariates: tuition price; % in-state freshmen; % part-time undergraduate students; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; federal revenue; auxiliary revenue; endow/investment revenue; state revenue; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies).

[k] Fixed effects linear panel regression of logged total current revenue, excluding endowment and private giving revenue.[58] Covariates: tuition price; % in-state freshmen; % part-time undergraduate students; # of lib arts colleges within 100 miles; total professional BA degrees previously adopted; total professional MA degrees previously adopted; proportion of professional BA degrees; age; urbanization; selectivity; region (e.g., Northeast); religious; time (dummies).

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[58] The total current revenues variable does not include endowment revenue or private grants revenue because these measures are incomparable before and after 1997 FASB accounting changes. Specifically, reported endowment and private grants revenue increased dramatically after 1997 accounting changes. To the extent that organizations are colleges in early years (prior to accounting changes) and become universities in later years (after accounting changes), the inclusion of endowment revenue and private grants revenue may upwardly bias the coefficient on the college-to-university independent variable.

Figures

Figure 4.1 Becoming a university and organizational death, 1966-2010

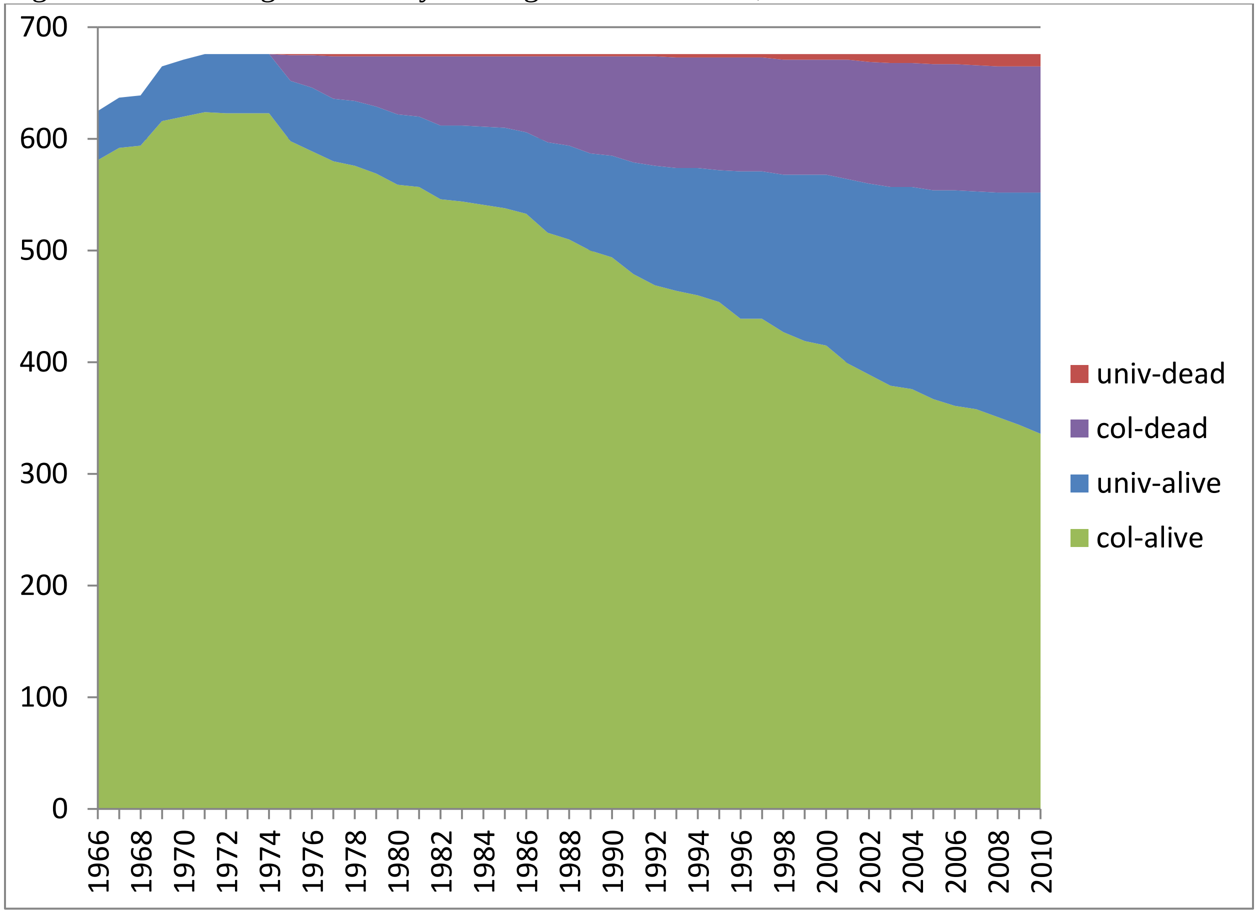
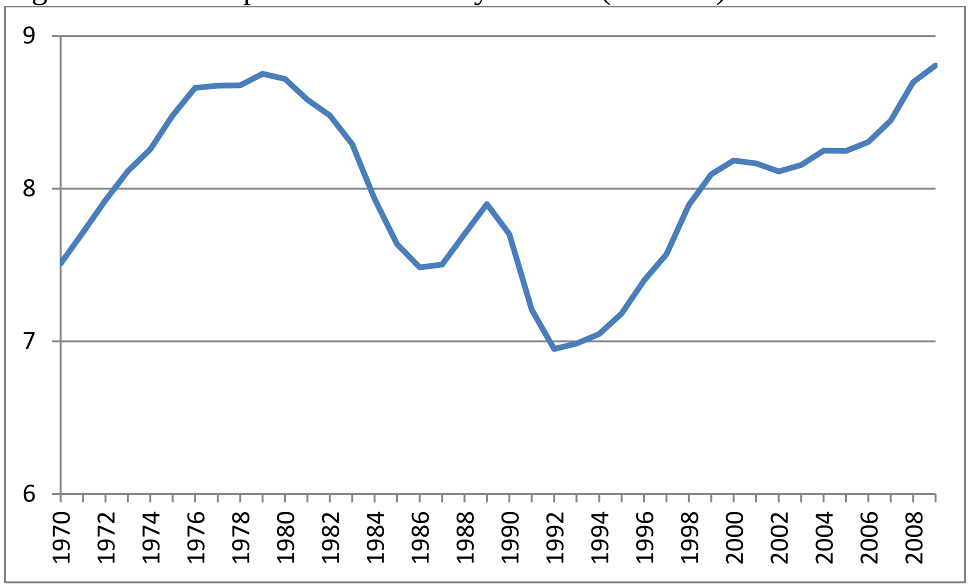


Figure 4.2 U.S. Population of 18-19 year-olds (millions) from 1970 to 2009



Source: NCES (2010, Table 15)

