
Original Paper

Predicting Private Non-Profit Higher Education Institution Closure

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Abstract

Ten years before closure, enrollment decline at private, not-for-profit colleges and universities is visible in existing information. Using IPEDS data on 991 private non-profit institutions, 59 of which closed between 2019 and 2024, we conducted descriptive analysis and logistic regression. Prior enrollment decline, small size in the base fiscal year of 2019-20, and the base year plant-debt-to-assets ratio independently predict closure. Small institutions faced 4.5 times higher odds of closing than other institutions. The strength of these early indicators of challenge for many institutions suggests that options, like slashing expenses, increasing tuition discounts, and increasing tuition price, may be insufficient to avoid eventual closure. Lacking stronger governmental support, this culling of small institutions serving financially less able students will continue.

Keywords: financial exigency, enrollment decline, tuition discounts, debt burden, size

1. Introduction

By detecting the early factors that *predict* declining financial health and closure using Integrated Postsecondary Education Data System (IPEDS) data, the authors sought to go beyond simply measuring financial exigency (Grawe 2018; Dickmeyer 1983a, 1983b; Zemsky, Shaman, and Baldrige 2020). We focused on private, not-for-profit colleges and universities that had a chance, but not a guarantee, of survival. That is, those with undergraduate enrollments larger than 300 and endowments smaller than one million dollars per full-time equivalent (FTE) student.

As the rate of closure increases, institutional diversity decreases. Colleges that once focused on sets of well-defined student needs, including those of women, people of color, and members of religious organizations with prescribed student conduct expectations, are now being forced to dilute their mandates. Many still fail as they can no longer satisfy their traditional markets, nor stretch to fit a broadened market.

While “everyone knows” that size and wealth matter, not everyone realizes how much size and wealth are being maintained, up to a point, by borrowing and tuition increases with heavy discounting and cost cutting (Dickmeyer 1982a; Dickmeyer 1982b; Dickmeyer 1997; Dickmeyer 2004, Dickmeyer 1982d). The constraint of “up to a point” is critical. Increased borrowing, tuition discounting, and cost cutting have limits. Banks only loan *up to the point* when collateral is no longer available. The higher the discount rate, the fewer dollars to be gained with each tuition increase. Debt service, insurance, utilities and core salaries offer few cost cutting opportunities, and all such opportunities are *up to a point*. Our analysis seeks to understand the early combinations of factors that have moved institutions into financial peril and closure. Debt, discounts and cuts are not causes of financial peril, but symptoms, resulting from continuing enrollment declines in the face of reductions in government support of education.

All institutions have more good and expensive budget ideas than expected revenues can cover. The annual cutting of budget requests is inevitable in the best of times. All institutions borrow to replace old buildings and create new and better laboratories and student centers. All institutions must dip into reserves when

enrollments, investment returns or gifts fall short of expectations and when student's financial needs balloon due to demographic shifts or declines in governmental student financial aid availability.

Nevertheless, we have sought to differentiate between normal conditions and life and death struggles. It is not normal for enrollment to fall year after year. It is not normal to use up all your reserves. It is not normal to be unable to borrow for new facilities. It is not normal to spend most of your tuition increase on financial aid to your students. It is not normal to "borrow" from your endowment.

2. Method

We draw on IPEDS data for the academic years 2019–20 (base year) and 2023–24 (outcome year), supplemented by institutional trend data from 2011–12 through 2023–24 also drawn from IPEDS (National Center for Education Statistics [NCES], 2026). Our analysis sample consists of 991 private, non-profit colleges meeting three criteria: 1) undergraduate enrollment of at least 300 in fall 2019; 2) endowment per total student FTE in fall 2019 below one million dollars (to exclude institutions with fundamentally different financial dynamics); and 3) financial data submitted in both base and outcome years. Closed institutions ($n = 59$) were identified by matching IPEDS unit IDs against records of institutions that closed or announced planned closure between 2019 and 2024 (Castillo 2026).

We conducted descriptive analysis and also estimated a logistic regression model predicting institutional closure using institution characteristics measured in FY 2019–20.

$$\text{Model:} \quad \log \left(\frac{P(\text{closed})}{1-P(\text{closed})} \right)_i = \alpha + \sum \beta_j X_{ji,2019} + \varepsilon_i \quad [1]$$

Where $P(\text{closed})_i$ is the probability that institution i closed between 2019 and 2024; β_j are log-odds estimates; $X_{ji,2019}$ are the institutional characteristic j of institution i at base-line year (i.e., 2019) and ε_i is the error term.

The model uses FY 2020 financial and fall 2019 enrollment characteristics as predictors, as well as enrollment trends over the prior six years through fall 2019, ensuring no look-ahead bias. Predictors sharing components with the outcome variable were excluded to avoid tautology. All "per student" variables use total (full-time and part-time of both undergraduate and graduate) FTE enrollments.

