

Price Effects of Non-Profit College and University Mergers

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Abstract

Non-profit colleges and universities have merged across the US, citing economies of scale and scope. Yet, whether these mergers raise prices has not been empirically assessed. Using a retrospective merger evaluation approach, I estimate that the average merger between 2000 and 2015 increased tuition and fees by 5-7% relative to non-merging institutions in the same state and sector (public or non-profit). Effects on net prices are estimated imprecisely, but the results are suggestive that non-profit colleges use mergers to increase price discrimination.

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1 Introduction

There is considerable debate over whether non-profit organizations, such as non-profit colleges and universities, take advantage of market power (Lynk, 1995; Simpson & Shin, 1998; Prüfer, 2011). One view of non-profit organizations is that they function like consumer cooperatives (Lynk, 1995). This view applied to colleges and universities implies that institutions redistribute any residual “profits” back to students through decreased prices or by increasing quality. In this case, there is no strong incentive for organizations to exercise market power. On the other hand, colleges’ pricing behavior may be indistinguishable from profit-maximization if institutions use market power to raise sticker prices for wealthy (or less desirable) students to fund more generous financial aid awards for poorer (or more desirable) students.¹

In this paper, I conduct a retrospective analysis of mergers of public and non-profit colleges and universities. This study is the first to my knowledge that presents evidence on the price, cost, and quality effects of these mergers in the US. The setting is not only one of economic and policy interest but also presents a unique opportunity to test whether ostensibly non-profit institutions take advantage of mergers by raising prices for students.

The emerging literature on the industrial organization of higher education has focused much attention on the for-profit sector. For example, Cellini & Goldin (2014) and Gibbs & Marksteiner (2016) document that for-profit institutions increase tuition in order to capture federal and state subsidies. This is consistent with market power because if markets were perfectly competitive, institutions would price at marginal cost, and prices would be unresponsive to student financial aid availability. Additionally, Eaton *et al.* (2018) find that when for-profits are bought out by private equity firms, heightening incentives to maximize profits, for-profits raise prices, decrease quality, and increase capture of government aid. Though these studies of for-profit institutions are informative, for-profit institutions serve only 6%

¹Turner (2017) shows that selective public institutions and nonprofit institutions have a strong willingness to pay for students categorized as Pell Grant eligible.

of students, and it is not clear whether non-profit institutions similarly take advantage of market power (NCES, 2017).

Of the few studies that have looked at responses of non-profits to changes in market conditions, the results are mixed. Kramer *et al.* (2018) find that just like for-profits, non-profits with tuition-setting authority increase tuition and fees to capture increases in state merit-aid grants. Deming *et al.* (2018) show that the massive introduction of online degree programs following a regulatory change in 2006 led to larger declines in enrollments in very concentrated markets. This finding is consistent with market power among public and private institutions. However, Deming *et al.*'s tuition estimates are puzzling since they indicate that increased competition leads to higher tuition prices at private non-profits. Moreover, Deming *et al.* (2018) do not assess public tuition effects, asserting that public tuition is “heavily subsidized” and “unlikely to reflect market forces.” Epple *et al.* (2017) also assume, without empirical justification, that individual public colleges do not set their own prices in response to local market forces. By investigating the effects of mergers on tuition prices, the results shed light on whether public and private non-profit institutions respond to changes in market structure.

There are two general approaches to estimating horizontal merger effects. Ex ante simulation methods, or prospective evaluation methods, use estimates from structural models to predict price changes from proposed or consummated mergers while ex post methods compare prices before and after mergers occur. Implementing an ex ante approach in my setting would require explicitly defining markets, estimating demand in each market, estimating marginal costs, and making assumptions about the nature of competition and how cost structures change with mergers.² Since I lack good instrumental variables for college prices and because this setting does not lend itself to a natural set of assumptions about

²Two notable papers that pioneered ex ante approaches to merger simulation include Farrell & Shapiro (1990) and Nevo (2000). For a relatively recent review of this literature, see Whinston (2007).

the nature of competition, I instead adopt an ex post approach or retrospective evaluation method.³ This approach has the advantage of being relatively transparent and requires making no structural assumptions. My setting is also ideally suited to this ex post approach because I have a relatively large number (72) of uncontested merger events between 2000 and 2015 as well as panel data on prices covering all Title IV participating public and non-profit institutions over this time period.⁴

By exploiting variation in merger timing, I estimate models with (merged) institution fixed effects to control for unobservable differences between merging and non-merging institutions. I find that prior to merging, merging institutions follow the same pricing trends as other institutions in their state and sector (public or private non-profit). However, immediately after a merger, merging institutions diverge from this trend and differentially raise tuition and fees. I estimate that mergers involving public or private non-profit institutions raise tuition and fees by 5% for full-time students and 7% for part-time students, on average. Interestingly, these estimates accord with several retrospective evaluations of hospital mergers which have documented that mergers raise prices between 3% and 10% (Vita & Sacher, 2001; Dafny *et al.*, 2012; Gowrisankaran *et al.*, 2015; Cooper *et al.*, 2018).