Figure 4.3 Rates of adoption and death by 1972 Carnegie Classification

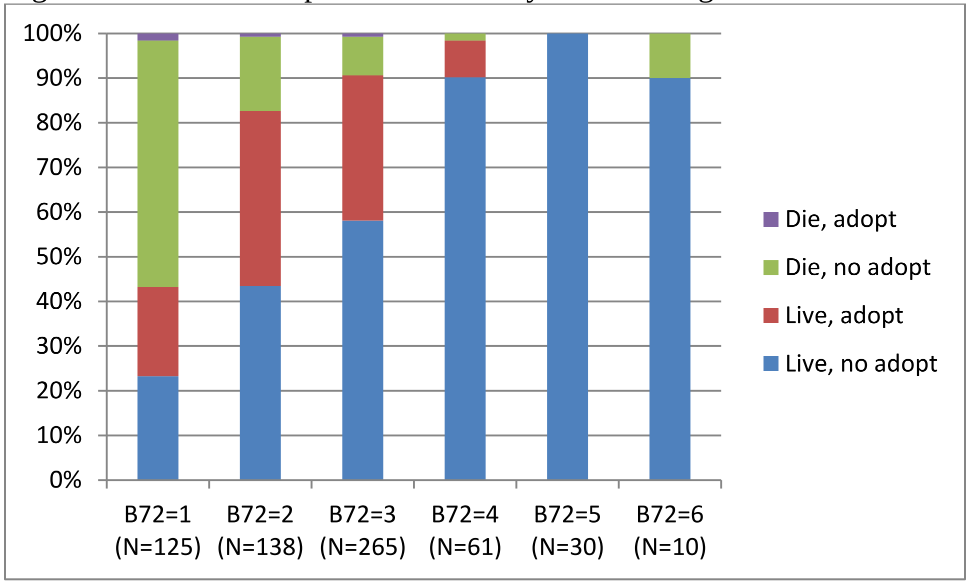


Figure 4.4 Organizational change in the population of liberal arts colleges

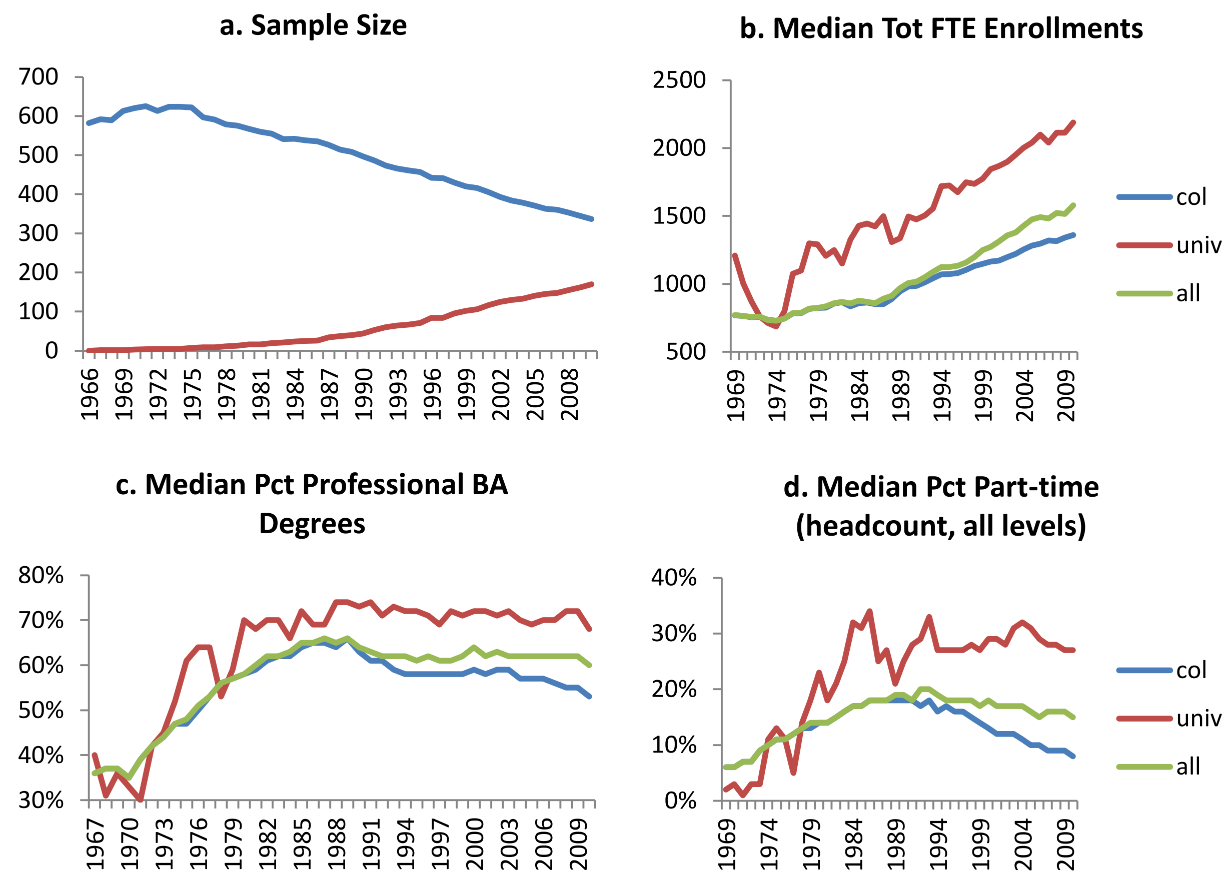
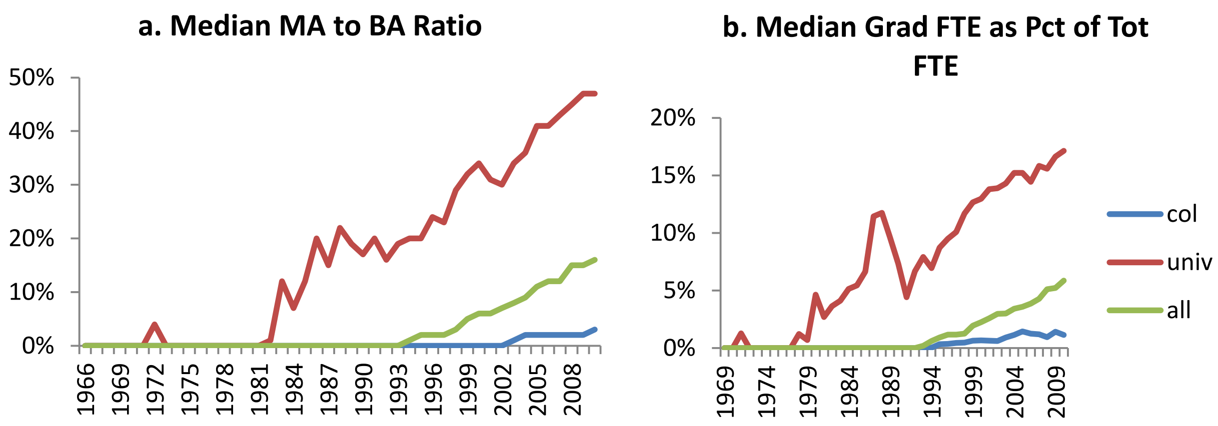


Figure 4.5 Organizational change in the population of liberal arts colleges



Appendix

Appendix Table 4.1 Basic adoption model with market, institutional, and geographic proximity variables, conventional standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
Ln Undergrad FTE enroll	1.711***	1.341***	1.724***	1.259***	1.743***	1.319***
	(0.319)	(0.293)	(0.329)	(0.287)	(0.332)	(0.289)
Ln Freshmen FTE enroll (H1)	-0.729***	-0.305	-0.723***	-0.295	-0.743***	-0.310
	(0.151)	(0.172)	(0.154)	(0.167)	(0.154)	(0.169)
Pct non-tuition revenue (H2)	-1.347**	0.046	-1.379***	-0.082	-1.351**	0.082
	(0.414)	(0.725)	(0.410)	(0.747)	(0.419)	(0.702)
Ln Tuition price (H2)	-0.762***	-0.300	-0.676***	-0.238	-0.768***	-0.291
	(0.190)	(0.213)	(0.188)	(0.216)	(0.196)	(0.208)
Age (H3)		-0.011**		-0.009**		-0.011**
		(0.003)		(0.003)		(0.003)
Region=Midwest (H4)		1.752***		1.483***		1.718***
		(0.450)		(0.434)		(0.451)
Region=South (H4)		2.144***		1.862***		2.083***
		(0.491)		(0.470)		(0.490)
Region=West (H4)		2.351***		1.973***		2.400***
		(0.519)		(0.522)		(0.518)
Total professional BA adopted (H5)		0.055		0.055		0.056
		(0.043)		(0.042)		(0.043)
Total professional MA adopted (H5)		0.424***		0.420***		0.420***
		(0.087)		(0.090)		(0.087)
Pct professional BA awarded (H5)		3.779***		3.864***		3.848***
		(0.675)		(0.670)		(0.677)
Ever in consortium (H6)	-0.562	-0.081	-0.601	-0.089	-0.597	-0.070
	(0.304)	(0.312)	(0.310)	(0.306)	(0.311)	(0.308)

