

RUNNING HEAD: College failure

**Why do colleges fail?
An analysis of college and university closings and mergers, 1975-2005**

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Abstract

We posit that whether schools close depends on 1) changes in the higher education marketplace and the ability of an institution to attract students and 2) the institution's level of resources and ability to weather financial difficulties. Using the set of private institutions listed in the 1973 Carnegie classification of institutions, and a survival model of closure, we explore why 10% of these institutions no longer existed as stand-alone institutions by 2005.

Why do colleges fail? An analysis of college and university closings and mergers, 1975-2005

The higher education marketplace has become increasingly competitive in the past several decades. Many students now treat education as a consumer good, with increased expectations about the college experience, while at the same time schools face decreasing state and federal support, as well as rising costs in areas such as healthcare and energy (Pratt, 2003). As academics we tend to think of our institutions as eternal, and view events such as the recent closing of Antioch College (Fain, 2007) and Vennard College (Masterson, 2008) as isolated incidents. Yet our analysis of private institutions listed in the 1973 Carnegie classification reveals that 11% of these institutions no longer existed as stand-alone institutions in 2005. Clearly closures and mergers are not uncommon events, yet they have been little studied in the social sciences (Rothschild & White, 1993).

Only a handful of studies have looked at why institutions of higher education (IHEs) cease to exist, either by closing or merging with another institution. Almost all of these analyses are case studies (e.g., Eastman & Lang, 2001; Millett, 1976; Mingle, Berdahl, & Peterson, 1981; O'Neill & Barnett, 1981), which do not allow us to generalize their findings to American higher education as a whole. These cases studies also propose numerous reasons why institutions close, often based on anecdotal evidence, which makes it difficult to determine the causes of college failure.

The purpose of our paper is to understand why some colleges and universities close or merge with other institutions, and to quantify the effects of several different variables mentioned in the case study literature. Using IPEDS and college guidebook data, we look at institutions listed in the 1973 Carnegie classification and analyze why some of these institutions no longer existed three decades later.

Conceptual framework

We view institutions of higher education as firms competing within an industry, in this case, higher education. While some scholars may object that colleges and universities are not firms, they are clearly non-profit firms, and admittedly they can be more difficult to analyze than for-profit firms (Anheier & Ben-Ner, 2003; Weisbrod, 1988). It is not clear, for example, who the residual claimants are. And unlike for-profit firms, colleges and universities almost universally sell one of their main products, undergraduate education, at below cost (Winston, 1999).

However, colleges and universities still operate within similar constraints as for-profit firms. Over the long term they must bring in at least as much revenue as they spend, and they must compete with other colleges for revenue sources. Students (and thus their tuition dollars) are one of the major sources of college and university revenue, as well as research funds and private giving, and colleges and universities compete intensely for these resources (Brewer, Gates, & Goldman, 2002). When they are unsuccessful in this competition, IHEs then close or merge with another institution.

The perspective of IHEs that close or merge as firms undergoing bankruptcy is a common conceptual framework in the case study merger literature (Eastman & Lang, 2001; Martin & Samels, 1994), and is congruent with the industrial organization approach used to study institutional behavior in higher education (e.g., Brewer et al., 2002; Garvin, 1980; Hoxby, 1997; Warning, 2004). We posit that whether IHEs close or merge depends on 1) changes in the higher education marketplace and the ability of an institution to attract students and 2) the institution's level of resources and ability to weather financial difficulties.

An institution's ability to attract students will depend on its mission. In terms of trends over the past several decades, it is clear that students have been moving away from IHEs that offer predominately liberal arts education to ones that offer more occupationally-oriented education (Breneman, 1993; Zajac & Kraatz, 1993; Zammuto, Whetten, & Cameron, 1983). At the same time, student demand for single-sex education has decreased (Gueverra, 2001; Millett, 1976). We expect that schools with a liberal arts emphasis and single-sex schools to be less likely to survive, with these effects tempered by the selectivity of the institution. IHEs with a religious affiliation may also be at a disadvantage, as they may face a limited pool of students from which to recruit (Kraatz, 1998).

