Assessing the Structure of Organizational Fields:
Multilevel Latent Class Analysis as a Tool for Institutional Analysis

Sondra N Barringer, M.A.
University of Arizona
July 17, 2009

Abstract: Within organizational research a question researchers are often interested in is the "why" question. A question that is not focused on as frequently is the how question. I argue in this paper that as researchers we need to pay more attention to how organizations are behaving within organizational fields before we begin to answer the why questions and in order to do this researchers need to expand their methodological tool kits. This analysis examines how institutions within the field of higher education have responded to the changing environmental conditions. Using multilevel latent class analysis I show that there are a number of distinct strategies that the organizations within this field are pursing as well as distinct deviations between the behavior of public and nonprofit institutions. This analysis of the changes occurring in the field of higher education demonstrates the ability of MLCA to break the organizational field down into more manageable units which allows for a deeper understanding of the ways in which these fields are changing over time. MLCA makes organizational fields more manageable both empirically and conceptually resulting in a more accurate assessment of the critical dynamics within the organizational fields

Keywords: Multilevel latent class analysis, Organizational fields, Higher education, Strategic adaptation, Organizational change

Word Count: 8,288 not including Works Cited and Appendix; 9,635 including Works Cited and Appendix

Introduction

Within organizational research a key question researchers are often interested in is the "why" question. Researchers want to know why certain organizations survive and certain organizations fail (Hannan and Freeman1977; Carroll and Swaminathan2000; McPherson 1983), why organizations are becoming more similar (Powell and DiMaggio 1983, 1991; Meyer and Rowan 1977), why organizations are adopting reforms that are not required of them (Tolbert and Zucker 1983; Meyer and Rowan 1977) why the structure of corporations change over time, and why organizational fields evolve differently around the world (Fligstein 1991; Dobbin 1995). The why questions generally, though not always, are the main focus of research about organizations.

A question that is not focused on as frequently is the how questions: how do different organizational structures impact different constituencies, how are organizations responding to changes in their environments, how constituencies impact organizations (Becker 1998). The how questions get at the process behind the events as well as the actual events and take a more holistic approach to understanding social phenomena. Why questions on the other hand tend to focus on evaluating the validity of a particular event or condition rather than obtaining a complete picture of what is going on with a particular phenomenon of interest. In order to fully understand the answer to the why question and provide a valid explanation researchers must understand the contextual environment of the phenomenon they are studying. For example, in order to understand why organizations within a particular field are becoming more similar we need to first understand in what ways they are converging, in other words researchers need to understand the pathways they follow as they become more similar before they can answer why.

I argue in this paper that as researchers we need to pay more attention to how organizations are behaving within organizational fields before we begin to answer the why questions and in order to do this we need to expand out methodological tool kit. Traditional regression frameworks do not

allow for the detailed evaluation of how organizations are behaving and adapting, they are focused on evaluating the role of particular factors in explaining why these changes occur. Social network analysis can be incorporated to answer both how and why questions, but to date has primarily focused on questions of diffusion and using network ties as an pathways through which isomorphic pressures can be exerted and currently are unable to address changes over time (Abbott 2004; Breiger 2004l).

A technique is needed that allows for the examination of both how organizations change as well as evaluating the impact of factors that influence those changes. Multilevel latent class analysis (MLCA) is a method that is able to do these things. MLCA allows for the detailed examination of the organizational field through the generation of groups or clusters of institutions that respond to forces in similar ways, thereby breaking the organizational field down into smaller more comprehensible units while still allowing for the analysis of the field as a whole. This is different than the majority of approaches used to examine organizational fields which have the implicit assumption that all of the organizations will respond in similar ways.[1] There has been a significant body of work that indicates that organizations within a field do not always respond in similar ways. Organizations in different sectors have been shown to respond in very different ways to the same set of conditions (Frumkin and Galaskiewicz 2004, Weisbrod 1998; Frumkin 2002).

The particular research question of interest for this analysis is how institutions within the field of higher education have responded to the changing environmental conditions which began in the mid 1970s and early 1980s. The analysis shows that there are distinct differences between the organizations in the field of higher education in how they respond to environmental conditions that

---

[1] Both qualitative and quantitative approaches used in the study of organizational fields tend to study the field as a whole with little attention paid to how subgroups in the field can react differently to the factors influencing the field. Some examples of this include Fligstein 1991, DiMaggio 1991, Dobbin 1995, Tolbert and Zucker 1985. There are some exceptions to this, most frequently these are found in the population ecology literature where more attention is given to market position and the different roles of specialist versus generalist organizations (Hannan and Freeman 1989; Carroll and Swaminathan 2000).

should be taken into account in order to obtain a more comprehensive understanding of the dynamics of this complex organizational field. These differences include distinct deviations between the behavior of public sector and nonprofit sector institutions as well as significant variation within these two sectors. This will also serve to illustrate the utility of MLCA in organizational research for the study of organizational fields.

The paper will be organized as follows. First, I will briefly discuss the state of research surrounding this question of change within organizational fields and strategic adaptation. Following this I will outline the case of interest, the field of higher education in the United States from 1975-1995. Next I will discuss the data and measures incorporated in this analysis. This will be followed by a brief discussion of the nature of MLCA. The discussion of the analysis and results will incorporate a more in-depth examination of the multilevel latent class analysis highlighting features unique to this statistical method. Particular attention will be given to the similarities and differences between the strategies pursued by public and private institutions of higher education and the longitudinal changes including potential avenues for cross-field comparisons of stability and mobility. I will conclude with a summary of the findings and the implications of these findings for the field as a whole.

Research on Organizational Fields

Within organizational research there are a number of different theoretical paradigms that can be used to understand the behavior of organizations, for the purposes of this analysis I focus on neoinstitutional theory which takes as its starting premise that organizations within a field will become more similar over time (Meyer and Rowan 1977; Powell and DiMaggio 1983). Typically research within this field focuses on which factors are causing organizations within an organizational

field to become more homogenous in their structure or strategies.[2] The examination of how organizations are behaving is given less emphasis within the literature; more attention is focused on explaining the strategic adaptations or behavior of the organizations in response to the changes. This is occurring in spite of the importance of acceptably answering how organizations are behaving for the internal validity of the argument explaining why the changes occur within an organizational field. This is a likely byproduct of the inability of the standard methodological toolkits used to address these issues to adequately assess how different organizational groups are behaving within an organizational field.

There are two distinct strains of research within the neoinstitutional framework that should be addressed and both focus primarily on the question of why organizations are becoming more similar (Mohr 1982; Tolbert and Zucker 1996; Scott 1994). The first research strain has focused on narrative accounts of organizational field formation, structuration and change through the use of qualitative techniques, primarily historical case studies, which examine a particular organizational field or set of institutions over a broad time span (Frumkin and Kaplan 2002). This line of inquiry is particularly useful for providing insight on the sequence of actions and events that shape organizations within a particular field which cannot be provided by the second strain of research which is more cross sectional in nature. Some of the notable studies in this tradition include DiMaggio's work on art museums (1991), Brint and Karabel's work on community colleges (1991), Dobbin's work on the railroad industries in Great Britain, France and the United States (1995) and Fligstein's work on the evolution of the corporate form (1991).