	(1)	(2)	(3)	(4)	(5)	(6)
Previous adopters in region (H8b) (H9)			2.044**	1.771**		
			(0.651)	(0.668)		
# of Prev adopters in region > 0					0.320	0.551*
					(0.228)	(0.239)
FTE chg of prev adopt in region (H10b)					-0.119	-0.228
					(0.184)	(0.230)
Time (years)	0.235***	0.191*	0.234***	0.180*	0.220**	0.160*
	(0.069)	(0.076)	(0.070)	(0.075)	(0.070)	(0.075)
Time squared (years)	-0.002*	-0.002	-0.003*	-0.002	-0.002*	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of panels	596	583	587	574	596	583
Number of observations	16,484	16,325	16,167	16,008	16,484	16,325
Max number of time periods	35	35	35	35	35	35
Avg number of time periods	27.66	28.00	27.54	27.89	27.66	28.00
chi2	51.74	66.29	51.08	66.13	49.92	68.64
Log likelihood	-850.73	-765.39	-829.93	-748.13	-849.61	-762.50
std dev of v_i	1.14	1.13	1.17	1.04	1.19	1.09
Pct of variance contributed by v_i	0.28	0.28	0.29	0.25	0.30	0.26

* p<0.05, ** p<0.01, *** p<0.001

Appendix Table 4.2 Basic adoption model with market, institutional, consortium, and geographic proximity variables, conventional standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Undergrad FTE enroll	1.196**	1.005***	1.071**	1.056***	1.068**	0.869**	1.052**	1.033***
	(0.411)	(0.278)	(0.384)	(0.273)	(0.404)	(0.283)	(0.361)	(0.274)
Ln Freshmen FTE enroll (H1)	-0.617**	-0.266	-0.602***	-0.337*	-0.560**	-0.247	-0.597***	-0.332
	(0.211)	(0.177)	(0.182)	(0.171)	(0.207)	(0.174)	(0.178)	(0.171)
Pct non-tuition revenue (H2)	-3.488**	-0.012	-3.426**	0.116	-3.944**	-0.340	-3.379**	0.151
	(1.301)	(1.163)	(1.209)	(1.033)	(1.327)	(1.270)	(1.173)	(0.988)
Ln Tuition price (H2)	-1.136**	-0.367	-0.965**	-0.367	-0.968**	-0.311	-0.938**	-0.358
	(0.381)	(0.279)	(0.346)	(0.284)	(0.370)	(0.276)	(0.312)	(0.280)
Age (H3)		-0.013***		-0.012***		-0.011**		-0.012***
		(0.003)		(0.003)		(0.004)		(0.003)
Region=Midwest (H4)		2.486***		2.395***		2.374***		2.425***
		(0.608)		(0.611)		(0.600)		(0.610)
Region=South (H4)		2.622***		2.378***		2.412***		2.384***
		(0.625)		(0.620)		(0.609)		(0.615)
Region=West (H4)		2.993***		2.852***		2.839***		2.905***
		(0.644)		(0.644)		(0.654)		(0.648)
Total professional BA adopted (H5)		0.033		0.027		0.044		0.029
		(0.048)		(0.048)		(0.048)		(0.049)
Total professional MA adopted (H5)		0.360***		0.374***		0.353***		0.377***
		(0.053)		(0.053)		(0.053)		(0.053)
Pct professional BA awarded (H5)		2.473**		2.452**		2.507**		2.510**
		(0.796)		(0.798)		(0.814)		(0.803)
In a consortium (time varying) (H6)	-0.008	-0.092			-0.046	-0.099		
	(0.323)	(0.307)			(0.323)	(0.311)		
Prev depart from consortium (H7)	0.159	0.364						
	(0.368)	(0.322)						
Pct of consort members adopting (H8a)	6.492***	5.026***			6.162***	5.082***		
	(1.805)	(1.490)			(1.779)	(1.489)		
# of consort members adopting > 0			0.625	0.407			0.671*	0.352

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			(0.343)	(0.330)			(0.339)	(0.338)
FTE chg of prev adopt in consort (H10a)			2.161**	1.966**			2.112**	2.052**
			(0.766)	(0.658)			(0.725)	(0.669)
Previous adopters in region (H8b) (H9)					2.486*	1.117		
					(1.157)	(0.858)		
# of Prev adopters in region > 0							-0.320	0.193
							(0.270)	(0.281)
FTE chg of prev adopt in region (H10b)							-0.035	-0.234
							(0.283)	(0.393)
Time (years)	0.419*	0.392*	0.396*	0.338	0.413*	0.364*	0.411*	0.335
	(0.180)	(0.176)	(0.173)	(0.175)	(0.178)	(0.175)	(0.174)	(0.175)
Time squared (years)	-0.006	-0.006	-0.006	-0.005	-0.006	-0.006	-0.006	-0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Number of panels	483	481	483	481	477	475	483	481
Number of observations	10,830	10,760	10,830	10,760	10,679	10,609	10,830	10,760
Max number of time periods	25	25	25	25	25	25	25	25
Avg number of time periods	22.42	22.37	22.42	22.37	22.39	22.33	22.42	22.37
chi2	28.24	144.65	38.57	150.95	28.13	143.33	46.29	151.54
Log likelihood	-410.47	-364.87	-406.68	-362.13	-399.49	-357.72	-405.94	-361.81
std dev of v_i	1.36	0.01	0.88	0.00	1.28	0.01	0.76	0.00
Pct of variance contributed by v_i	0.36	0.00	0.19	0.00	0.33	0.00	0.15	0.00

* p<0.05, ** p<0.01, *** p<0.001

Appendix Table 4.3 Extended adoption model with market, institutional, and geographic proximity variables, conventional standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
Ln Undergrad FTE enroll	1.618***	1.297***	1.558***	1.169***	1.605***	1.217***
	(0.290)	(0.288)	(0.279)	(0.277)	(0.292)	(0.276)
Ln Freshmen FTE enroll (H1)	-0.682***	-0.277	-0.652***	-0.265	-0.681***	-0.270
	(0.141)	(0.166)	(0.137)	(0.156)	(0.140)	(0.157)
Pct non-tuition revenue (H2)	-1.352**	-0.285	-1.414***	-0.441	-1.348**	-0.327
	(0.422)	(0.807)	(0.397)	(0.787)	(0.416)	(0.777)
Ln Tuition price (H2)	-0.642***	-0.314	-0.539***	-0.253	-0.632***	-0.285
	(0.162)	(0.212)	(0.151)	(0.206)	(0.162)	(0.199)
Pct freshman in-state (H2)	0.348	-0.440	0.337	-0.489	0.333	-0.489
	(0.400)	(0.464)	(0.388)	(0.442)	(0.397)	(0.437)
Age (H3)		-0.009**		-0.008**		-0.009***
		(0.003)		(0.003)		(0.003)
Region= Mid-Atlantic (H4)		1.003		1.077		0.867
		(0.655)		(0.626)		(0.653)
Region= South (H4)		2.324***		2.070**		2.123**
		(0.692)		(0.658)		(0.651)
Region= Midwest (H4)		2.211**		1.935**		1.992**
		(0.681)		(0.653)		(0.643)
Region= Southwest (H4)		3.751***		3.244***		3.488***
		(0.861)		(0.810)		(0.797)
Region= West (H4)		2.849***		2.487***		2.719***
		(0.712)		(0.691)		(0.664)
Total professional BA adopted (H5)		0.036		0.035		0.033
		(0.041)		(0.038)		(0.037)
Total professional MA adopted (H5)		0.432***		0.403***		0.400***
		(0.085)		(0.084)		(0.081)
Pct professional BA awarded (H5)		3.393***		3.438***		3.370***
		(0.658)		(0.632)		(0.632)
Ever in consortium (H6)	-0.548*	-0.138	-0.539*	-0.135	-0.570*	-0.130