Clearly more selective institutions will be more attractive to students for several reasons. Selective institutions offer incoming students three benefits that less selective institutions generally cannot. First, job market outcomes tend to be better for graduates of selective institutions (Brewer, Eide, & Ehrenberg, 1999; Dale & Krueger, 2002; Eide, Brewer, & Ehrenberg, 1998; James, Alsalam, Conaty, & To, 1989). Second, given the theory of peer effects and empirical evidence that educational outcomes are better for students when they are educated with higher ability peers (Sacerdote, 2001; Winston & Zimmerman, 2004), more selective institutions simply have more to offer in terms of the makeup of the student body. Third, even with their higher cost of tuition, more selective institutions actually offer students a better bargain in terms of what student pay versus the actual cost of the education; so much so that theorists refer to selective institutions as paying "wages" to students (Rothschild & White, 1995).

Besides the ability to attract students, IHE survival is also determined by their level of resources and ability to weather financial difficulties due to a changing marketplace. Schools with large endowments have more time to develop plans to deal with falling student enrollments,

and we expect these schools to be more likely to survive, *ceteris paribus*. Revenue sources also vary between IHEs (Brewer et al., 2002), and we expect that tuition dependent schools to be more likely to close or merge than schools dependent on other sources of revenue, such as research grants. Finally, a literature has demonstrated the existence of economies of scale in higher education (Brinkman, 1986; Cohn, Rhine, & Santos, 1989), and thus larger institutions should be less likely to close or merge.

Methodology

Our sample consists of 824 private research, doctoral, comprehensive, and baccalaureate institutions listed in the 1973 Carnegie classification of institutions (Carnegie Commission on Higher Education, 1973) that still existed in 1975. We chose 1975 as our base year because previous HEGIS finance surveys are not directly comparable to 1975 and later surveys (Paulsen & Smart, 2001). We focus on private institutions because college failure is a relatively rare event, and almost never occurs for public institutions.

Analytic approach

The study of college closings is the study of a phenomena that occurs over time, as different colleges close at different points in time. Adopting a cross-sectional approach, such as choosing a cohort of schools and then tracking whether they close over a subsequent period of time, requires measurement of variables at the time of the cross-section and does not allow the use of time-varying covariates. For example, by using a cross-sectional approach with the cohort of schools in existence in 1975, and tracking whether they closed by 2005, we would be limited to variables for the year 1975. Yet clearly a school's circumstances might be fine in 1975, but change dramatically ten years later. Such a change is missed with the cross-sectional approach.

We instead use a discrete time hazard model with a logistic distribution to analyze college closings. Hazard models, also known as survival and duration models, have two primary advantages over typical cross-sectional regression models. First, they allow the use of independent variables that change in value across time, as well as across schools. Second, hazard models take into account the fact that we do not observe whether or when many schools close, as many schools still exist at the end of our observation period, the year 2005.

A primary analytic decision with hazard models is the determination of the unit of time. We chose five-year time periods for our analysis, collecting data on schools in the first year of the time period, and then determining whether the school closed during the next five years. For example, we have data for the schools in our sample for 1980, and classify a school as closed if it subsequently closed between 1981 and 1985. We thus have data for schools for six time periods (1975, 1980, 1985, 1990, 1995, and 2000), and track whether they close in the time periods 1976-1980, 1981-1985, 1986-1990, 1991-1995, 1996-2000, and 2001-2005.

We chose five-year time periods instead of single years because the number of school closings in any given year is quite small. In this dataset, the number of closings ranges from a high of 26 (1976-1980) to a low of 5 (1996-2000). When the number of events becomes very small, the maximum likelihood routine used to estimate hazard models often cannot converge. Using five-year time periods rather than one-year time periods ensures that we can tractably analyze the data. In addition, unlike other firms, colleges and universities change slowly over time, and it is unlikely that our results would change if we used one-year time increments.

Variables

The dependent variable is whether the institution existed as an independent entity in the years 1980, 1985, 1990, 1995, 2000, and 2005. To our knowledge, there is no central database

listing college and university closures, so we define existence as having an independent active record in the IPEDS Institutional Characteristics survey for those years. We use the term “closed” as shorthand, recognizing that some of the schools in the study merged with other institutions rather than closed down completely.