The second strain of research within neoinstitutional theory is characterized by quantitative analytical techniques which utilize a cross sectional approach to examine organizational fields with the occasional addition of longitudinal data (Frumkin and Kaplan 2002). Overall these studies are

---

[2] For example Fligstein's examination of the transformation of corporate control in the United States in the 20th century (1991) or Brint and Karabel's analysis of American community colleges in the latter half of the 20th century (1991).

testing neoinstitutional theory against some alternative theory of organizations through the use of standard regression analyses and also, with increasing frequency, the use of social network analysis (see Tolbert, 1985; Kraatz & Zajac, 1996; Galaskiewicz & Wasserman 1989; Palmer, Jennings & Zhou, 1993). While providing answers to key questions within the field of organizational analysis this quantitative approach tends to focus on the evaluation of narrow questions through traditional hypothesis testing procedures based on the significance of variables within a regression framework. In addition, with few exceptions social network analysis, though more equipped to deal with how questions, is not as useful for time series data and is not well equipped to deal with statistical inference (Abbott 2004; Breiger 2004).

The technique of multilevel latent class analysis (MLCA), however, provides an analytical framework that can be used to examine both the how and why questions of organizational fields and neoinstitutional research while combining aspects of both of these research traditions. MLCA bridges these traditions by looking at the organizational field inductively, examining how different groups of organizations are behaving over a period of time within an organizational field while at the same time still providing a framework for the statistical evaluation of the impact of various factors on the organizations within the organizational field.

Contributions of Multilevel Latent Class Analysis

This method provides a more accurate picture of the dynamics of organizational fields than the standard techniques used within the second strain of quantitative analysis for three primary reasons. First, it provides a mechanism that uses the similarities and differences of institutions within a particular organizational field to estimate clusters of institutions that are pursuing particular behaviors or strategies (Vermut 2003; Eliason et al 2007; MacMillan and Eliason 2003). This is an advancement over the state of current research which often examines the field as a whole without taking into account how different clusters of institutions could be behaving in drastically different

ways. Accounting for these different groups of institutions are fundamental to understanding an organizational field because it breaks down the organizational field into more manageable units of analysis thereby allowing for the variation in the organizations within a field to be more accurately accounted for within empirical analyses of organizational fields.

Second, MLCA allows for the examination of institutions both cross sectionally and longitudinally, adding to our ability to study institutional change over time. Third, this technique allows for an evaluation of independent factors that are allowed to vary across the different clusters of institutions that are specified, in other words, allowing different groups of institutions to be affected by exogenous factors in different ways. Accounting for these differential effects is important because they can erase or minimize the magnitude of the effect of a particular factor, which may be shown to be significant when those group differences are taken into effect. This leads to researchers falsely concluding that particular factors do not have an impact on the dynamics of an organizational field when these factors happen to impact different sets of institutions in drastically different ways.

The Field of Higher Education in the United States

The field of higher education is rarely examined as a whole due to the significant differences that exist between the institutions within the field instead previous research has focused on a wide variety of smaller groups of organizations within this field (Rizzo 2006; Powell and Smith 2002; Brint and Karabel 1991; Kirp 2003).[3] Given these differences and variation within the field, it is apparent that a standard quantitative analysis of this field as a whole would obscure the variation in the impacts of exogenous factors on this field while at the same time confounding the variation in the changes that occur in the behavior or strategic adaptation of the organizations in this complex

---

[3] For example, including the wealthy Ivy league institutions as well as the smaller branch campuses of state institutions within the same sample is problematic due to the fact that exogenous factors are likely to impact these two groups of institutions in drastically different ways, not to mention the fact that in many ways these institutions are not subject to the same set of external pressures or constraints (Ehrenberg 2002, 2006).

and dynamic field. Therefore when it comes to answering the question of how institutions of higher education have adapted their behavior to the changing environmental conditions of the field as a whole MLCA provides a methodological tool that allows for the examination of how these organizations have changed over time within the field as a whole without obscuring the variation in the behavior of different groups of institutions within the complex and dynamic organizational field.

In order to examine the utility of MLCA for answering the how questions of organizational change and strategic adaptation and how the field of higher education has changed over time I will be examining the field of higher education in the United States from 1975-1995. MLCA will be used to examine how the colleges and universities within this field were behaving and how that behavior changed over the course of the period; specifically how their funding strategies changed as the environmental conditions around the institutions changed. In this section I will establish briefly the nature of some of these changes to provide a basis for focusing on this case and time span and to orient the reader to the field as a whole.

The 1970s began a key period of transition for higher education in the United States which necessitated changes in the behavior of the organizations within this field. This decade marked the start of a shift in higher education that has been characterized by declining state support, at both the federal and state levels, as well as shifts in the nature of federal financial aid and federal research funding (Kirp 2003; Ehrenberg 2002, 2006; Alexander 2006; McPherson and Shapiro 1998; Powell and Smith 2002). The role of the federal government in supporting research at colleges and universities in the United States has changed significantly since the early 1970s when legislation was enacted which demanded a greater emphasis on more directed or "useful" research rather than basic or "undirected" research. Since this change in legislation the government's share of research costs has been decreasing and universities have to turn to alternative sources of funding for research

dollars while costs at colleges and universities have continued to increase (Kirp and Berman 2003; Powell and Smith 2002, 1998).

Federal financial aid policies were also subject to a major policy shift in the 1970s. Prior to this point in time federal financial aid was distributed directly to the institutions rather than the students. The shift in the policy, giving the money directly to students, gave the students greater freedom in choosing the college or university of their preference (Parsons 1997). This change also resulted in the creation of significant subsidies in the form of financial aid money to private colleges and universities at a time when they were facing threats to their existence due to increased competition from cheaper public universities (Alexander 2006). This shift in financial aid policies was followed in the 1980s by a general decline in federal student aid as the program began to shift towards a greater reliance on loans rather than grants. More recently the nature of financial aid provided by the colleges and universities has changed as the institutions increasingly use it as a competitive weapon for schools to employ to recruit the best students which also reflect a broader trend away from need based financial aid towards merit based aid (McPherson and Schapiro 1998).

Public institutions of higher education are subject to an additional external constraint which does not generally affect private institutions, state appropriations. On average state appropriations account for approximately one third of the budgets of public colleges and universities thereby constituting a significant source of external funding that has been declining since the late 1970s (Wiley 2006). In 1974 state appropriations covered 78% of the cost of schooling on average; in 2000 they only cover 43% of the cost of schooling indicating a significant decline (Rizzo 2006).

These external forces, according to numerous accounts in the literature, are significantly impacting the field of higher education in the United States (Ehrenberg 2006; Brint 2002; McPherson and Shapiro 1998; Kirp 2003). Based on this previous research as well as preliminary analyses I argue that they field of higher education is in a period of transition during the 1970s to

1990s.[4] This leads to two questions: how are the organizations responding to these forces over time; and do these responses different for the different groups.

Data

  The data used to examine these questions is drawn from the Institutional Data Archive (IDA) which has been developed by the Colleges and Universities Staff at the University of California Riverside (Brint et al 2003). The dataset is a compilation of both longitudinal and cross-sectional datasets originally including 384 public and private institutions of higher education[5]. A stratified sampling design of both public and private colleges and universities was used to create the dataset.[6] This stratified design leads to an overrepresentation of the more elite research universities within the data; however, I argue this is beneficial to the analysis at hand for three reasons. First, the elite institutions are those that set the trends for the rest of the field and are those that are most frequently discussed in the debates about higher education and therefore are important cases that need to be understood in order to comprehend the dynamics of the field of higher education. In addition, the inclusion of a random sample of institutions from the other three tiers provides an opportunity for comparison between the behavior of the elites and the rest of the field of higher education allowing for increased insight into the overall dynamics of the field. Given that the focus of this analysis is on the organizational field as a whole, it is necessary to include a wide range of institutions (in terms of their relative status) from both sectors in order to gain a complete picture of

---

[4] Given that the shifts in financial aid, federal research funding and state appropriations all began in the mid to late 1970s focusing on the time period from 1975 to 1995 allows for the assessment of the funding strategies pursued by institutions both before and after the key changes. I assert that this twenty year time frame offers an adequate window for the assessment of how these institutions of higher education were responding to the changes which began in the mid 1970s and early 1980s.