Institutions may adjust financial aid awards to compensate for higher sticker prices post-merger, leaving actual prices for students receiving aid unchanged. I use data on average institutional grant aid to assess whether price increases are borne only by students not receiving aid. I find that the share of students receiving institutional grant aid is unchanged by mergers at merging institutions, but for students receiving institutional aid, the average grant may increase along with the sticker price, and estimated increases in grant aid for aid

³For a few examples of papers using an ex post approach to assess mergers in other industries, see Vita & Sacher (2001), Dafny (2009), Ashenfelter & Hosken (2010), Dafny *et al.* (2012), Ashenfelter *et al.* (2015), or Cooper *et al.* (2018).

⁴I drop four merger events from the analysis sample that involve institutions in different states. This leaves 68 merger events from 2000 to 2015.

recipients (one-third of students) are large enough to offset sticker price increases. However, these results are less robust than the price effect results and are estimated more imprecisely. Taken as a whole, the results suggest that institutions may use mergers to increase the degree to which they price discriminate.

I investigate what mechanisms are responsible for the sticker price changes. The mechanisms analysis is largely inconclusive but leaves open the possibility that both market power and a change in colleges' pricing strategies can explain price changes. I also assess whether costs, measures of quality, or degree offerings change to investigate some of the non-price effects of these mergers. I find no statistically significant changes in costs, and the 95% confidence interval rules out decreases in spending per student larger than 1%, indicating that the average merger did not generate notable economies of scale. I find no changes in retention rates of full-time students but some evidence of increases in retention rates for part-time students. Finally, institutions do not change the number of unique degrees they offer as a result of the merger, so students do not have access to increased degree variety which could offset price effects. These results suggest that mergers are probably not welfare-improving for the majority of full-time students who do not receive institutional financial aid, though, of course, more work is needed.

The rest of the paper proceeds as follows: Section 2 provides institutional background on mergers in US higher education markets; Section 3 describes my data and sample restrictions; Section 4 presents the price effect estimates; and Section 5 interprets the price effect results by assessing what mechanisms may be responsible. Section 6 concludes.

2 Mergers in US Higher Education

In contrast to externally initiated higher education mergers in Australia, Norway, Belgium, and Finland, mergers in the United States are typically voluntary, meaning that the merging institutions themselves initiate the merger (Skodvin, 1999). However, managed mergers, initiated by state, regional, or system authorities in public systems, frequently referred to as "consolidations" are becoming more common (Warren, 2008; Ohman, 2011; Diamond,

2013; Hamilton, 2013; Marcus, 2013; Mytelka, 2015). (Throughout the paper, I use the term mergers to refer both to mergers and consolidations.) The strategic nature of voluntary or managed mergers whereby institutions or entire public systems may try to improve their position in the education hierarchy or increase their market power leaves scope for anticompetitive effects.

There are a wide range of stated motivations for mergers, but the most commonly cited are the desire to capture cost savings by combining administration and eliminating duplicate programs, to increase transferability of credits, to expand program offerings, and to have a greater presence in particular geographic locations. For example, a series of consolidations in 2003 within the Community College System of Alabama had the expressed goal of reducing overhead costs and increasing transferability of credits (Evelyn, 2003). Similarly, the Board of Regents of the University System of Georgia cited “fostering operational efficiencies” as the key justification for their recent series of consolidations (Azziz, 2013). A merger between Woodbury College and Champlain College, two small colleges in Vermont, had the goal of expanding course offerings for students (Huff, 2008). Avoiding immediate financial crisis is mentioned occasionally. For instance, a merger between Johnson University and Florida Christian College involved a \$7.5 million bridge loan to help Florida Christian College stay afloat (DeSantis, 2013). However, public discussion surrounding consummated mergers generally suggests that most of these institutions are not at risk of closing in the absence of a merger. Anecdotally, institutions in poor financial standing often seek a merging partner but are unable to secure one.⁵

Mergers occur in all segments of the higher education market but are most common among

⁵For example, Native American Educational Services College wanted to merge with East-West University to address its financial difficulties, but the merger agreement fell through (Bollag, 2005). Similarly, financial pressures at Goddard College prompted the college to seek a merger with Union Institute, but the merger was ultimately rejected (Basinger, 2002; Carlson, 2011).

non-selective, two-year institutions. Of the public and private non-private institutions that were involved in a merger between 2000 and 2015, only 10% are doctoral universities. Forty-five percent are Associate's colleges, 9% are Baccalaureate colleges, 2% are Master's colleges, and the remainder are specialized institutions such as theological seminaries, medical schools and health professions schools, schools of art and design, and schools of business.⁶ It is most common for mergers to involve institutions offering the same level of degree; 57% of mergers combine institutions offering two-year or shorter degrees while 38% of mergers combine institutions offering four-year degrees; only 4% of mergers combine a two-year and four-year institution.