We use two sets of independent variables to measure an institution’s market characteristics and its level of resources. While Carnegie classification is often used to differentiate institutions, it suffers from several drawbacks as an explanatory variable. The classification combines several different measures such as size and type of degree offerings, uses arbitrary numerical cutoffs to classify institutions, and allows some institutions to switch categories if they contest their original classification. Instead, we break apart the classification by using separate measures for size, types of degrees offered, and emphasis on research.

We use four variables to measure an institution’s market characteristics. The proportion of student enrollment at the undergraduate level distinguishes between institutions emphasizing undergraduate and graduate education. Given trends over the past thirty years, we expect that as the proportion of undergraduate enrollment increases, the probability of closure increases. Two dummy variables measure whether an institution was single-sex or had a religious affiliation. Because there is no variable in the Institutional Characteristics survey that measures single-sex status, we defined a single sex-institution as one that had at least 99% of its undergraduate enrollments with one gender. We expect single-sex institutions to have a higher probability of closure than coeducational institutions.

We use the Barron’s college guidebook selectivity measure, which rates institutions on a six-point scale ranging from most competitive to noncompetitive, as our measure of selectivity. Ideally, a set of dummy variables would measure each point on the scale, to allow for a nonlinear

effect for quality. However, there are no closures for the higher points on the scale. This means that the dependent variable does not vary across these dummy variables, and models including such variables cannot be estimated. Instead, we use the scale as a six-point interval scale, and include a squared term to test for a nonlinear relationship. Schools that were not rated by Barron's (approximately 4% of the sample) are coded as nonselective.

We include four measures of institutional resources and ability to withstand financial difficulties. The first, student body size, is measured as the total student FTE enrollment, with a squared term to take into account a nonlinear relationship between size and closure. Given economies of scale in higher education, we expect larger institutions to have lower probabilities of closure. The dollar amount of the institution's endowment per student (logged) is included as a measure of institutional wealth. Because the National Center of Education Statistics did not ask for endowment for a few years around the year 2000, we use endowments from 1995 and 2005 to interpolate the endowment size for 2000. Both size and endowment per student have been identified as measures that predict institutional distress (Gilmartin, 1984; Schipper, 1977). We also include the percentage of revenue from tuition and the percentage of expenditures on research in our models. These two variables measure how dependent an institution was on tuition and research grants. (Due to how the HEGIS Finance Survey was written, it is not possible to calculate what percentage of an institution's revenue comes from research grants; we use spending on research as a proxy.)

Finally, to control for regional differences, we include population (logged) for the state in which the school was located, and three dummy variables indicating the Southern, Western and Northeastern census regions (with Midwest as the reference category).

Three variables, endowment per student, percentage of revenue from tuition and percentage of expenditures on research had missing data for some schools in some years. Missing data are handled with multiple imputation (Allison, 2002) using the ICE routine within Stata (Royston, 2007).

Results

Figure 1 shows the estimated hazards and survival curve for the sample. The hazards can be interpreted as conditional probabilities, in that they show the probability of a school closing in any given time period, given that the school survived to that time period. The probability of a school closing during any given time period in this dataset ranges from 1% to 3%, with the hazard decreasing over time. The survival curve shows that 11% of the schools in existence in 1975 had closed or merged by 2005.

Table 2 shows the results of the hazard models predicting closure. In terms of institutional characteristics, neither the proportion of undergraduate enrollments nor the single-sex status of an institution had a statistically significant effect on closure. (A test for a possible nonlinear relationship between proportion of undergraduate enrollment and closure using a squared term was also negative.) Both selectivity and religious affiliation had a negative effect on closure, as illustrated in Figures 2 and 3. Figure 2 shows the probability of surviving for three types of schools. The first, with a “most competitive” selectivity rating from Barron’s, would be similar to Harvard or Williams College, accepting fewer than a third of its applicants. The second, with a “competitive rating,” would be a school with modest selectivity, accepting around 75% of its applicants. The third, rated “non-selective,” would typically have some type of open-enrollment admissions process, in which almost all applicants would be accepted. As the figure shows, selectivity has a strong effect on the probability of closure, with non-selective institutions

most at risk of closure. In any given time period, the difference in the conditional probability of closure between most selective and non-selective institutions ranges from 1% to 5%.