[5] I excluded a small number of the public institutions due to the fact that the majority of the variables of interest were unavailable for those institutions. Taking into account the dropped cases the final analysis included 165 public higher education institutions and 210 private institutions of higher education for a total sample size of 375 institutions.

[6] This sampling design was implemented by first including all 71 of the highly selective colleges and leading research universities in the United States, along with more than 100 institutions from the other three tiers. The three additional tiers are: "other selective colleges and research universities", "masters-granting comprehensive universities," and "non-selective baccalaureate-granting institutions" (Brint et al 2003, Codebook).

the overall variety of strategies that are being pursued within the field and how they might differ between public and private institutions.

There are three modifications that were made to the dataset as a whole. First, all variables reported in dollar amounts were adjusted for inflation and included in terms of 2005 dollars. Second, the funding streams included in the analysis were scaled by the enrollment levels at each college or university.[7] This method of standardization takes into account the different sizes of the institutions while also providing insight on some potential enrollment dynamics in these institutions in effect creating standardized absolute measures of the funding streams that compose the organization's funding strategy.

The final change made to the data was in order to ease the interpretation of the results. All of the observed variables were recoded as ordinal variables; specifically each variable was broken down into deciles for each sector[8] at each point in time.[9] This allows for the examination of changes of the individual institutions in terms of their position on each of the funding streams relative to the other institutions over time. The ordinal variables allow for a clearer interpretation of the strategy clusters because each cluster is defined by relative levels of funding sources rather than by raw dollar amounts which, greatly eases the interpretation of the results of models of this nature.

Table 1 below lists the observed funding streams that were used to estimate the strategy clusters of the institutions of higher education along with brief descriptions of each of the

---

[7] The end result of this process is that each variable is reported in thousands of 2005 dollars per student This standardization was used instead of examining each category as a percent of total funds due to the ambiguous nature of the original data which made it difficult to compute the values for each of these funding streams as a percentage of the total funds of an institution.

[8] Recoding the variables separately for the two sectors allowed for the examination of the relative movement of institutions within each sector rather than over the entire field which was more useful for the analysis at hand due to the fact that recoding without differentiating by sector would eliminate a significant amount of the variation in the funding stream levels for public institutions.

[9] The ordinal categorization of variables is usually difficult for statistical methods to deal with; however within the latent class regression model framework the reverse is in fact the case, the ordinal classification greatly eases the interpretation of the results relative to interval scale variables without a corresponding decline in the statistical power of the models. The relative changes between the strategies and over time are also more easily addressed within this ordinal categorization scheme which is the primary focus of this analysis. Categorization of variables such as these within the higher education literature is also common practice in order to ease the interpretation of results.

indicators. These funding streams were chosen because in combination they provide the majority of internally generated revenues for the colleges and universities. [10] Using information from the literature on higher education it was determined that tuition income; educational activities income, gifts grants and contracts, endowment income, and the value of an institutions' endowment are all key resources for colleges and universities (McPherson and Schapiro 1998; Ehrenberg 2002, 2006). The value of an institutions endowment was included for two reasons. First, in order to control for differences between institutions, particularly in terms of wealth, and second, the market value of an endowment in combination with endowment income is more fully representative of the resources dedicated to this funding source.

Table 1: Observed Funding Streams

Variables	Descriptions
Tuition Income	The income received from tuition revenues per enrolled student in thousands of dollars
Endowment Income	The income received from the endowment per enrolled student in thousands of dollars
Education Activities Income	The income received from revenues of educational activities per enrolled student in thousands of dollars
Gifts, Grants and Contracts	The income received from gifts, grants and contracts from private sources per enrolled student in thousands of dollars
Market Value of the Endowments	The market value of the endowment of the institution to control for differences in the wealth of institutions

Multilevel Latent Class Analysis

In this analysis MLCA is used to estimate strategy clusters within the field of higher education based on the levels of different funding streams that colleges and universities rely on. These models use the observed funding streams of colleges and universities in the United States, to create clusters/classes/groups of organizations that pursue the same strategies. The models also

---

[10] Sources of external funding such as federal and state government support as well as financial aid are excluded from the estimation of the strategy clusters for two reasons. First they are beyond the direct control of the colleges and universities and second because these are representative of the external factors that I believe are causing the funding strategies of institutions of higher education in the US to change over this period.

allow these classes to conditionally vary (in terms of their prominence among the sample) over time and the institutions themselves to move between the strategies overtime which allows for a detailed and comprehensive mapping of the strategies pursued by these institutions and how the configurations of strategies change over time in response to changing environmental conditions (Vermut 2003; MacMillan and Eliason 2003). This method thereby allows researchers to gain a more comprehensive picture of how organizations are changing within the field of higher education within this period.

MCLA was chosen over other, more common, methods for clustering including hierarchical clustering, correspondence analysis and factor analysis for three reasons. First, the functional form of this model and the math involved in estimating the parameters and mapping out the associations is relatively simple. This is not to say that it is not difficult but rather that compared to other clustering methods it is more intuitive, which could decrease potential errors due to misapplication. Second, this method, unlike the others mentioned, has the ability to model cross sectional association, changes in those associations over time and the impact of exogenous changes on the likelihood of a case or institution being in one strategy rather than other strategies or the marginal which provides a more comprehensive picture of how organizations are changing (Vermut 2003; MacMillan and Eliason 2003; Eliason et al 2007). Neither factor analysis or other clustering methods are able to take into account the trajectories of strategy clusters and the movement of institutions between those strategy clusters over time which is fundamental to understanding how organizational fields are structured and the organizations within them are adapting in response to dynamic conditions (Abbott 2001). Finally, latent class analysis is able to fully account (assuming a good fitting model) for the association between all of the observed funding streams and incorporate this into the estimation of the latent strategy clusters and trajectories; this is in contrast to other methods which rarely are able to fully account for the association and therefore are unable to establish a

complete picture of how organizations are behaving within a field (Vermut 2003; Clogg 1995;

Eliason et al 2007).

The overarching goal of multilevel latent class regression models is to answer the question of

how many core trajectories (paths over time) can accurately characterize a given set of cases or

institutions. This framework allows for the examination of the different strategy trajectories

organizations pursue over time within a field, as well as a detailed picture of the component parts of

those strategies (in terms of various funding streams levels which characterize a particular strategy

cluster) at each point in time within the field. The nominal latent variable that is generated by the

model (which represents the strategy clusters), assuming a good fitting model, accounts for the

totality of the association between the observed variables. In the language of conditional

independence, all the information about the associations is contained within the latent strategy

clusters and therefore no other information is necessary to understand the relationship between

these variables. In substantive terms, the latent classes of strategies incorporate all the relevant

statistical and distributional information about the relationships between the funding streams of

these institutions of higher education, therefore the funding strategies, pursued by the institutions in

the sample are fully taken into account by the strategy groups estimated by the MLCA model.[11]

The statistical model for MLCA, before any exogenous factors are included in the model, is

simply a variation on a log linear model for counts. The parameters in the model each capture

different parts of the overall association between all of the observed factors and the latent class

variable. This is perhaps best illustrated with the equation for the model. The statistical equation for

the latent class analysis model is:[12]

---

[11] For further information on multilevel latent class regression models see: Macmillan and Eliason 2003; Vermunt 2003; Eliason et al 2007; Vermut and Magidson 2005; Goodman 1974.