Dollar-denominated and enrollment variables are log-transformed. We also cap extreme outliers rather than remove them. That is, any institution in the top or bottom 2.5 percent of a variable's distribution has that variable set to the value of that threshold. This limits the influence of unusual cases without discarding data (Kelchen, 2020; Kelchen, Ritter, & Webber 2024).

Institutions with missing values on any predictor were dropped listwise, reducing the logistic regression sample from 991 to 940 institutions (55 closed, 885 surviving).

3. Results

3.1 Descriptive Analysis Results

Figure 1 shows median undergraduate enrollment trajectories for closed and surviving institutions, with 2014–15 enrollment as the baseline. The Enrollment Index is defined as (median enrollment in a specific fiscal year / median enrollment in FY 2014–15) $\times$ 100. Even before 2019, the divergence is clear: closed institutions were losing students while survivors held roughly steady. By 2023–24, closed institutions had lost approximately 35 percent of their 2014–15 enrollment at the median; survivors had declined only modestly.

This finding is consequential for policy. Accreditor and governmental monitoring systems that flag institutions for critical attention only when *financial* ratios breach thresholds are starting to monitor too late. Enrollment decline precedes financial distress in the data by years. Therefore, by the time balance sheet ratios deteriorate, the window for effective intervention may have largely closed.

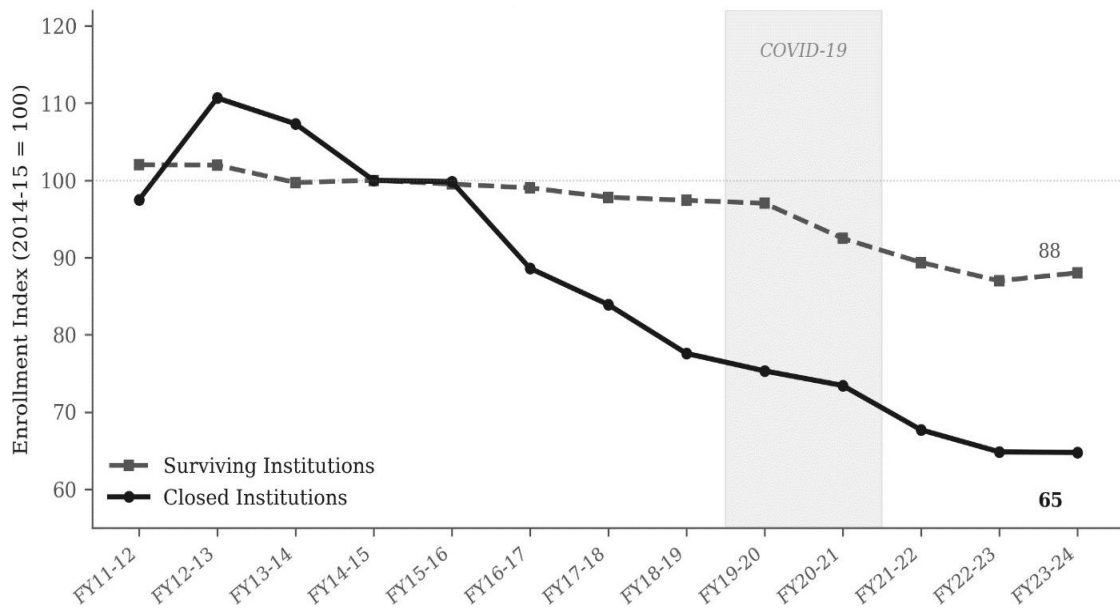


Figure 1. Undergraduate Enrollment Trajectories, Closed vs. Surviving Institutions

Table 1 compares the characteristics of institutions that closed between 2019 and 2024 (closed) with those that survived (survivors). The groups differ dramatically on enrollment, scale, and financial cushion: the median closed school enrolled 834 undergraduates versus 1,686 for survivors; median total net assets were \$33.0 million versus \$127.7 million; and median resilience ratios were already lower in FY 2020 (0.64 vs. 0.87). Retention and graduation rates were eleven and thirteen percentage points lower, respectively, signaling the student-facing vulnerability that preceded the financial collapse.