Figure 2 shows that institutions with a religious affiliation were at lower risk of closure, with a difference in conditional probability of closure ranging from 1% to 3%, depending on the time period.

Turning to institutional resources, only student body size and endowment per student had statistically significant effects on closure, with larger and wealthier institutions at less risk of closure. Figure 3 shows the survival curves for institutions at the 10th, 50th and 90th percentiles in terms of FTE enrollments. The figure shows a sharp drop in survival for smaller institutions, with a difference in the conditional probability of closing between 10th and 90th percentile institutions ranging from 2% to 6% over the six time periods. The survival curve for logged endowment per student shows more modest differences between schools at the 10th and 90th percentiles of logged endowment, with a difference in conditional probability of closing ranging from .5% to 1%.

Discussion

Our results suggest that our understanding of the closures and mergers during the past thirty years may be incomplete. Much of the literature refers to a shift in student preferences from liberal arts colleges to other types of institutions as a major issue for liberal arts colleges as they struggle to survive. Yet our models suggest that an emphasis on baccalaureate education was not a significant factor. Liberal arts colleges tend to be small, and many are less selective, two of the primary drivers of school failure. Delucchi (1997) has demonstrated that over two-thirds of schools that self-identify as liberal arts colleges actually graduate at least 60% of their students with degrees in professional fields. Thus, it is not surprising that emphasis on the

baccalaureate does not have an effect of closure, as many of these schools more closely resemble, larger, more professionally-oriented schools in terms of their degree offerings (Breneman, 1993).

Similarly, a popular conception is that single-sex institutions have suffered as student preferences have shifted to coeducational institutions, while our models suggest that, *ceteris paribus*, single-sex institutions did not have a heightened risk of closure during this time period. In our sample, coeducational institutions are on average over twice as large as single-sex institutions, indicating that it is their size rather than enrollment practices that led to the closure of some primarily single-sex institutions, such as Trinity College in Vermont.

Two other institutional characteristics, selectivity and religious affiliation, both have positive effects on survival. All other things being equal, highly selective institutions have little risk of closure, while less selective institutions face a high risk of closure. Given the benefits of attending a selective institution, this result is not surprising. Selective institutions have long lists of applicants, and rarely worry about having enough students enroll (although they do worry about the quality of those students).

It is not entirely clear why religious affiliation confers a survival advantage to schools. Schools with a religious affiliation may have greater access to resources, in terms of donative resources from members of the affiliated religion. In addition, rather than being limited to a pool of students with the same religious outlook, this pool of potential students may actually confer an advantage, as they may be more likely to attend than other students. Schools with religious affiliation may thus have a constrained source of student enrollment in terms of size, but a more stable source of enrollment due to the religious preferences of these students.

In terms of institutional resources, tuition and research grant dependence appear to have little effect on closure. Instead, size and wealth, as measured by endowment per student, positively affect school survival. Of the two, wealth appears to have the more modest effect on survival, which is somewhat surprising. Larger schools are likely to be better able than smaller schools to weather problems with student recruitment and finances, and their per student cost of education will be less due to economies of scale (Brinkman, 1986; Cohn et al., 1989; McPherson & Schapiro, 1999).

To our knowledge, this is the first quantitative analysis to examine why schools close. The results presented here are not surprising, in that few people would expect wealthier schools to be more at risk of closing. The analysis, however, allows us to test competing explanations of why schools fail. Given that the common view of many school closings is of the small, poor, liberal arts college that cannot compete against wealthier, more professional-oriented schools, the results here indicate that it is not necessarily the emphasis on liberal arts education that leads to college failure, but instead these institutions' size and selectivity.

Our next steps in the project include expanding the dependent variable. Because the variables that affect closure may differ from those that affect mergers, we are currently researching each closed institution to determine whether it closed or merged (finding this information is surprisingly difficult for some institutions). We also plan to add data from the Completions survey to the panel, in order to directly measure the proportion of degrees granted in various fields.