	(1)	(2)	(3)	(4)	(5)	(6)
	(0.272)	(0.290)	(0.259)	(0.271)	(0.268)	(0.266)
Previous adopters in region (H8b) (H9)			1.927***	1.547**		
			(0.533)	(0.595)		
# of Prev adopters in region > 0					0.313	0.636**
					(0.210)	(0.223)
FTE chg of prev adopt in region (H10b)					-0.032	-0.148
					(0.168)	(0.237)
Religious institution	1.064***	0.465	1.056***	0.502	1.059***	0.466
	(0.243)	(0.271)	(0.235)	(0.256)	(0.240)	(0.253)
Cumulative # of adopters	-0.017	-0.003	-0.022	-0.009	-0.019	-0.008
	(0.022)	(0.023)	(0.022)	(0.023)	(0.022)	(0.023)
Time (years)	0.207**	0.199**	0.201**	0.179*	0.189**	0.161*
	(0.066)	(0.074)	(0.066)	(0.073)	(0.066)	(0.072)
Time squared (years)	-0.001	-0.002	-0.000	-0.001	-0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Number of panels	595	583	586	574	595	583
Number of observations	16,482	16,325	16,165	16,008	16,482	16,325
Max number of time periods	35	35	35	35	35	35
Avg number of time periods	27.70	28.00	27.59	27.89	27.70	28.00
chi2	65.93	76.91	73.33	83.66	66.70	89.43
Log likelihood	-837.04	-757.81	-815.97	-740.98	-835.91	-753.79
std dev of v_i	0.75	0.98	0.61	0.74	0.70	0.73
Pct of variance contributed by v_i	0.15	0.23	0.10	0.14	0.13	0.14

* p<0.05, ** p<0.01, *** p<0.001

Appendix Table 4.4 Extended adoption model with market, institutional, consortium, and geographic proximity, conventional standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln Undergrad FTE enroll	1.180**	0.914**	1.031**	0.997***	1.041**	0.821**	1.043**	0.988***
	(0.397)	(0.283)	(0.351)	(0.279)	(0.387)	(0.287)	(0.342)	(0.280)
Ln Freshmen FTE enroll (H1)	-0.613**	-0.168	-0.586***	-0.220	-0.558**	-0.164	-0.587***	-0.219
	(0.200)	(0.178)	(0.172)	(0.175)	(0.192)	(0.178)	(0.174)	(0.175)
Pct non-tuition revenue (H2)	-3.296*	-0.576	-3.077*	-0.321	-3.809**	-0.939	-3.111*	-0.329
	(1.325)	(1.312)	(1.223)	(1.302)	(1.334)	(1.347)	(1.217)	(1.314)
Ln Tuition price (H2)	-1.064**	-0.371	-0.871**	-0.377	-0.892*	-0.347	-0.884**	-0.370
	(0.366)	(0.270)	(0.288)	(0.275)	(0.353)	(0.270)	(0.281)	(0.276)
Pct freshman in-state (H2)	-0.075	-0.328	0.066	-0.293	-0.165	-0.456	0.076	-0.276
	(0.618)	(0.586)	(0.543)	(0.580)	(0.609)	(0.595)	(0.549)	(0.581)
Age (H3)		-0.012***		-0.012***		-0.011**		-0.011**
		(0.004)		(0.003)		(0.004)		(0.004)
Region= Mid-Atlantic (H4)		-0.431		-0.430		-0.344		-0.819
		(1.102)		(1.079)		(1.090)		(1.146)
Region= South (H4)		2.103*		1.787*		2.045*		1.553
		(0.887)		(0.874)		(0.867)		(0.906)
Region= Midwest (H4)		2.311**		2.197**		2.302**		2.007*
		(0.864)		(0.851)		(0.850)		(0.875)
Region= Southwest (H4)		3.262***		3.088***		3.161***		2.886**
		(0.938)		(0.923)		(0.930)		(0.945)
Region= West (H4)		2.707**		2.560**		2.645**		2.380**
		(0.863)		(0.852)		(0.855)		(0.878)
Total professional BA adopted (H5)		0.020		0.009		0.023		0.006
		(0.050)		(0.049)		(0.050)		(0.050)
Total professional MA adopted (H5)		0.345***		0.356***		0.343***		0.352***
		(0.056)		(0.057)		(0.057)		(0.057)
Pct professional BA awarded (H5)		2.688***		2.635**		2.666**		2.757***
		(0.804)		(0.808)		(0.817)		(0.820)
In a consortium (time varying) (H6)	-0.019	-0.043			-0.059	-0.072		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.313)	(0.314)			(0.311)	(0.317)		
Prev depart from consortium (H7)	0.165	0.200						
	(0.355)	(0.328)						
Pct of consort members adopting (H8a)	5.988***	5.590***			5.609**	5.587***		
	(1.740)	(1.520)			(1.719)	(1.495)		
# of consort members adopting > 0			0.560	0.467			0.613	0.416
			(0.332)	(0.336)			(0.336)	(0.343)
FTE chg of prev adopt in consort (H10a)			2.076**	2.071**			2.066**	2.185**
			(0.686)	(0.680)			(0.684)	(0.687)
Previous adopters in region (H8b) (H9)					2.402*	0.755		
					(1.086)	(0.893)		
# of Prev adopters in region > 0							-0.286	0.211
							(0.266)	(0.288)
FTE chg of prev adopt in region (H10b)							-0.020	-0.489
							(0.272)	(0.452)
Religious institution	0.322	-0.474	0.339	-0.477	0.352	-0.418	0.296	-0.484
	(0.337)	(0.319)	(0.295)	(0.318)	(0.331)	(0.324)	(0.299)	(0.325)
Cumulative # of adopters	0.015	0.018	0.009	0.014	-0.003	0.004	0.010	0.014
	(0.057)	(0.057)	(0.056)	(0.057)	(0.058)	(0.058)	(0.056)	(0.057)
Time (years)	0.455	0.458	0.428	0.399	0.389	0.393	0.446	0.392
	(0.253)	(0.261)	(0.252)	(0.258)	(0.251)	(0.260)	(0.253)	(0.258)
Time squared (years)	-0.008	-0.009	-0.008	-0.008	-0.006	-0.007	-0.008	-0.008
	(0.009)	(0.010)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)
Number of panels	483	481	483	481	477	475	483	481
Number of observations	10,830	10,760	10,830	10,760	10,679	10,609	10,830	10,760
Max number of time periods	25	25	25	25	25	25	25	25
Avg number of time periods	22.42	22.37	22.42	22.37	22.39	22.33	22.42	22.37
chi2	31.81	147.52	54.27	154.12	32.79	144.57	56.71	154.10
Log likelihood	-410.01	-362.04	-406.01	-359.04	-398.94	-355.05	-405.40	-358.32
std dev of v_i	1.17	0.00	0.53	0.00	1.04	0.00	0.56	0.00
Pct of variance contributed by v_i	0.29	0.00	0.08	0.00	0.25	0.00	0.09	0.00

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Chapter 5 :

Conclusion

This concluding chapter summarizes empirical findings, draws implications for research and practice, and proposes future research. First, I summarize and synthesize the results from Chapters 3 and 4. In particular, I discuss the results for total undergraduate enrollments versus freshmen enrollments. I also discuss the pursuit of resources versus the pursuit of prestige. Second, I discuss implications for higher education. I argue that organizational theory can help resolve questions that are important to the field of higher education. However, resolving these questions depends on appropriate use of theory and on developing appropriate datasets. Finally, I discuss implications for practice and policy. The research results point to some general strategies that can be adopted by administrators pursuing the individually rational goals of resource and prestige maximization. The implications for policy are based on the idea that, in aggregate, individually rational pursuits do not necessarily contribute to societal goals.

Summary and Synthesis

Summary

Adoption and production of master's degrees. Chapter 3 analyzes the adoption and production of master's degrees. Drawing on resource dependence theory, I hypothesize that institutions will increase the adoption and production of master's degrees in response to declines in undergraduate enrollments and state appropriations. Contrary to this hypothesis, results show that both the adoption and production of master's degrees is positively related to growth in total undergraduates. Similarly, for the entire sample, the production of master's degrees is positively related to growth in freshman enrollments. However, freshman enrollments have a strong negative relationship to the production of master's degrees at liberal arts colleges and non-selective universities, consistent with resource dependence theory.