Table 1. Characteristics of Closed vs. Surviving Institutions (Medians, 2019)

Variable	Closed (n=59) Median	Survivors (n=932) Median	Sig.
Enrollment			
Undergraduate enrollment	834	1,686	***
Change in UG Enrollment, 2014–2019	-187	-30	***
Small institution (UG < 1,000)	100.0%	0.0%	***
Change in UG enrollment, 2019–2024 (%)	-21.0	-4.3	***
Revenue			
Net tuition revenue per student, 2019	\$13.7k	\$15.5k	**
Balance Sheet			
Total net assets, 2019	\$33.0M	\$127.7M	***
Expendable net assets per student, 2019	\$17.5k	\$30.4k	***
Plant-debt-to-assets ratio, 2019	0.26	0.19	**
Resilience			
Resilience ratio, 2020	0.64	0.87	**
Student Outcomes			
Full-time retention rate, 2019 (%)	67.0	78.0	***
6-year graduation rate, 2019 (%)	47.0	60.0	***

Notes: Significance based on Mann-Whitney U test (non-parametric): *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Change in UG Enrollment, 2014–2019 is based on $n=923$ survivors (9 institutions missing 2014 baseline enrollment); all other rows use the full $n=932$.

Notably, while surviving institutions are twice as large by enrollment, they hold four times the net assets. This gap cannot be fully explained by factoring in net tuition revenue, which is only 13 percent higher per student. This wealth advantage reflects accumulated endowment, gifts, and surpluses over decades, not superior current operations. Institutions that closed were not necessarily mismanaged; many simply lacked the historical financial inheritance that provides resilience against enrollment shocks.

The plant-debt-to-assets ratio is also significantly different between the two groups (median 0.26 vs. 0.19) but is the weakest among all significant variables in the descriptive comparison. This ratio will be shown to be significant in the logistic regression model predicting closure below.

3.2 Logistic Regression Results

Table 2 presents the odds ratios and significance levels from Model [1] for each predictor in the logistic regression analysis. Three are statistically significant (change in enrollment, institutional size, and plant debt to assets). The other two (log tuition revenue per FTE and tuition discount rate) are not significant (as is the constant) for closure once the three main predictors are controlled. The model achieves an AUC of 0.774 (10-fold cross-validated AUC of 0.775), indicating reasonably strong discrimination between closed and surviving institutions despite modest overall explanatory power (McFadden $R^2 = 0.122$).

Table 2. Logistic Regression Predicting Institutional Closure Results

Predictor	Log Odds	Odds Ratio
Change in UG Enrollment, 2014–2019	-0.0018*** (0.00)	0.998*** [1.00, 1.00]
Small Institution (UG < 1,000)	1.51*** (0.33)	4.53*** [2.39, 8.61]
Plant-Debt-to-Assets Ratio, 2019	2.69*** (0.90)	14.73*** [2.55, 85.17]
Log Tuition Revenue per FTE, 2019	-0.09 (0.42)	0.92 [0.40, 2.08]
Tuition Discount Rate, 2019	-0.10 (0.84)	0.90 [0.17, 4.70]
Constant	-3.38 (3.97)	0.03 [0.00, 81.26]

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$; standard errors are in parentheses; Odds ratio 95% CI in brackets. $N = 940$ (55 closed, 885 surviving). McFadden $R^2 = 0.122$; AUC = 0.774.

4. Discussion

Neglecting the error term, Model [1] with estimated coefficients is thus:

$$\begin{aligned} \log \left(\frac{P(\text{closed})}{1 - P(\text{closed})} \right) &= -3.38 - 0.0018(\text{Prior Enrollment Change}) + 1.51(\text{Small Institution}) \\ &+ 2.69 \left(\frac{\text{Plant_Debt}}{\text{Assets}} \right) - 0.09(\log(\text{Tuition Revenue per FTE})) \\ &- 0.10(\text{Tuition Discount Rate}) \end{aligned}$$

where $P(\text{closed})$ is the probability of closure, and all financial predictors are measured in FY 2020. Two of the five predictors, log tuition revenue per student and the discount rate, are not statistically distinguishable from zero and can be set to their sample medians without meaningfully changing the result.

To convert the log-odds to a probability, apply the formula:

Probability (closed) = $\frac{1}{1+e^{-X}}$, where X is the right-hand side of the equation above.

Pre-2019 enrollment decline correlates significantly with closure, having an odds ratio of 0.998 ($p < 0.001$). Its predictive power can be seen using the median values of closed institutions shown in Table 1. If, for our median institution, the enrollment loss of 187 students had been 10% above that median, the probability of closure would have been 0.4 percentage points higher. This confirms the pattern: a downward enrollment trajectory was already visible in federal data years before closure. This model confirms that each additional increment of decline deepened the risk.

Small size carries a large, independent structural penalty. Institutions with fewer than 1,000 undergraduates in 2019 had 4.5 times higher odds of closing than larger peers, holding all else constant. This reflects a structural vulnerability in institutional scale itself. Smaller institutions have fewer resources to absorb fixed costs across a shrinking enrollment base, less access to credit markets, and less capacity to invest in the recovery strategies that helped larger survivors stabilize after COVID.