[12] Where F_1 is the tuition income, F_2 represents the educational activities income, F_3 corresponds to the gifts, grants and contracts income, F_4 refers to the endowment income, F_5 refers to the market value of the endowment, and π represents the conditional probability of an institution being in a particular strategy cluster relative to the marginal for each of the

$$\pi_{fjklmst}^{F_1 F_2 F_3 F_4 \ F_5 \ X_{it} Y_i} = [\pi_{fs}^{F_1|X} \pi_{js}^{F_2|X} \pi_{ks}^{F_3|X} \pi_{ls}^{F_4|X} \pi_{ms}^{F|X}][\pi_{st}^{X|Y}]\pi_t^Y$$

The left side of the equation basically represents the total association between all of the

observed funding streams and the latent strategy clusters where as the right side is all of the

parameters that must be included in order to fully account for that association (once again assuming

a good fitting model). Each parameter in the first set of brackets on the right refers to the

conditional probability of the observed funding stream (corresponding to F_i where i corresponds to

the particular funding stream), for a given strategy cluster relative to the marginal or average over all

of the strategy clusters. In other words there is a separate parameter for each observed funding

stream and each latent strategy cluster that is estimated in the model. Together all of these

parameters represent the conditional probabilities of the different levels of the funding streams

occurring in each of the latent strategy clusters thereby fully accounting for the association between

all of the funding streams and the latent strategy clusters (again represented here by the different

nominal categories of X). The parameter in the second set of brackets indicate the conditional

probabilities of each latent strategy cluster X occurring in a given latent path or trajectory Y. This

parameter is taking into account the changes over time in the prevalence of the different strategy

clusters (as defined in the previous set of brackets) and in so doing also accounting for the

movement of institutions between the different strategy clusters overtime. The final parameter in the

above equation (π_t^Y) represents the weights of the latent strategies on Y.

Analysis and Results

As with any empirical analysis there are many steps to multilevel latent class analysis. This

section will go through the analysis in somewhat sequential order for two purposes: first, to allow

for a better understanding of the analyses that are being performed; and second to provide a

---

conditional relationships specified by the observed revenues streams. The latent strategy cluster variable, which is
nominal, is represented by X and the latent trajectories of the strategy clusters, a group nominal variable, are represented
by Y.

coherent narrative of the results of the analyses which will highlight the numerous features of

MLCA that allow for a more adequate answer to the how questions of organizational analysis. It

should be noted that the models for public institutions were estimated separately from the models

for private institutions. The specifications of both sets of models are identical, the same funding

streams are included, the same exogenous forces are evaluated and the same alterations were made

to the data. This was done for two reasons. First running the models separately allowed for a more

complete understanding of what was happening over the period for each sector which was rather

distinct. The second reasons was practical, if all of the institutions (both public and private) were

included in one model there is simply too much heterogeneity between the colleges and universities

for the model to estimate a coherent set of strategy clusters and latent trajectories that were

substantively interpretable.[13]

Estimating the Strategy Clusters

MLCA begins with the specification of the observed variables that define the nominal latent

classes, in this case strategy clusters; and uses the associations between these observed factors to

determine how organizations are grouped within an organizational field. Each strategy cluster is

generated based on the interrelationships between the institutions as defined by the associations

between the funding streams included in the analysis.[14] In order to estimate the strategy clusters all

possible combinations of latent classes and latent pathways are estimated until the model with the

lowest BIC and CAIC scores is ascertained. The model with the lowest BIC and CAIC score

contains the optimal number of latent classes and latent trajectories that best represent the data; this

best fitting model is able to fully account for the association between the institutions given the

observed variables and data. Using these scores I determined that the best fitting model for public

---

[13] Including all of the institutions in one model would also obscure the significant variation that exists within the two sectors thereby obscuring key differences between organizations within the two sectors.

[14] These models were run using the Latent Gold (version 4.5) statistical package (Vermut and Magidson 2005).

institutions has five strategy clusters with five distinct trajectories over time. The private institutions were determined to have six latent strategy clusters and six latent trajectories for those strategies over time.[15]

MLCA, unlike other clustering methods, has the ability to evaluate the significance of each of the observed variables in determining the boundaries of each of the strategy clusters. In the case of private colleges and universities there are only four situations in which a specific funding stream was not significant for a strategy cluster. However all of the group Wald Chi-Square statistics for each of the funding streams were significant indicating that all of the funding streams are necessary to fully differentiate the institutions into the six strategy clusters.[16] In the case of public institutions the overall the Wald Chi-squares for each funding streams on the strategy clusters as a group are also significant indicating that all of these funding streams are significantly contributing to the determination of the strategy clusters of the public colleges and universities. There were only four situations where an individual funding stream was not significant for a specific strategy cluster again indicating that all of the funding streams are necessary to fully account for the boundaries between the latent strategy clusters.

How are Colleges and Universities Responding to Changing Conditions?

A key component that is necessary to understanding how organizations within a field adapt or behave generally is the determination of whether or not all the organizations within a field are behaving in a similar way. If there are multiple groups of institutions that are all behaving in a

---

[15] In most cases the best fitting model will account for all of the association between the observed variables that define the strategy clusters, however in some cases there are additional associations that must be accounted for which was the case for the model estimated for the private colleges and universities. Residual association can be addressed through the examination of the bivariate residual plots which display the residual associations of the observed variables included in the analysis. These associations are taken into account through the specification of covariance associations the variable pairs that exhibit high associations. It was necessary to include two covariance associations, the value of the endowment and the endowment income and the value of the endowment and the tuition income, in order to fully account for all of the association in the private institution model.

[16] The P-values for each of the funding streams for each of the strategy clusters are included in Table A1 in the appendix.

different manner and this is not ascertained it is not only substantively problematic but it can also lead to inaccurate statistical inferences about the behavior of the organizations within a field. MLCA addresses this issue directly by estimating different strategy cluster or groupings of institutions within an organizational field that are similar in terms of observed factors, in this case funding streams. In addition to providing these groupings MLCA estimates which institutions are in each strategy cluster, the specific funding stream levels that characterize each strategy cluster, and how the prevalence of that strategy cluster changes over time.

For private colleges and universities six distinct strategy clusters were estimated using MLCA. Table 2 provides a brief description of each strategy cluster as well as some typical cases and the basic trend over time of the prominence of the strategy cluster. Each of these strategy clusters were examined in great detail and then labeled based on the funding stream levels and other key characteristics of the colleges and universities that are included in the clusters. The strategy clusters are most easily illustrated by discussing them descriptively in general terms and thinking about the typical cases that are exemplify the funding stream configurations that characterize each of the strategies as demonstrated in the table below.

Table 2: Strategy Clusters of the Private Colleges and Universities

Classes	Description	Over Time Trajectory	Typical Cases
1-Elite Liberal Arts Strategy (19% of Private Institutions)	Medium/High Tuition Income	No Change	Reed College
	No Educational Activities Income		Tulane University
	Medium Gifts, Grants and Contracts Income		Pitzer College
	Medium/High Endowment Income		Wheaton College
	Medium/High Endowment Value		Coe College
2-Ivy League, Research Emphasis Strategy (13.5% of Private Institutions)	High Tuition Income	Slight Increase	University of Chicago
	High Educational Activities Income		Harvard University
	High Gifts, Grants and Contracts Income		University of Pennsylvania
	High Endowment Income		Yale University
	High Endowment Value		Northwestern University
3-Ivy League Strategy (13.5% of Private Institutions)	Highest Tuition Income	Slight Decrease	Wellesley College
	No Educational Activities Income		Duke University
	Highest Gifts, Grants and Contracts Income		Claremont McKenna College
	Highest Endowment Income		Vassar College
	Highest Endowment Value		Massachusetts Institute of Technology
4-Working Class Strategy (18% of Private Institutions)	Low/Medium Tuition Income	No Change	Northeastern University
	Low Educational Activities Income		Seton Hall University
	Low Gifts, Grants and Contracts Income		DePaul University
	Low Endowment Income		Xavier University
	Low Endowment Value		St. Edward's University
5-Middle Class Strategy (21% of Private Institutions)	Low Tuition Income	Slight Decrease	Clark Atlanta University
	No Educational Activities Income		Oral Roberts University
	Medium/High Gifts, Grants and Contracts Income		Liberty University
			Rosemont College
	Low/Medium Endowment Income		King College
	Low/Medium Endowment Value		Notre Dame College
6-Upper Middle Class Strategy (15% of Private Institutions)	Medium Tuition Income	Very Slight Increase	Marquette University
	Medium Educational Activities Income		Baylor University
	Low/Medium Gifts, Grants and Contracts Income		Brigham Young University
			Illinois Wesleyan University
	Medium Endowment Income		Rochester Institute of Technology
	Medium Endowment Value		Loyola University New Orleans