Also drawing on resource dependence theory, I hypothesize that institutions increase the adoption and production of master's degrees when non-tuition revenues are weak. In support of this hypothesis, endowment and grant revenues have a negative relationship with the production of master's degrees for the sample of all institutions and in particular for the sample of public institutions, the sample of liberal arts colleges, and the sample of highly selective universities (but not the sample of research universities). I find similar, though weaker, results for revenue from auxiliary enterprises.

For liberal arts colleges, endowment and grant revenues have a significantly negative relationship with the adoption of master's degrees in business, education, health, education administration, and psychology but not with computer science, or biology. These results imply that liberal arts colleges adopt revenue-generating, professional master's degrees when alternative revenues are weak, but not master's degrees in the sciences, which generate few enrollments and may be expensive to develop (Middaugh, Graham, Shahid, Carroll, & National Center for Education Statistics., 2003).

The hypotheses about prestige are generally supported. Prestigious universities produce more master's degrees than non-prestigious universities, but prestige is negatively related to the production of master's degrees at liberal arts colleges. Bowen (1980) argues that a university is an organization that makes as much money as it can and spends all the money it makes on becoming more prestigious, implying that revenue from master's degrees subsidizes the pursuit of prestige. I find this statement to be true for research universities. Prestigious liberal arts colleges, however, are unwilling to generate revenues through master's degrees because doing so would damage status in their core market of undergraduate education (Podolny, 1993).

The relationship between prestige and alternative revenues differs for selective non-research universities (e.g., Lehigh, Brown) versus research universities. The production of master's degrees is negatively related to endowment and grant income at selective non-research universities but not at research universities. These results imply that selective non-research universities view master's degrees as a substitute for endowment revenue, but prefer to maintain a brand identity focused on undergraduate education. Research universities, by contrast, maximize revenues from all sources, consistent with Bowen (1980).

Finally, policymakers want institutions to focus on degrees demanded by the labor market (U.S. Department of Education, 2006). I analyze whether changes in occupational earnings and employment affect the adoption of related master's degree programs by liberal arts colleges. I find that earnings growth is associated with the adoption of master's degrees in business, education, and computer science. However, employment growth in related occupations does not have a significantly positive effect on the adoption specific master's degree programs. In fact, employment growth has a significantly negative relationship with the adoption of master's degrees in educational administration. A potential mechanism for this finding is that when fewer jobs exist, individuals have a stronger incentive to obtain credentials to compete for those increasingly scarce jobs (Boudon, 1974).

Mission drift in liberal arts colleges. Chapter 4 analyzes mission drift in liberal arts colleges. I define "becoming a university" as changing the organizational name to include the word "university." Drawing on Greenwood and Hinings (1996), I argue that becoming a university symbolizes the abandonment of the liberal arts college organizational template and the adoption of the comprehensive university template. I integrate research from the field of higher education (e.g., Aldersley, 1995; Morphew, 2002) by defining "mission drift" as a change in organizational template.

The liberal arts template admonishes colleges to focus on undergraduate, liberal arts majors, to focus on "traditional" college students, and to maintain small enrollments (Breneman, 1990). In contrast, the comprehensive university template permits all enrollment growth strategies. I argue that many colleges adopted the comprehensive university template when changes in the external environment made the liberal arts template unsuitable to the goals of organizational survival and stability.

I hypothesize that becoming a university is caused by market, institutional, and network factors. I find that growth in total undergraduate enrollments is positively related to becoming a university, but growth in freshman enrollments is negatively related to becoming a university. Colleges are less likely to become universities when they have a strong market position (tuition price and selectivity), strong organizational resources (non-tuition revenues), a strong historical tradition (organizational age), and when they are located in a region that values the liberal arts template (the Northeast).

The proportion of bachelor's degrees in professional fields, and the prior adoption of professional master's degrees increase the probability of becoming a university. Colleges are more likely to become universities when socially proximate colleges (geographic proximity and membership inter-organizational consortia) have previously become universities. I also find that colleges are more likely to become universities when fellow consortium members increase enrollments after becoming a university. Finally, I show that becoming a university has a positive effect on total enrollments, the production of bachelor's and master's degrees, the subsequent adoption of professional master's degrees, total tuition revenue, and total current revenues.

I argue that the primary rationale for becoming a university is to diversify clientele through the expansion of master's degree programs. Therefore, Chapter 3 and Chapter 4 complement one another nicely: liberal arts colleges adopt master's degrees in order to grow enrollments and diversify their customer base (Chapter 3); liberal arts colleges become universities in order to expand the production of master's degrees (Chapter 4).

Synthesis

Total undergraduate enrollments versus freshmen enrollments. The results for total undergraduate enrollments and freshmen enrollments in Chapter 3 appear contradictory. Total undergraduate enrollments have a positive relationship with the production of master's degrees for all organizational types. Freshman enrollments, however, have a positive relationship with production for the sample of all institutions, but a negative relationship with production for liberal arts colleges and unselective private universities.[59]

For liberal arts colleges and non-selective private universities, I argue that declining freshmen enrollments are ultimately the driver of master's degree expansion. Figures 1.3 and 1.4 show that many liberal arts colleges and non-selective universities experienced dramatic declines in their freshmen enrollments – a leading indicator of enrollment decline – during the 1970s and 1980s. However, Figures 1.1 and 1.2 show that few institutions experienced declines in total enrollments. Rather, most institutions experienced dramatic enrollment expansions that continued into the 21st century.

I argue that total undergraduate enrollments expanded, despite declining freshmen enrollments, because these institutions pursued new customer bases – part-time students, older students, etc. – in response to declines in their core constituency of full-time, "college-age" students. At a later stage, these institutions continued to diversify their clientele by expanding master's degree enrollments. By the time these institutions began expanding master's degree programs, total undergraduate enrollments were increasing (hence the positive coefficient) but freshmen enrollments remained stagnant (hence the negative coefficient). Note that one potential problem with my interpretation of the results, is that total undergraduate enrollments may have increased due to a rebound in the size of the college-age cohort in the 1990s (NCES, 2010), rather than because of changes in organizational behavior. Therefore, future research should integrate demographic change into the model.

[59] Note that no contradiction exists for the production of master's degrees by public institutions and selective universities; enrollment growth occurs simultaneously at all levels as part of a general expansion strategy.

Results for Chapter 4 support my interpretation of Chapter 3 findings. For liberal arts colleges, becoming a university is positively related to total undergraduate enrollments but negatively related to freshmen enrollments. Kraatz and Zajac (1996) show that liberal arts colleges adopted professional bachelor's degrees in the 1970s and 1980s. I show that in the 1980s and 1990s, many liberal arts colleges became universities. Colleges that became universities were concerned about declining freshmen enrollments (hence the negative coefficient) but were already on a path of overall enrollment growth, with a growing emphasis on part-time students and professional bachelor's degree programs (hence the positive coefficient).

Pursuit of revenue versus the pursuit of prestige. Important theoretical contributions argue that the pursuits of resources and prestige cannot be studied in isolation (Bowen, 1980; Podolny, 1993; Winston, 1999); the institutions with the most resources win the competition for prestige and prestige enables institutions to generate more resources. How do the pursuits of resources and prestige differ across the prestige spectrum? Winston states that (1999, pp. 29-30):

> Competition among schools appears to be limited to overlapping "bands" or segments of similarly wealthy schools within the hierarchy (with the further separation by geography and ideology)…. Competition at the top and bottom of the hierarchy takes place in markets for very different things. At the bottom, it is competition in the product market for customers who will buy the output; at the top, it is competition in the input market for scarce student (and faculty) quality that will improve a school's educational quality and position.

For institutions on the upper end of the prestige distribution, organizational prestige depends largely on the academic profile of undergraduate students. All prestigious institutions will be selective about enrolling undergraduate students, meaning that these institutions do not maximize short-term undergraduate tuition revenue.