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Table 1. Descriptive Statistics

Variable	Mean	SD	Min	Max	Missing	Data Source
<i>Institutional market characteristics</i>						
% undergraduate enrollment	0.88	0.17	0.04	1	0%	H/I Enrollment Survey
Barron's selectivity index	3.0	1.1	1	6	4%	Barron's college guidebook
Single-sex	0.06	0.25	0	1	0%	H/I Enrollment Survey
Religious affiliation	0.63	0.48	0	1	0%	H/I Institutional Characteristics Survey
<i>Institutional resources</i>						
FTE enrollment	2,033	2,672	4	29,250	0%	H/I Enrollment Survey
Endowment per student (logged)	8.35	2.28	0	14.34	5%	H/I Finance Survey
% of revenues from tuition	0.41	0.18	0	1	2%	H/I Finance Survey
% of expenditures on research	0.02	0.04	0	0.49	9%	H/I Finance Survey
<i>Regional</i>						
State population (logged)	15.65	0.88	12.82	17.34	0%	Statistical Abstract of the United States
Region: Northeast	0.29	0.45	0	1	0%	H/I Institutional Characteristics Survey
Region: South	0.31	0.46	0	1	0%	H/I Institutional Characteristics Survey
Region: West	0.11	0.31	0	1	0%	H/I Institutional Characteristics Survey

Note: H/I denotes HEGIS or IPEDS survey

Table 2. Hazard Model Results: College Closings, 1975-2005

	Model 1		Model 2	
	B	se	B	se
<i>Institutional market characteristics</i>				
% undergraduate enrollment	0.0269	0.7159	-1.6560	3.6380
% undergraduate enrollment (squared)			1.2496	2.6722
Barron's selectivity index	-0.4719 **	0.1468	-0.4623 **	0.1486
Single-sex	0.4331	0.3178	0.4235	0.3191
Religious affiliation	-0.9413 ***	0.2581	-0.9333 ***	0.2591
<i>Institutional resources</i>				
FTE enrollment	-2.1843 ***	0.3542	-2.1563 ***	0.3588
FTE enrollment (squared)	0.0739 ***	0.0149	0.0729 ***	0.0151
Endowment per student (logged)	-0.1126 *	0.0420	-0.1151 **	0.0424
% of revenues from tuition	0.3401	0.6757	0.3253	0.6776
% of expenditures on research	5.5380	4.2605	5.5696	4.2814
<i>Regional</i>				
State population (logged)	-0.0476	0.1112	-0.0550	0.1123
Region: Northeast	0.4593	0.3105	0.4703	0.3116
Region: South	0.0244	0.3203	0.0175	0.3207
Region: West	-0.0896	0.4067	-0.0755	0.4085
<i>Time dummy variables</i>				
1975	0.8154	1.9220	1.3556	2.2227
1980	0.4135	1.9353	0.9557	2.2371
1985	1.2109	1.9216	1.7578	2.2315
1990	0.8629	1.9442	1.4096	2.2507
1995	0.4300	1.9636	0.9799	2.2718
2000	1.4025	1.9740	1.9639	2.2937

Figure 1. Baseline Hazard and Survival Probabilities.