There are a couple of things that should be noted about the strategy clusters presented in

Table 2. First, the Ivy League Research Strategy and the institutions in it are distinct from the other

Ivy League strategy cluster due to the lower levels overall of all of the funding streams and the

distinct difference in the level of educational activities income. The second Ivy League strategy is a combination of Ivy League institutions, and what some call the "smaller Ivies" and a few of the "southern" Ivies. The Ivy League Research strategy on the other hand is composed almost exclusively of research one institutions with a few research two institutions. A second point that should be noted is the division between the three elite strategy clusters and the non-elite strategy clusters. The non-elite strategies were characterized by higher levels of internal heterogeneity than the three elite clusters. The labeling of these non-elite clusters relied primarily on the levels of the funding streams for these clusters, with the aid of additional insight that was gained through the examination founding dates, religious affiliations, and the Carnegie Classification of the colleges and universities in the clusters.

In contrast to the six private strategy clusters there are only five strategy clusters public colleges and universities. However there is considerably more change over time and movement of institutions between the public strategy clusters than the private strategy clusters. Table 3 below provides brief descriptions of each of the clusters as well as typical cases for each strategy and a summary of the over time trends for each cluster.

Table 3: Strategy Clusters of Public Colleges and Universities

Classes	Description	Over Time Trend	Typical Cases
1- Public Strategy (37% of Public Institutions)	Low Tuition Income Low Educational Activities Income Low Gifts Grants and Contracts, No Endowment Income No Endowment Market Value	Significant Decline	Central Missouri State University Stephen F. Austin State University California State University-Fullerton Western Montana College
2-Primary Transition Strategy (16% of Public Institutions)	Medium/ High Tuition Income Medium Educational Activities Income Medium/High Gifts Grants and Contracts No Endowment Income Low Endowment Market Value	Constant with a Decline in the 1980s	University of Florida State University of New York at Stony Brook West Virginia University Montana State University
3-Secondary Transition Strategy (23% of Public Institutions)	Medium Tuition Income Medium Educational Activities Income Medium Gifts Grants and Contracts Low/Medium Endowment Income Low/Medium Endowment Market Value	Significant Increase	Portland State University Arizona State University University of Arkansas at Little Rock East Carolina University
4-Upper Middle Class Strategy (18% of Public Institutions)	Medium/High Tuition Income Medium/High Educational Activities Income Medium/High Gifts, Grants and Contracts Medium/High Endowment Income Medium/High Endowment Market Value	Mostly Constant	University of Arizona University of Texas at Austin University of Nebraska-Lincoln Ohio University Main Campus
5-Private Strategy (10% of Public Institutions)	High Tuition Income High Educational Activities Income High Gifts, Grants and Contracts High Endowment Income High Endowment Market Value	Constant until 1985, then a Decline	University of Minnesota-Twin Cities Pennsylvania State University Main Campus University of Michigan-Ann Arbor University of Wisconsin-Madison University of North Carolina at Chapel Hill

There are two key things that should be noted about the strategy clusters of the public institutions. First, there are two strategies labeled as transitionary strategies. There are two reasons for this. First there is the nature of the levels of endowment spending and the market value of the endowments of the institutions. In the Primary Transition strategy the market value of the endowment had increased mildly relative to the Public strategy but the endowment income was still at zero. In the Secondary Transition strategy both the market level of the endowment as well as the level of endowment income showed market increases from both the Public strategy and the Primary Transition strategy. The second reason is due to the fact that a number of institutions moved into the Secondary Transition strategy from both the Public strategy and the Primary Transition strategy,

resulting in the Secondary Transition strategy having the largest gain in prevalence over the time period. There were also a number of institutions that began in the Public strategy, shifted into the Primary Transition strategy and then shifted again into the Secondary Transition strategy during the time period. The second thing which should be noted from Table 3 are the over time trajectories of the public strategy clusters, particularly relative to the trajectories of the strategy clusters for the private institutions.

Public versus Private Strategies

MLCA is useful for the study of organizational fields as well as the organizational clusters or groups which constitute that field. Like standard regression analyses MLCA can be used to compare two groups within a field, in this case public versus private colleges and universities. However, unlike standard regression techniques, MLCA can examine the clusters within those groups in terms of their number, their characteristics, and the nature of the boundaries between the clusters.

In terms of the number of clusters in each sector, there are more private strategy clusters than public strategy clusters. There are two primary reasons for this difference. First, there are simply a greater number of private colleges and universities in the sample relative to public colleges and universities (210 to 170) therefore it makes sense that more clusters would be needed to capture the extent of the variation in a larger number of cases. However, it is possible that the greater number of strategy clusters could be indicative that private institutions are simply pursing more strategies over time than public institutions which would be consistent with the nonprofit literature (Galaskiewicz et al 2007; Salamon 1995; Weisbrod 1998).

This option is given greater weight by the fact that in the public model, the association between the funding streams included in the model specification was fully accounted for by the latent strategy clusters; for private institutions however additional covariance associations were necessary to fully account for the association between the funding stream levels. Even once the

additional associations were taken into account, the differences in the proportional allocation of the institutions between the public and private sectors are significant. A much higher number of private institutions were proportionally allocated to more than one strategy cluster than public institutions.[17] These two facts indicate that the public strategy clusters are more clearly defined than those for private institutions. In other words the boundaries between the clusters for the private institutions are more porous than those for public institutions.[18]

This discussion of the cluster differences between public and private sectors within this organizational field highlight two further benefits of MLCA over traditional quantitative methods for studying organizational fields. First, the proportional allocation of institutions into the strategy clusters is a significant advancement of MLCA over standard clustering methods and regression analyses which are ill equipped to provide insight on the extent to which organizations are fully in or out of any particular strategy cluster. The proportional allocations provided by MLCA allow for a more complete understanding of what is going on in the field as a whole by speaking to the issue of the state of the boundaries between the clusters and in combination with the knowledge of which clusters the individual institutions are in over time can be used to assess the stability or instability of the field as a whole.

Second, standard quantitative analyses of organizational fields are not well adapted to generating a holistic picture of the dynamics of an organizational field MLCA on the other hand through its estimation of the clusters, the characteristics of those clusters, the trajectories of the clusters over time and the proportional allocation of institutions into the clusters provides a much more comprehensive picture of the organizational field. This strength of MLCA that serves to

---

[17] This is evident through the examination of the proportional allocation of the colleges and universities to the different clusters in the two sectors. Almost all of the public institutions were primarily in a single cluster. The private institutions however were more amorphous in the sense that a significantly larger number of institutions were partially in multiple clusters. This indicates that the cluster boundaries are more porous for the private strategy clusters than the public strategy clusters.