Additionally, all prestigious institutions will attempt to maximize “donative resources” (Winston, 1999) – investment revenue and private grant revenue – to subsidize the pursuit of prestige of prestige. For research universities, master’s degree students do not affect overall college rankings (U.S. News & World Report, 2010). Therefore, research universities might attempt to maximize revenues from master’s degrees in order to subsidize the pursuit of prestige in undergraduate and doctoral education (Ehrenberg, 2000). However, prestigious academic units (e.g., a business school) concerned with their long-term reputation may prefer to be selective about master’s degree enrollments.

For prestigious liberal arts colleges, master’s degree programs undermine brand identities that have been built over hundreds of years. Therefore, prestigious liberal arts colleges do not seek revenues from master’s degrees, nor do they consider becoming a university in order to grow overall tuition revenues. Selective non-research universities (e.g., Brown, Dartmouth) lie somewhere between research universities and selective liberal arts colleges, not avoiding master’s degrees entirely but maintaining a focus on undergraduate education.

For institutions at the lower end of the prestige distribution, organizational stability is an important concern and national prestige is not a realistic objective. Results from Chapters 3 and 4 are consistent with Winston (1999); these organizations do not have access to “donative” resources so they pursue organizational stability by maximizing tuition revenue from both undergraduate enrollments and from graduate enrollments. Whereas expanding undergraduate enrollments undermines brand-identity for prestigious institutions, non-prestigious institutions can expand undergraduate enrollments with relative impunity.

Doyle (2010) finds that from 1992 to 2003 non-prestigious institutions increased spending on institutional “merit” aid designed to raise academic profile. This finding is inconsistent with the argument (Winston, 1999) that non-prestigious institutions attempt to maximize undergraduate enrollments and care little about the academic profile of enrolled students. If the findings of Doyle (2010) are indicative of long-term trends, then non-prestigious institutions may increasingly behave like research universities, becoming selective about undergraduate enrollments but maximizing revenue from master’s degree students.

Studies of prestige in higher education often assume that stark differentiation exists between the relatively few prestigious institutions (e.g., Harvard vs. George Washington University) but that little differentiation exists amongst the thousands of non-prestigious institutions (Bastedo & Jaquette, 2011). Perhaps this assumption is false. Future research should analyze behavioral differences between non-prestigious institutions striving to increase academic profile (Doyle, 2010) and non-prestigious institutions willing to accept any student (Winston, 1999).

Another area for future research is the motivation for the high production of master’s degrees at prestigious universities. Drawing on Bowen (1980), I have argued that prestigious universities expand the production of master’s degrees to subsidize the pursuit of prestige in undergraduate education. For example, Brandeis University was ranked 34th in the 2011 USNWR rankings, but offers master’s degree programs that do not require GRE or GMAT test scores (Brandeis University, 2011). This argument assumes that organization-level decision makers promote the expansion of master’s degrees. An alternative argument is that the high production of master’s degrees at prestigious universities is not the result of organization-level decision-making, but is the aggregate effect of individual academic units (e.g., the school of social work) desiring to increase enrollment revenue through the expansion of master's degrees. This argument seems especially plausible in large universities (e.g., University of Michigan) where academic units are responsible for generating revenues to match their costs.

Implications for Higher Education Research

A Research Program on Enrollments

Chapter 1 reviewed historical studies of U.S. higher education, arguing that important organizational changes in postsecondary organizations were motivated by the desire to increase enrollments. Contemporary research increasingly argues that postsecondary institutions attempt to increase prestige by attracting students with high academic profiles. Building on these ideas, Chapter 1 proposed a research program focusing on how postsecondary institutions change organizational behavior in order to generate enrollments from desired student populations. Chapters 3 and 4 are two studies that fit within the research program. I suggest several additional studies.

First, several studies document increased expenditure on institutional financial aid to students (Doyle, 2010; McPherson & Schapiro, 1998). The panel dataset described in Chapter 2 can be used to provide descriptive analyses of change over time in organization-level spending on institutional aid, across organizational types. Second, panel analyses could examine whether increased spending on institutional aid results in higher academic profile (e.g., standardized test scores), higher yield rates, or higher USNWR rankings. When institutional aid is allocated on the basis of "merit" – to attract high achieving students – less aid is allocated for students with financial "need" (Heller & Marin, 2004). Therefore, organization-level research on institutional aid should also examine the extent to which the increase in institutional aid negatively affects access for low-income and minority students.

A second topic is the recruitment of out-of-state students by public institutions (Curs, 2010). Out-of-state students are desirable for public institutions because they pay higher tuition and may have stronger academic profiles than in-state students. Do public institutions increase enrollments of out-of-state students in response to declines in state appropriations or in response to volatility in state appropriations? Prestigious public institutions (e.g., University of Michigan) enjoy stronger demand from out-of-state students but not prestigious institutions do not. Therefore, analyses should examine whether the effect of declining or volatile state appropriations differs by institutional prestige.

International students represent another opportunity to increase enrollment revenue and academic profile. However, empirical research has not analyzes trends over time and across institutional type in the enrollment of international students. I find that the growth in international enrollments differs dramatically across institutional types.[60] Using categories from the 1976 Carnegie Classification, the percent of freshmen from foreign countries increased from 3.5% in 1973 to 7.3% in 2009 for private research universities, from 1.2% to 3.1% for public research universities, from 2.8% to 6.2% for private doctoral institutions, from 1.0% to 1.3% for public doctoral institutions, from 2.1% to 7.2% for selective private liberal arts colleges, and from 2.3% to 2.7% for non-selective private liberal arts colleges.

[60] Author's calculations.

Another fruitful area of research is the adoption and effects of responsibility centered management (RCM) budgeting systems (Hearn, Lewis, Kallsen, Holdsworth, & Jones, 2006; Priest, Becker, Hossler, & St. John, 2002). RCM systems generally require that each unit generate revenues to match their costs. The rationale for RCM systems is similar to that of "quasi markets" and "the new public management" (Jaquette, 2009; Walsh, 1995), in which government "steers the boat, but does not row." Especially in large organizations, RCM systems devolve decision-making to the unit level but compel units to behave in ways congruent with overall organizational goals. The incentives created by an RCM system depend on the specific policy details (Hearn, et al., 2006), but in general RCM systems provide academic units with the incentive to become more entrepreneurial in generating tuition revenue (Ehrenberg, 2000). For example, professional schools at prestigious universities (e.g., social work, education) have limited undergraduate enrollments when the organization does not allow undergraduate professional majors. Therefore, the adoption of RCM creates strong incentives to expand graduate education. Research papers on RCM could examine how the adoption of RCM systems diffuses across organizations and could examine the effects of RCM policies on organizational outcomes.

Other potential research topics include the following:

- The effect of the stock market on applications and yield
- The effect of federal loan policies on tuition prices (Curs & Dar, 2010; McPherson & Schapiro, 1993)
- The growth of for-profit education; federal student loans and grants as a percentage of for-profit revenues
- The effect of accreditation and losing accreditation on enrollments
- The adoption and effect of "student learning assessment plans" (Ewell, 2001; Middle States Commission on Higher Education, 2006)
- The causes of institutional closures and mergers

- Change over time in age composition and attendance-status in postsecondary education
- The growing use of adjunct professors
- The effect of state appropriations volatility on organizational revenue strategies (Doyle & Delaney, 2009)
- The relationship between degree production and skill shortages in the labor market

Research Design

I argue that insights from organizational studies can make unique contributions to scholarship on the behavior of colleges and universities. Over the last decade, organizational studies has moved away from a paradigm-driven approach, where cases are used to prove theory, to a problem-driven approach, where theory is used to develop insights about cases (G. F. Davis & Marquis, 2005). Organizational scholars in the field of higher often adopt a paradigm-driven approach, testing alternative theoretical perspectives to identify which one offers the best explanation of a real-world problem (e.g., Jaquette, 2010). I argue that problem-driven research designs will offer deeper insights about college and university behavior than paradigm-driven research designs.