Plant-Debt burden predicts closure independently of size and enrollment decline. Its predictive power can also be seen using the median values of closed institutions. If the plant-debt burden of 0.26 had been 10% higher, the probability of closure would have increased by 0.9 percentage points. The wide confidence interval reflects the small number of closures in the sample, but the direction and significance are robust.

The primary initial stress on an institution is clearly an enrollment decline. Those institutions that were initially small and have borrowed more are at greatest risk of compounding the enrollment decline with a financial decline. Closure and resilience decline are both made more probable by high debt burden. The lack of borrowing power appears to be the final door that closes after maximums have been reached in rates of tuition increase, increased scholarship aid to students, and cost cutting.

To illustrate the impact of the predictors shown in the model, we can compare two fictional institutions.

Institution A — at risk: a small college (under 1,000 undergraduates) that lost 400 students between 2014 and 2019, carrying a plant-debt-to-assets ratio of 0.40, collecting \$13,000 per student in net tuition revenue and with a tuition discount rate of 55%. (For the two non-significant predictors, we use sample medians). Plugging these numbers into the equation:

$$X = -3.38 - 0.0018(-400) + 1.51(1) + 2.69(0.40) - 0.09(9.47) - 0.10(0.55) = -0.97$$

In this example, the contribution toward a higher probability of closing is carried by three factors. Nearly half of this log factor is contributed by the small size alone. Even the loss of at least 40% of their students contributes to less than one-quarter of the higher probability factors with the final one-third of the higher probability factors coming from the debt ratio.

Summing the constant, the negative and positive factors yields -0.97 and a final probability of closing calculated as follows:

$$P(\text{closed}) = \frac{1}{1 + e^{0.97}} = 27.5\%$$

Nearly one in four institutions matching this profile would have closed between 2019 and 2024.

Institution B — in good standing: a larger college (over 1,000 undergraduates) that gained 150 students between 2014 and 2019, with a plant-debt-to-assets ratio of 0.08, net tuition revenue of \$21,000 per student and a tuition discount rate of 50%.

$$X = -3.38 - 0.0018(150) + 1.51(0) + 2.69(0.08) - 0.09(9.95) - 0.10(0.50) = -4.37$$

In this example, nearly 75% of the factors contributing to a lower probability of closing is contributed by the constant, reflecting the general tendency for institutions to remain open during this period.

$$P(\text{closed}) = \frac{1}{1 + e^{4.37}} = 1.2\%$$

This contrast of 27.5% versus 1.2% is driven by three variables, enrollment trend, institutional size and

debt load, and by the constant. The model achieves this using only information available in 2019, five years before the outcomes were observed.

5. Conclusion

Institutional diversity has suffered as colleges with few resources to sustain enrollments have been undermined by callous federal student financial aid policies. For the smallest of these, largely unable to cut bare-bones budgets, raise tuition faster or further pad financial aid packages, the final blow comes after debt capacity is exhausted. If you have lost enrollment and are small with little room to borrow, you are well on your way to closure.

Wells College was once a women's college designed for bright, young women wishing a bit of shelter before entering the world of full adulthood. Wells used its network of successful alumnae to place these women in internships, often in New York City, where they could take what they had learned in the classroom and, under the guidance of successful women leaders, transform themselves into people ready for the professional world. Many of these students needed financial support. Yet, the quality of a Wells education forced expenses higher. To make ends meet, the college began to admit men. It lost its unique calling. It closed (Kolodner, 2024).

Hampshire College was designed for young people who wanted to chart their own transformation. They wanted to be guided by bright teachers who would not punish them for a choice of growth paths that might lead to roadblocks and retreats. Not all such young people come from wealthy families. Not all such faculty will work for little or nothing. Hampshire is closing (Arsenault, 2026).

In 1979 the trustees voted to close Wilson College. Their decision was overruled by a Pennsylvania court. New trustees and a new administration made strategic decisions to better serve new markets, including adults and single mothers, keep tuition low, avoid high discounting rates, borrow cautiously, and balance budgets. Wilson has grown and survives (Gies, 1980).

Future research should seek the factors that differentiate successful responses from favorable initial conditions. The strength of initial conditions, like enrollment decline, institutional wealth, and student wealth may fully determine financial decline, leaving analysts unable to discover significant sets of successful responses. Case studies, like that of Wilson College, suggest, however, that the best responses to financial stress should be multiple and early. In that case, genetic programming, as has been used to predict business failures (Beade, Rodriguez, & Santos, 2024), might be applied to higher education. Nevertheless, AI analyses often lead to opaque results. Understanding the interaction of variables over time may best be done with simpler intuitive models (Ooghe, Spaenjers, & Vandermoere, 2006).

This study documents the relationships between initial conditions and institutional financial decline and closure.

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