[18] These issues will be addressed in greater detail below with the discussion of the over time trends.

bridge both of the traditions of organizational field research mentioned above. MLCA preserves the strength of the traditional quantitative analyses, significance testing for hypothesis evaluation and for the factors incorporated in determining the strategy clusters, while also incorporating a mechanism for depicting different groups of institutions in the field, how those groups differ from each other, and how the groups jockey for prominence over time. In essence MLCA is able to provide the same benefits of standard quantitative techniques, as well as many additional insights demonstrated above, while also providing a holistic description of the dynamics of an organizational field which has been the goal of qualitative analyses of organizational fields.

How Institutions Change Strategies Over Time

Understanding how organizations change over time is a fundamental component of the larger question of how organizations adapt to their environments. MLCA provides a way to understand how an organizational field changes over time by mapping out how the institutions within the field move between the different strategy clusters that constitute the field. By estimating the transitions of the institutions between the strategy clusters over time MLCA can shed light on the larger trends within the organizational field by demonstrating which strategy clusters are increasing or decreasing in prominence over the period of interest.

In the case of the field of higher education MLCA highlights a stark contrast between the behavior of public and private colleges and universities in terms of field stability and organizational mobility. Figures 1 and 2 below show that the stability of the strategies pursued by private colleges and universities is drastically different than the dynamic changes in the strategies pursued by public colleges and universities.[19] In fact, for private colleges and universities there is no significant change

---

[19] Figures 1 and 2 demonstrate the over time trends in the different strategy clusters for private colleges and universities in the aggregate. The aggregate or marginal representation of the over time trends because it does not take into account the six distinct latent trajectories over time that the specification for the strategy clusters is conditional on. Instead this graph summarizes those six latent trajectories to create a single graph that summarizes the overall trends.

in the prevalence of any of the clusters over time.[20] Notice the vertical axis of Figure 1 only ranges

between zero and 0.35 so despite the fact that the graph depicts minor changes, these changes are

not significantly different from zero or no change. In contrast, Figure 2 demonstrates that there are

both significant movements of public institutions between strategy clusters as well as significant

overall changes in the prevalence of the strategy clusters of public institutions over time. Significance

testing demonstrates that the changes in the prevalence of the strategy clusters for the public

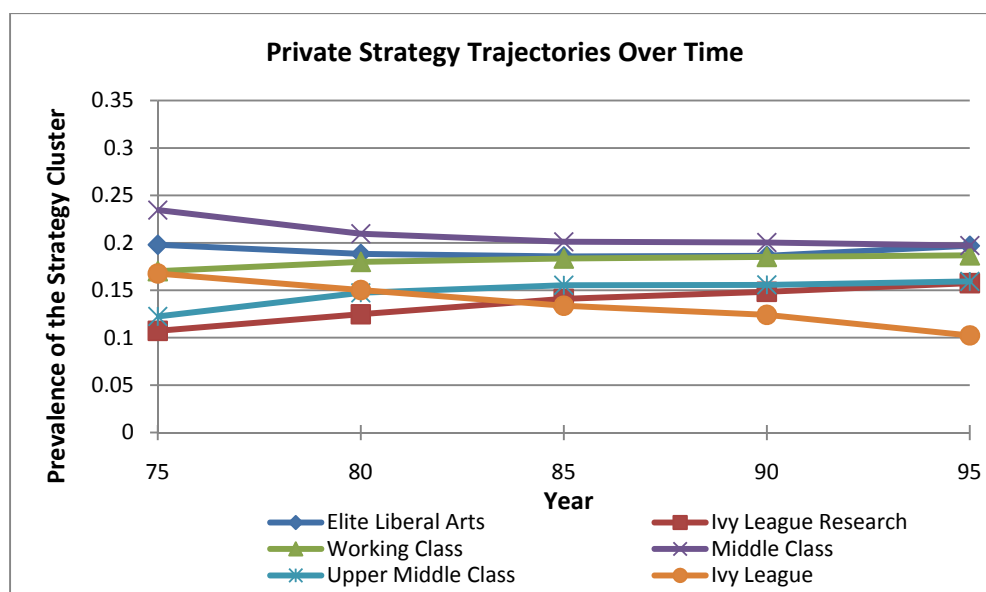institutions were significant over time unlike private institutions.

Figure 1: Private Strategy Trajectories 1975-1995[21]

---

[20] When the best fitting model was estimated, year in fact was determined to be nonsignificant overall and for each individual strategy cluster. This further substantiates the fact that there are no significant changes over time in terms of which funding strategies are pursued by private colleges and universities.

[21] The horizontal axis represents the years, from 1975 to 1995. The vertical axis is the prevalence of each of the different funding strategies over the time period and the individual lines are each representative of a single strategy cluster.
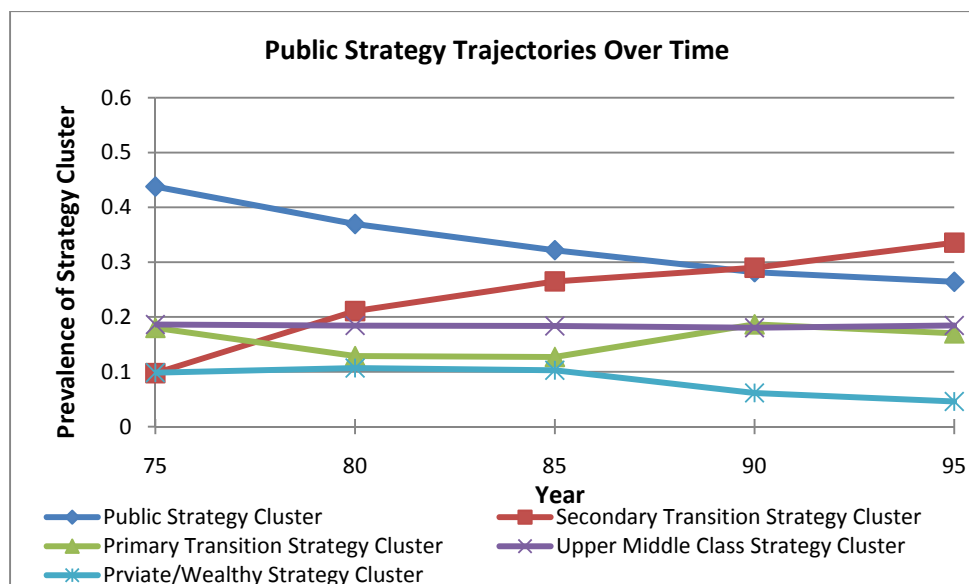
Public Strategy Trajectories Over Time

Figure 2: Public Strategy Trajectories 1975-1995

Assessing Field Stability and Organizational Mobility

A key issue within the neoinstitutional research is the inability to engage in cross field comparisons or within field comparisons across different groups or sectors due to an inability to generate measures that can be standardized across these dimensions, in other words this is an additional limitation of our current methodological toolkit. Using MLCA I have developed a preliminary version of a measure that allows for the evaluation of differences in organizational mobility between sectors within an organizational field that can address this weakness in our toolkit. Through mapping out the movement of the individual institutions between the clusters in both the public and private strategy clusters I was able to determine that only 9% of the private colleges and universities move at least once over the course of time compared to 37.5% of public colleges and universities. This is useful for descriptive purposes but does not take into account the differences in the number of clusters, the variation in the magnitude of the movements or the frequency of movements.

Therefore I computed an index of mobility by weighting the number of institutions that moved by the number of times that they moved[22] and then standardized this by the total number of institutions in sample for each sector and the number of clusters in each sector.[23] This created an index of mobility that is roughly comparable across the two sectors within the field of higher education. The public sector had a mobility index score of 0.092 and the private institutions had a mobility index score of 0.015. This shows that the mobility of institutions in the public strategy clusters far exceeds the mobility of institutions within the private strategy clusters even once the number of times and institutions moved and the differences in the sample size and number of strategy clusters were taken into account.