Problem-driven work in organizational studies is increasingly based on the concept of the organizational field. The field consists of actors – focal organizations, key suppliers, customers, and regulators – and the relationships between actors as they pursue goals amidst a changing external environment. The field is not defined a priori. Rather, the scholar sketches the organizational field relevant to the explanation of a particular problem (G. F. Davis & Marquis, 2005). After outlining the organizational field, organizational behavior is a contingent outcome that depends on market position, interactions with other actors in the field, and changes in the external environment (McAdam, Tarrow, & Tilly, 2001). Paradigm-driven research forces messy cases to fit into neat theories. In contrast, research based on the field provides more realistic predictions by identifying the mechanisms at work in a specific empirical context.

This dissertation shows the utility of problem-driven research designs over paradigm-driven research designs. In Chapter 3, I developed alternative hypotheses based on human capital theory, resource dependence theory, and the pursuit of prestige (economics/sociology). The resource dependence hypotheses focused on diversification, which is one element of the theory. At the same time, the hypotheses about prestige were not mutually exclusive from the resource dependence hypotheses. In Chapter 4, I made a conceptual contribution by defining "mission drift" as the change from one organizational template to another (Greenwood & Hinings, 1996). I argued that adding the word "university" to an organizational name symbolized the adoption of a new organizational template. Next, I integrated several literatures within a single theoretical tradition – institutional theory – into a cohesive conceptual framework to study the causes of adopting a new organizational template. In comparison to the paradigm-driven research in Chapter 3, I believe that the problem-driven research in Chapter 4 created a more engaging argument and resulted in deeper insights about a real-world problem.

Therefore, I argue that future research on organizational change in higher education will benefit from using a problem-based, field-based research design. Higher education is an applied research field, so it makes sense that scholars should use theory to develop insights about real-world problems (Peterson, 1985). Like in economics, most organizational theorists view actors in the field as goal-oriented. However, whereas empirical contributions from economics often model behavior based an individual utility functions, the field concept compels scholars to view organizational behavior in relation to the behavior of other organizations.

Data Requirements

The study of organizational behavior poses strong data requirements. By definition, the study of behavioral change requires panel data. Furthermore, empirical contributions to organizational scholarship often use data on focal organizations (e.g., colleges), the relationships between focal organizations (i.e., network ties), and data on the external environment (e.g., demographic change, regulatory change). These intensive data requirements can be a barrier to entry for scholars desiring to study organizational behavior. Therefore, by creating a panel dataset of colleges and universities and by providing these data to the public, I hope to catalyze future research on organizational behavior. In the future, I hope to increase the utility of the dataset by adding variables on faculty, administrators, and institutional expenditures. Eventually, the panel dataset will include a comprehensive set of organization-level variables, to which researchers can merge additional data sources (e.g., Brint, 2002).

Implications for Practice

Administrators

Non-prestigious institutions. The research findings from Chapters 3 and 4 have implications for administrators. I suggest separate implications for non-prestigious and prestigious institutions. Non-prestigious institutions are primarily concerned with long-term organizational stability and enhancing prestige at the regional level. These institutions generate the majority of their revenues from student enrollments. My results indicate that aggressively reorganizing the curricula to attract a diverse customer base is a sound strategy for organizational stability. Institutions can increase enrollments by offering professional baccalaureate degrees and professional master's degrees. Enrollment growth can be further enhanced by targeting part-time and older students and by offering programs in both brick-and-mortar and online settings.

The credentialism literatures suggests that enrollment revenues can be maximized by focus on master's degrees related to occupations where credentials are required or de facto requisite for career advancement. MBAs provide strong enrollment revenues for many institutions(Khurana, 2007). Collins (1974) finds that educational requirements are highest in the social services professions, implying that institutions should adopt professional master's degrees in education (e.g., educational administration, curriculum design, subject-specific teaching, etc), social work, nursing, psychology, public administration.

The results from Chapter 3 suggest that non-prestigious institutions seeking enrollment growth should avoid master's degrees with intensive pre-requisite skills, (e.g. statistics, biology). Non-prestigious institutions draw enrollments primarily from local students (Manski & Wise, 1983), but few prospective students possess the prerequisite skills, leading to low enrollments. In contrast, inter-disciplinary professional master's degrees (e.g., social work, educational administration) can generate strong enrollments while drawing on the local population because these degrees require few prerequisite skills.

I suggest that non-prestigious universities seeking to maximize *net* tuition income should offer a few master's degree programs, each with strong enrollments, rather than many master's degree programs, each with few students. The latter option has poor economies of scale in that it requires high expenditure on administration and requires many different instructors. However, Chapter 3 suggests that institutions may generate strong enrollments by offering short courses, post-baccalaureate certificates, and industry certifications in subjects where degree programs already exist.

The long-term success of any professional degree program depends on cultivating relationships with employers, seeking employer advice on curriculum design, and using former students as a network to help current students find employment. Finally, adopting an incentive-based budgeting system may be a way to devolve enrollment growth incentives to the unit-level (Priest, et al., 2002) and can provide a convenient rationale for cutting unprofitable degree programs.

Prestigious institutions. I assume that administrators at prestigious institutions attempt to maximize prestige. Institutions attempting to maximize prestige should maintain selective undergraduate admissions (Winston, 1999). The strategic use of institutional aid can increase the academic profile of enrolled students. For example, the adoption of a "university honors program" – coupled with an "honors program scholarship" – enables institutions to attract students that would otherwise attend more prestigious institutions.

The competition for prestige depends on maximizing revenues, without engaging behaviors that undermine brand identity (Kraatz & Zajac, 2001). For both prestigious universities and liberal arts colleges, revenues from donations and investments (e.g., endowment) generate substantial revenues without undermining brand. Although master's degrees undermine brand identity as prestigious liberal arts colleges, prestigious research universities can generate substantial enrollment revenue from master's degrees without undermining brand identity. For example, both Harvard University and Oxford University couple very-selective undergraduate programs with less-selective graduate programs. Prestigious universities enjoy strong demand for their master's programs, leading to cohort sizes that are typically much larger than those at non-prestigious institutions.

At research universities, academic units are often responsible for generating revenues to match costs. This creates an incentive for academic units to increase master's degree enrollments, especially in professional schools that have few undergraduate students (e.g., social work, education). Deans in these units may be tempted to grow master's enrollments aggressively. However, the expansion of cohort sizes may negatively affect the academic profile of enrolled students. Therefore, enrollment growth can negatively affect USNWR rankings if it is coupled with declines in academic profile. In turn, lower USNWR rankings leads to lower student demand (Bowman & Bastedo, 2009). Therefore, a better strategy may be to pursue enrollment growth only when it does not negatively affect academic profile. Additionally, academic units may temporarily decrease cohort size to generate a positive shock to academic profile.

Policymakers

The research findings from Chapters 3 and 4 also have implications for policymakers. Frank (2008) argues that one goal of public policy is to discourage behaviors that are individually rational but socially harmful. The pursuit of prestige is a zero-sum game; no matter how many billions of dollars are spent on the pursuit of prestige, only 25 institutions "get on the front page" of USNWR rankings (Bowman & Bastedo, 2009). Winston (1999) argues that institutions are engaged in a socially wasteful arms-race for educational prestige, spending vast sums on luxury dorms and recreation centers in order to attract the best students. The spending is wasteful in the sense that it drives tuition prices upwards without contributing to a higher quality education. Increasingly, institutions attempt to increase their academic profile by devoting institutional aid to "merit" rather than "need" (Doyle, 2010), a phenomenon that may result in reduced access to prestigious institutions for low-income students.

Policy prescriptions for problems associated with the pursuit of prestige are unclear. In theory, wasteful competition can be curbed by placing a ceiling on the amount of money spent (Frank, 2008). Decreasing maximum loan amounts, especially for affluent households, could ultimately result in lower tuition prices and lower spending per student, perhaps making educational spending more efficient. However, this solution is politically unfeasible in that it undermines access to prestigious institutions for middle class families. Similarly, state policymakers could set lower ceilings on tuition, making it more difficult for prestigious public universities to compete with prestigious private universities. However, maintaining prestigious public universities is one way states retain their most talented students and poach the most talented students from other states. Furthermore, policymaking is moving away from tuition ceilings, with several states relinquishing regulatory control as compensation for lower state appropriations (Breneman, 2004).