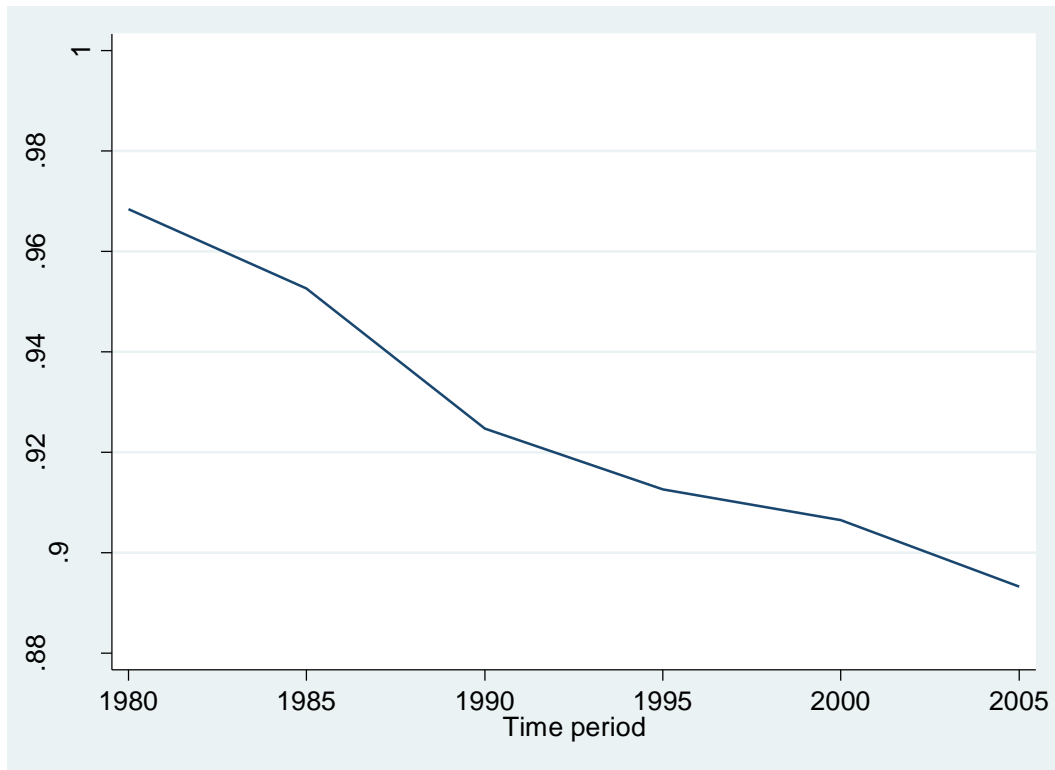
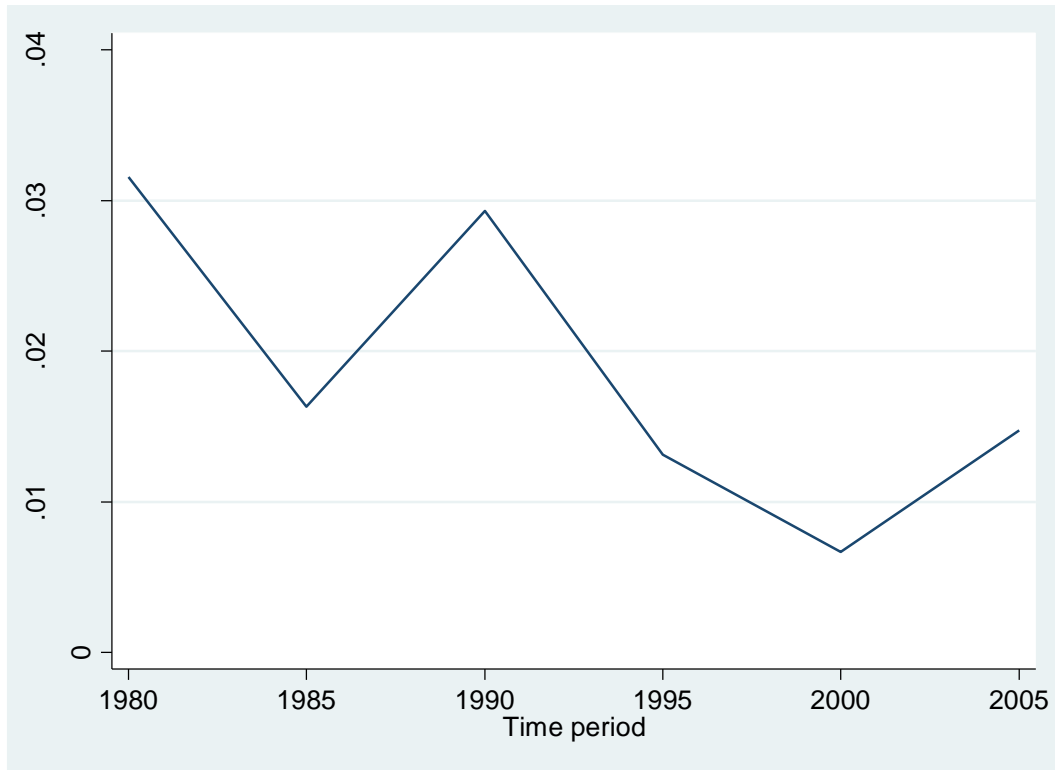