As previously mentioned the ability to examine the proportional allocation of institutions to the different strategy clusters as well as the relative prevalence of the strategy clusters can be used to assess the level of stability or instability within a field that can ideally then be compared across fields or across sectors within the same field. Looking at the percent of institutions which are proportionally allocated in more than one strategy cluster and weighting that by the extent to which they are divided among the strategy clusters and evaluating how this measure changes over time could be used to evaluate field stability and instability across sectors or across fields. However at this point in time more work needs to be done in terms of how to weight the proportional allocations and the over time changes before a standardized measure can be generated.

These two measures in addition to the ability to take into account the changes in the overall prevalence of the different strategy clusters that is provided by MLCA provide a strong argument

---

[22] The number of institutions that moved more than once was multiplied by the number of times they moved in effect creating the number of moves rather than the number of institutions that moved.

[23] Since the number of factors defining the strategy clusters and the number of time points were the same in both of these models they were not included in the standardization but could be added in relatively easily if these factors differed in different fields or sectors.

for the utility of this method in examining change within an organizational field as well as across organizational fields especially in terms of organizational mobility and field stability/instability.

Discussion and Conclusion

This analysis overall has provided a very dynamic model which assesses the issues of how organizations within the field of higher education are adapting their behavior in a time of environmental changes. Key findings include the differences in organizational mobility and field stability between public and nonprofit institutions of higher education. Organizational research to date has been limited in terms of the tools available for studying how organizations change over time. Regression techniques and social network analysis are not well suited to answer descriptive questions about organizational practices especially those concerning how organizations change those practices over time. Organizational research has tended to address questions concerning the behavior of organizations with qualitative techniques, focusing on case studies and accounts of decision making processes. This sort of work does she light on what goes on inside organizations but it does not set the stage well for the systematic study of why organizations change in the ways that they have on a large scale. MLCA allows for a more rigorous empirical evaluation while making possible an in depth assessment of how organizations are behaving through the estimation of the strategy clusters. This approach breaks the organizational fields down into more manageable units which allows for a deeper understanding of the ways in which these fields are changing over time. MLCA makes organizational fields more manageable both empirically and conceptually. The result is a more accurate assessment of the critical dynamics within the organizational fields, leading alternatively toward and away from convergence.

The utility of MLCA for the study of organizational fields is fourfold. First, it allows for an in depth examination of the factors that define the groups within an organizational field. This includes the characteristics associated with defining each strategy, an evaluation of the statistical

significance of the factors in determining the clusters, and a model that fully accounts for the association between the cases of interest for the observed factors in the model. Second, it allows for the thorough examination of both the movement of institutions between different strategy clusters over time including the degree to which institutions fall in any one strategy cluster and the overall changes in the prevalence of the different strategy clusters that is a result of these movements. This allows us to understand the mobility of institutions, the stability or instability of an organizational field and the fragmentation or cohesion of a field. MLCA also provides measures that can be used for within and cross-field comparisons of organizational mobility and field stability. Third, it allows for the examination of organizations both cross sectionally and over time. Standard quantitative methods are, for the most part, unable to do this, despite the fact that this is particularly useful when it comes to complex organizations. Finally, it offers a way to bridge two distinct strains of organizational research. This is accomplished through the fact that MLCA is able to incorporate aspects of both the holistic qualitative approach while still proving a mechanism for engaging in large scale empirical examinations of the organizational changes within a field while also providing avenues for cross field comparisons.

Addressing the question of how organizations change over time and migrate towards particular practices is a useful endeavor. This also provides the set up to provide answers to the second question of why these organizations are behaving as they do. MLCA is useful for this additional step in the process because it allows for the effects of exogenous factors to vary for each strategy cluster thereby providing a more accurate assessment of the effects of these factors on the field as a whole. MLCA could also be used to assess the effects that these different strategies might have on the various constituencies of higher education. For example are certain strategies more prone to have greater student diversity or lead to higher levels of adjunct faculty relative to tenured faculty? There is also significant room for further examination into the various ways in which MLCA

can be utilized to advance cross field comparisons through standardized measurements of

organizational mobility, field stability/instability, and field cohesion or fragmentation.

Works Cited

Abbott, Andrew. 2001. *Time Matters: On Theory and Method.* Chicago: University of Chicago Press.

Alexander, F. King. 2006. "Concluding Remarks." In Ehrenberg, Ronald G. 2006. *What's Happening to Public Higher Education?: The Shifting Financial Burden.* Baltimore: John Hopkins University Press. Pg. 337-344.

Becker, Howard. 1998. *Tricks of the Trade.* Chicago: University of Chicago Press.

Breiger, Ronald L. 2004. "The Analysis of Social Networks." In Hardy, Melissa and Alan Bryman eds. *Handbook of Data Analysis.* London: Sage Publications. Pp. 505–526.

Brint, Steven. 2002. *The Future of the City of Intellect: The Changing American University.* Stanford, CA: Stanford University Press.

Brint, Steven Lori Turk-Bicacki, Mark Riddle, and Charles S. Levy. 2003. *The Institutional Data Archive on American Higher Education.* Riverside, CA: University of California, Riverside.

Brint, Steven, and Jerome Karabel. 1991. "Institutional Origins and Transformations: The Case of American Community Colleges." In *The New Institutionalism in Organizational Analysis*, ed. Walter W. Powell and Paul J. DiMaggio, 337-360. Chicago: University of Chicago Press.

Carroll, Glenn R. and Anand Swaminathan. 2000. "Why the Microbrewery Movement? Organizational Dynamics of Resource Partitioning in the U.S. Brewing Industry." American Journal of Sociology, 106:715-762.

Clogg, C. C. 1995. "Latent Class Models." in G. Arminger, C. Clogg, & M. Sobel (eds.), *Handbook of Statistical Modeling for the Social and Behavioral Sciences* (pp. 311-359), New York: Plenum Press.

DiMaggio, Paul. 1991. "Constructing an Organizational Field as a Professional Project: US Art Museums, 1920-1940." In *The New Institutionalism in Organizational Analysis.* Eds. Walter W. Powell and Paul J. DiMaggio, 267-292. Chicago: University of Chicago Press.

DiMaggio, Paul and Walter W. Powell. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," ASR, 48 (April): 147-60, 1983.

Dobbin, Frank. 1995. "The Origins of Economic Principles: Railway Entrepreneurs and Public Policy in 19th Century America." In *The Institutional Construction of Organizations: International and Longitudinal Studies.* ed. W. Richard Scott and Soren Christensen, 277-302. Thousand Oaks, CA: Sage Publications.

Ehrenberg, Ronald G. 2002. *Tuition Rising: Why College Costs So Much.* Cambridge, MA: Harvard University Press.

Ehrenberg, Ronald G. 2006. *What's Happening to Public Higher Education?: The Shifting Financial Burden.* Baltimore: John Hopkins University Press.

Eliason Scott, Jeylan T. Mortimer, Mike Vuolo and Eric Tranby. 2007. "A Sense of Timing: The Relationship between Life Course Structures in Pathways to Adulthood and Subjective Perceptions." Working Paper. University of Minnesota.

Fligstein, Neil. 1991. *Transformation of Corporate Control.* Cambridge, MA: Harvard University Press.

Frumkin, Peter. 2002. *On Being Nonprofit: A Conceptual and Policy Primer.* Cambridge, MA: Harvard University Press.

Frumkin, Peter and Joseph Galaskiewicz. 2004. "Institutional Isomorphism and Public Sector Organizations." *Journal of Public Administration Research and Theory.* 14(3): 283-307.

Frumkin, Peter and Gabriel Kaplan. 2002. "Institutional Theory and the Micro-Macro Link." Working Paper.