Another policy concern is that degrees that are profitable for institutions may not provide skills that are scarce in the labor market. For example, Chapter 3 shows that the adoption of master's degrees in educational administration is *negatively* related to the number of jobs in educational administration. The policy prescription is to modify incentives so that organizations pursue social policy goals through the pursuit of their own self-interest. While performance funding in U.S. postsecondary education has been widely viewed as ineffectual (Burke & Minassians, 2003; Dougherty & Hong, 2005), other countries have been successful in creating funding policies that incentivize organizations to pursue policy goals (DfES, 2003).

For U.S. policymakers, the "carrot" option may be for governments to provide supplemental payments for the production of desired degrees – e.g., psychometrics, STEM fields, potentially by embedding these incentives in funding formulae (Jaquette, 2009). However, funding such policies could be difficult politically. Multiple "stick" options exist. First, the federal government could require institutions to prominently display program-specific information on graduation rates, the percent of graduates who find related employment, and the percent of graduates who pay back student loans. A more extreme policy solution would refuse Title IV funding eligibility for degree programs with low-rates of job-placement and high rates of student loan default.

Conclusion: Equity and Efficiency Implications

Labaree (1997) describes three competing views on the goal of education. First, the *democratic equity goal* argues that all individuals should have equal access to education, both because a flourishing democracy requires an educated citizenry (Bloom, 1987) and because unequal access to education violates democratic principles of equity (Kezar, Chambers, & Burkhardt, 2005). Second, the *social efficiency goal* argues that different individuals require different levels of education in order to fulfill their appropriate role in the hierarchical labor market. The social efficiency goal is associated with human capital theory in economics (Becker, 1964; Goldin & Katz, 2008), functionalism in sociology (K. Davis & Moore, 1944; Parsons, 1959), and is exemplified by hierarchical state systems of postsecondary education, such as the California "Master Plan" (California State Department of Education, 1960).

Third, the *status attainment goal* argues that education is a private good that helps individuals obtain a competitive advantage in the competition for scarce jobs. The status attainment goal is associated with signaling theory in economics (Spence, 1973) and the credentialism literature in sociology (Berg, 1970; Collins, 1979). Under the social efficiency goal, total spending on education should not exceed that which is required to fulfill the skill demands of the labor market. Under the status attainment goal, total spending on education surpasses the amount required to fulfill the skill demands of the labor market because individuals attain career advancement by acquiring more credentials than competitors, creating an "arms race of educational attainment" (Frank & Cook, 1995).

Two reasons explain why the status attainment goal has become the dominant goal of education. First, competition intensifies when the number of desirable jobs is surpassed by the number of people competing for those jobs (Blau, 1994; Boudon, 1974). In the mid-twentieth century, social mobility increased because low-skill agricultural jobs were replaced by high-skill blue-collar and white-collar jobs (Blau & Duncan, 1967). Growth in the supply of high-skill occupations required investments in training so that individuals could perform job responsibilities (Clark, 1962), an explanation consistent with the social efficiency goal of education.

In the late-twentieth century, however, the number of high-skill job opportunities declined relative to the supply of highly-educated labor (Blau, 1994). The proportion of 25-29 year-olds with a baccalaureate degree increased from 26% in 1980, to 32% in 2000, to 35% in 2009 (NCES, 2010). By contrast, the Bureau of Labor Statistics (2006) states that only 20% of jobs "required" (according to job-skill requirements) at least a baccalaureate degree in 2004 and projects that 21% jobs will require at least a baccalaureate degree in 2014. As the number of job opportunities to decline relative to the number of job-seekers, individuals have an incentive to seek education in excess of job-skill requirements in order to compete for increasingly scarce jobs.

The second reason for the dominance of the status attainment goal relates to the adage "he who pays the piper calls the tune." Both the democratic equity goal and the social efficiency goal view education as a public good (Labaree, 1997). During the "golden era" of higher education (Thelin, 2004) institutions largely pursued the social efficiency goal because government revenue comprised a large percentage of total revenue.[61] In recent decades, tuition revenue from paying customers has increased and government revenue has declined, implying that institutions increasingly serve the status attainment goal of education, which views education as a private good.

The dominance of the status attainment goal is lucrative for postsecondary institutions. As supply of baccalaureate degrees increases relative to number of jobs "requiring" a baccalaureate, it becomes harder for employers to distinguish between job applicants purely on the basis of the baccalaureate (Hershbein, 2010). Paradoxically,

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[61] Author's calculations.

demand for master's degrees increases because the supply of college-educated labor exceeds the demand for college-educated labor. As I argued previously, most postsecondary institutions depend predominantly on enrollment-related revenue. Therefore, institutions can grow graduate enrollments by capitalizing on the competition for credentials that is inherent in the status attainment goal. In addition to master's degrees, institutions may offer post-baccalaureate certificates and industry certifications that promise a competitive advantage in the competition for career advancement.

A recent New York times article "The Master's as the New Bachelor's" (Pappano, 2011) describe the growth of the professional science master's (PSM) degree, which combines "job-specific training with business skills." Institutional administrators and the Council of Graduate Schools rationalize these degrees in terms of the social efficiency goal of education; they provide skills that are required due to technological and economic change.

> "There are several million job vacancies in the country right now, but they don't line up with skills," says [David King, dean of graduate studies and research at the State University of New York at Oswego]. Each P.S.M. degree, he says, is developed with advisers from the very companies where students may someday work. "We are bringing the curriculum to the market, instead of expecting the market to come to us," he says.

It is unsurprising that the actors who benefit most from the growth of master's degrees describe master's degrees as necessary for society, rather than as a means of generating tuition revenue. In contrast, employers, students, and scholars describe the growth of master's degrees in terms of the status attainment goal; master's degrees become necessary to get a job when employers – faced with hundreds of applications – discard all applicants without a master's degree (Pappano, 2011).

What are the implications for equity and efficiency (DesJardins, 2002) when the goal of education becomes acquiring more credentials than the next person? First, the dominance of the status attainment goal undermines the social efficiency goal. In aggregate, society devotes excess money to education because individuals acquire education in excess of job-skill requirements in order to compete for scarce jobs (Labaree, 1997). It is important to note that postsecondary institutions are the primary beneficiaries of this system; when some individuals gain a competitive advantage in the labor market by enrolling in a master's program, it becomes more rational for other individuals to follow suit, or else get left behind (Boudon, 1974). Furthermore, postsecondary institutions receive tuition funding on the front-end, but students must repay loans on the back-end, regardless of whether the credential leads to a job.

Second, the status attainment goal of undermines the democratic equity goal of equal opportunity (Labaree, 1997). When postsecondary institutions adopt degrees for the purpose of generating tuition revenue, they implicitly value only those students that can afford the tuition. When master's degrees become prerequisite for entry-level jobs, social mobility is likely to decrease because low-income students cannot afford master's degree tuition without incurring significant debt.

Postsecondary institutions are kingmakers in the sense that degree-granting authority enables institutions to bestow individuals with legitimacy in labor and social markets. Because most institutions depend predominantly on tuition funding, institutions will disproportionately bestow legitimacy on the paying customer, while prospects diminish for the capable self-learner. These ideas can be found in the prescient words of Max Weber (1948, pp. 242-243):

When we hear from all sides the demand for an introduction of regular curricula and special examinations, the reason behind it is, of course, not a suddenly awakened 'thirst for education' but the desire for restricting the supply for these positions and their monopolization by the owners of educational certificates….As the education prerequisite to the acquisition of the educational certificate requires considerable expense and a period of waiting for full remuneration, this striving means a setback for talent (charisma) in favor of property. For the 'intellectual' costs of educational certificates are always low, and with the increasing volume of such certificates, their intellectual costs do not increase, but rather decrease.

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