Figure 2. Effect of Selectivity (Barron's Index) on Survival

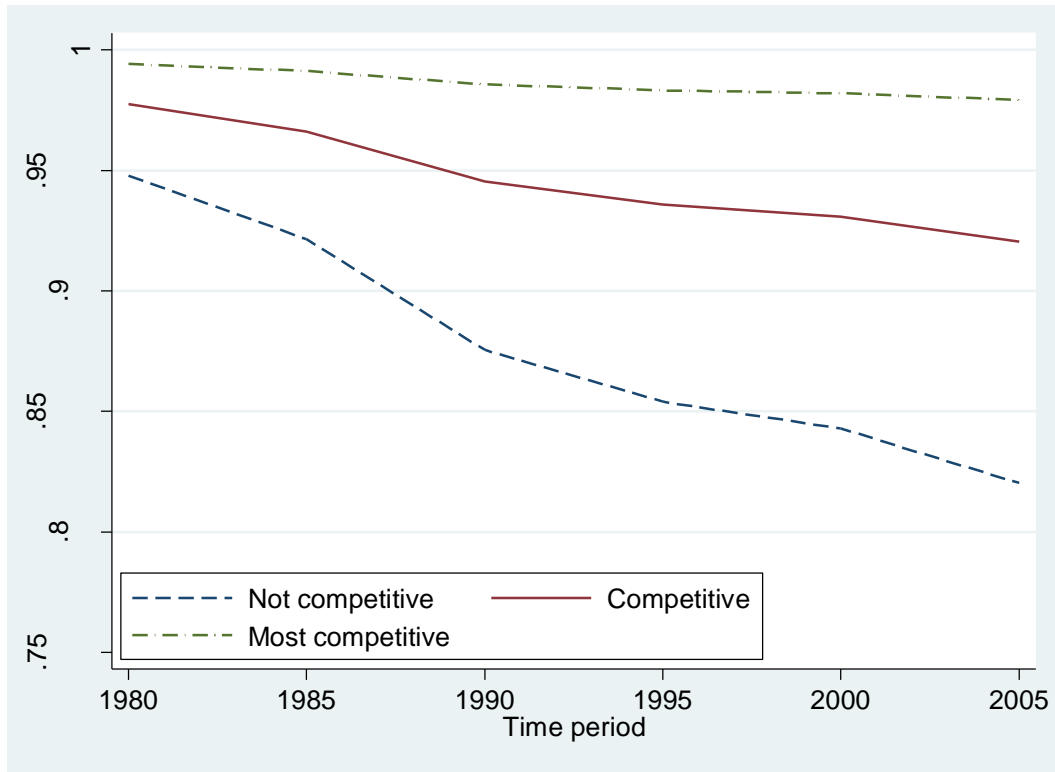


Figure 3. Effect of Religious Affiliation on Survival