Galaskiewicz, Joseph, Joy Inouye, Scott Savage and Paola Molina. 2008. "The Differences among the Sectors: Implications for Provider Choice." Working Paper. University of Arizona.

Galaskiewicz, Joseph, and Stanley Wasserman. 1989. "Mimetic Processes Within an Interorganizational Field: An Empirical Test" *Administrative Science Quarterly.* 34:454-479.

Hannan, Michael T. and John H. Freeman. 1977. "The Population Ecology of Organizations," *American Journal of Sociology*, 82 (March):929-64.

Kirp, David L. ed. 2003. *Shakespeare, Einstein, and the Bottom Line: The Marketing of Higher Education*. Cambridge, MA: Harvard University Press.

Kirp, David L and Elizabeth Popp Berman. 2003. "A Good Deal of Collaboration: The University of California, Berkeley." In Kirp, David L. ed. 2003. *Shakespeare, Einstein, and the Bottom Line: The Marketing of Higher Education*. Cambridge, MA: Harvard University Press. p207-220.

Kraatz, Matthew S., and Zajac, Edward. 1996. "Exploring the Limits of the New Institutionalism: the Causes and Consequences of Illegitimate Organizational Change." *American Sociological Review* 61:812-836..

Liao, Tim Futing. 1994. *Interpreting Probability Models: Logit, Probit, and Other Generalized Linear Models*. Los Angeles: Sage.

Macmillan, Ross and Scott Eliason. 2003. "Characterizing the Life Course as Role Configurations and Pathways." In Mortimer, Jeylan T. and Michael J. Shanahan. 2003. *Handbook of the Life Course*. New York: Kluwer Academic/Plenum Publishers.

McCutcheon, Allan L. 1987. *Latent Class Analysis*. Los Angeles: Sage.

McPherson, Michael S. and Morton Owen Schapiro. 1998. *The Student Aid Game: Meeting Need and Rewarding Talent in American Higher Education*. Princeton: Princeton University Press.

McPherson, J. Miller. 1983. "An Ecology of Affiliation.". 48 (August): 519-32.

Meyer, John W. and Brian Rowan. 1977. "Institutionalized Organizations: Formal Structure as Myth and Ceremony." *American Journal of Sociology*, 83 (September): 340-63.

Mohr, Lawrence B. 1982. *Explaining Organizational Behavior*. San Francisco: Jossey-Bass.

Palmer, Donald A., P. Devereaux Jennings, and Xueguang Zhou. 1993. "Late Adoption of the Multidivisional Form by Large US Corporations: Institutional, Political, and Economic Accounts." *Administrative Science Quarterly*. 38:100-131

Parsons, Michael D. 1997. *Power and Politics: Federal Higher Education Policymaking in the 1990s*. Albany, NY: State University of New York Press.

Powell, Walter W. and P. J. DiMaggio, eds. 1991. *The New Institutionalism in Organizational Analysis*. Chicago, IL: University of Chicago Press.

Powell, Walter W. and Jason Owen Smith. 1998. "Universities as Creators and Retailers of Intellectual Property: Life-sciences Research and Commercial Development." In Weisbrod, Burton. 1998. *To Profit or Not to Profit: The Commercial Transformation of the Non Profit Sector*. Cambridge: Cambridge University Press. p.169-193.

Powell, Walter W. and Jason Owen Smith. 2002. "The New World of Knowledge Product in the Life Sciences." In Brint, Steven. 2002b. *The Future of the City of Intellect: The Changing American University*. Stanford, CA: Stanford University Press. p. 107-130.

Rizzo, Michael J. 2006. "State Preferences for Higher Education Spending: A panel Data Analysis, 1977-2001." In Ehrenberg, Ronald G. 2006. *What's Happening to Public Higher Education?: The Shifting Financial Burden*. Baltimore: John Hopkins University Press. Pg. 3-36.

Salamon, Lester M. 1995. "Of Market Failure, Voluntary Failure, and Third Party Government: Toward a Theory of Government-Nonprofit Relations in the Modern Welfare State." In *Partners in Public Service: Government-Nonprofit Relations in the Modern Welfare State,* by Lester M. Salamon. Baltimore, Maryland: The Johns Hopkins University Press.

Salamon, Lester M. ed. 2002. *The State of Nonprofit America*. Washington, D.C.: Brookings Institution Press.

Scott, W. Richard. 1994. "Institutional Analysis: Variance and Process Theory Approaches." In *Institutional Environments and Organizations: Structural Complexity and Individualism.* W. Richard Scott, John W. Meyer, et. al., 81-99. Thousand Oaks, CA: Sage Publications.

Tolbert, Pamela S. 1985. "Institutional Environments and Resource Dependence: Sources of Administrative Structure in Institutions of Higher Education." *Administrative Science Quarterly* 30:1-13.

Tolbert Pamela and Lynne Zucker. 1983. "Institutional Sources of Change in the Formal Structure of Organization: The Diffusion of Civil Service Reform, 1880-1935." *Administrative Science Quarterly* 28(March): 22-39.

Tolbert, Pamela S., and Lynne G. Zucker. 1996. "The Institutionalization of Institutional Theory." In Handbook of Organization Studies. ed Stewart R. Clegg, Cynthia Hardy, and Walter R. Nord. Thousand Oaks: Sage Publications, 1996

Vermut, Jeroen K. 2003. "Multilevel Latent Class Models." *Sociological Methodology* 33:213-239.

Vermunt, J. K. and J. Magidson. 2005. *Technical Guide for Latent GOLD 4.0: Basic and Advanced.* Belmont Massachusetts: Statistical Innovations Inc.

Weisbrod, Burton. 1998. *To Profit or Not to Profit: The Commercial Transformation of the Non Profit Sector.* Cambridge: Cambridge University Press.

Wiley, John D. 2006. "Why We Won't See Any Public Universities "Going Private"." In Ehrenberg, Ronald G. 2006. *What's Happening to Public Higher Education?: The Shifting Financial Burden.* Baltimore: John Hopkins University Press. Pg. 327-335.

Appendix
Table A1: Significance of Funding Sources in Latent Strategy Clusters For Private Institutions

Funding Source	Latent Strategy Clusters					
	Elite Liberal Arts Strategy	Ivy League Research Strategy	Working Class Strategy	Middle Class Strategy	Upper Middle Class Strategy	Ivy League Strategy
Tuition Income	4.10E-17	2.70E-25	1.60E-16	2.20E-40	8.20E-09	3.10E-14
Educational Activities Income	0.0011	2.90E-21	0.25	0.028	0.00013	0.036
Gifts, Grants and Contracts	0.87	8.40E-40	1.30E-33	1.20E-08	1.30E-08	1.20E-37
Endowment Income	0.011	6.60E-12	2.20E-21	1.20E-06	2.30E-09	1.50E-19
Endowment Market Value	0.85	9.80E-06	1.00E-08	0.0052	0.13	6.00E-05

Table A2: Significance of Funding Sources in the Latent Strategy Clusters For Public Institutions

Funding Source	Latent Strategy Clusters				
	Public Strategy	Secondary Transition Strategy	Primary Transition Strategy	Upper Middle Class Strategy	Private Strategy
Tuition Income	3.20E-34	1.80E-19	0.1500	0.2200	3.90E-17
Educational Activities Income	2.50E-30	5.90E-15	0.0011	9.30E-05	9.60E-16
Gifts, Grants and Contracts	7.50E-41	1.20E-21	0.0760	7.50E-06	4.50E-25
Endowment Income	5.10E-27	0.0014	6.00E-25	3.50E-12	4.00E-31
Endowment Market Value	1.50E-40	2.80E-15	1.10E-28	0.9000	9.30E-21