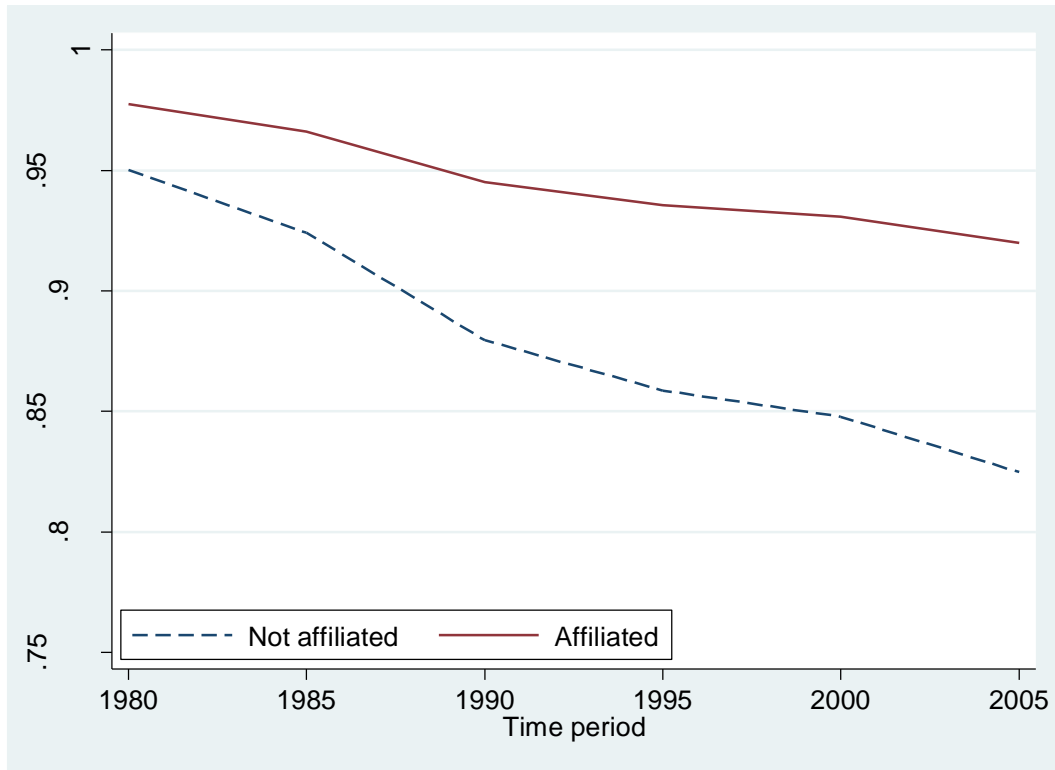


Figure 4. Effect of Student Body Size on Survival

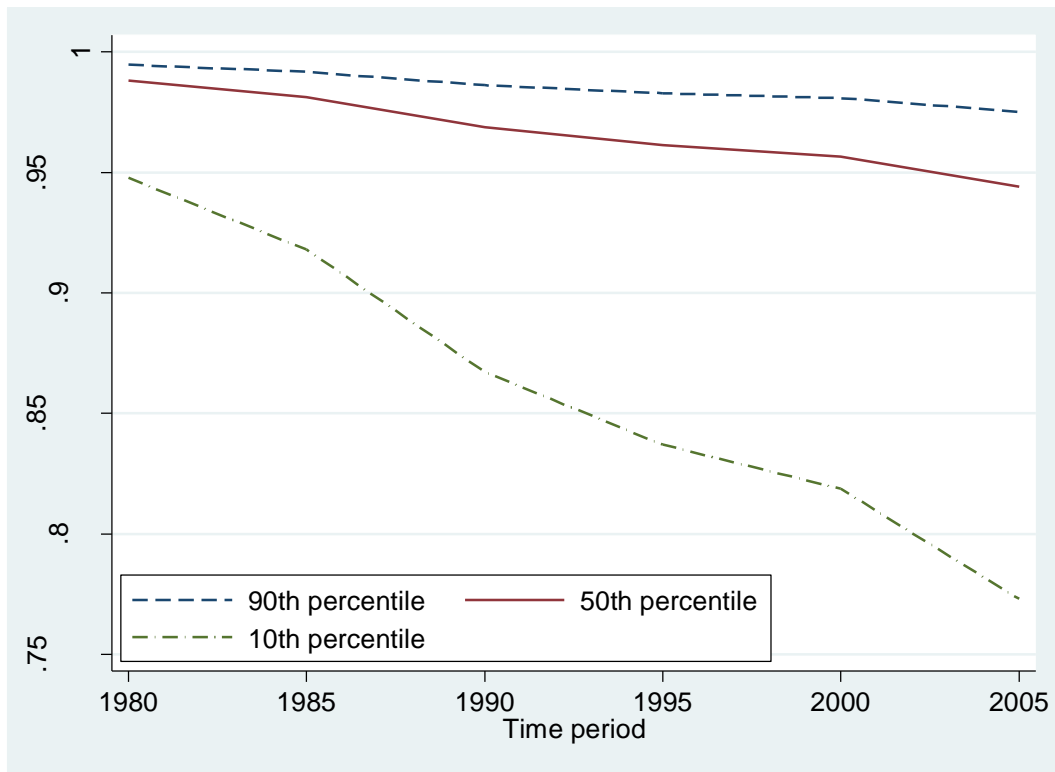


Figure 5. Effect of Endowment per Student on Survival