Markets involving merging institutions are probably quite local. In the sample of merging institutions, the average share of in-state students is 85%. Most of these in-state students probably live nearby since in the US, the median distance between a student's permanent residence and her college is only 8 miles for public two-year colleges, 18 miles for public four-year colleges, and 46 miles for private four-year non-profit colleges (Hillman & Weichman, 2016). The majority of mergers (63%) involve institutions all operating in the same commuting zone, and as I will document later in the paper using enrollment data, many of these markets are also quite concentrated prior to the mergers. Thus, many of these mergers substantially alter the effective number of options students have available to them and could have a significant impact on the prices they pay.

The appendix presents a standard model of differentiated product Bertrand competition to demonstrate that in the absence of cost synergies, mergers of profit-maximizing entities should raise prices. Intuitively, if institutions act like profit-maximizing firms, they should raise prices post-merger to take advantage of increased market power. However, mergers can also lead to increased prices for other reasons such as changes in pricing strategies, changes in leadership, or increased costs. I shed light on these different mechanisms in the analysis that follows.

⁶The online data appendix provides a list of all mergers in the sample.

Typically, there is a lag between when institutions desire to merge and when the merger is consummated because mergers can involve long periods of negotiation and require approval from several internal and external bodies. It can take a few years for institutions to iron-out consolidation details, to receive approval from the state legislature (through passage of a law authorizing the merger) or from the state's higher education board and/or board of trustees, and to receive a new accreditation for the combined institution. A typical lag is around two years, though occasionally lags can extend up to 6 years. Some mergers, such as those initiated by the University System of Georgia, have had a shorter timeline. Fewer than 17 months passed between when Chancellor Hank Huckaby announced his intentions to investigate the potential for consolidations and when the first set of four mergers took effect in January 2013 (Hawks, 2015). Given the variation in time to merger consummation, it is difficult for institutions to predict exactly when a merger will take effect. This fact makes it more plausible that the year of merger consummation will be uncorrelated with other institution-specific factors affecting pricing decisions, an assumption which underlies the difference-in-differences empirical strategy.

It is unlikely, though not impossible, that price effects would be observed prior to actual merger consummation. Because there is always a chance that a proposed merger will fall through, we would expect institutions to continue price competition until the operations of the institution are actually combined. It is at this point of merger consummation that tuition and fees are set and take effect for the new combined institution. In the empirical analysis that follows, I test whether merging colleges raise (gross) tuition and fees, my primary measure of price. I also investigate impacts on net tuition and fees revenue, a secondary measure of price, and whether mergers affect average total costs, as measured by total spending per full-time equivalent student. In addition to assessing the effects on the merging institutions, I also assess effects on competitors.

3 Data and Sample Construction

For this study, I constructed a new dataset of merger events involving public and non-profit colleges and universities between 2000 and 2015. I gathered and cross-checked merger information from accreditation documents, lists of known mergers provided by state higher education boards and academic sources, searches for “merger” in *The Chronicle of Higher Education*, and information reported in the IPEDS merger variable, which was first collected in the fall 2001 institutional characteristics survey. These sources yielded 72 merger events. Next, I found corroborating documentation for each merger to assign a year and/or month the merger took effect. Appendix Figure A.1 shows that merger events were spread fairly evenly over the 2000 to 2015 sample period. For more details on how merger events were identified and a complete list of the merger events and merger-level information, please see the online data appendix.

I obtained tuition and fees, student outcomes data, and institution-level expenditures from the National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS) complete data files. My data form a national panel of all Title IV eligible US colleges and universities from 2000-2015. Title IV eligible institutions are institutions at which qualifying students may utilize federal financial aid, including direct loans, Perkins loans, Pell Grants, and federal work-study. Non-Title IV eligible institutions are not required to report data to IPEDS, so my results may not be generalizable to these types of institutions.

I use several price measures from IPEDS. My primary price measures consist of “sticker prices” for tuition and fees: undergraduate average tuition and fees for full-time students and average tuition and fees per-credit hour for part-time students. Averages are reported because schools sometimes charge different tuition and fees depending on a student’s program. For example, the University of Illinois at Urbana-Champaign charges a business major about \$5,000 more per year than an education major.⁷ Public institutions report two average

⁷University of Illinois at Urbana-Champaign Office of the Registrar. “2016-2017 Academic Year Undergrad Tuition Rates.”

tuition and fees rates for full-time students: one for in-state students and another for out-of-state students. To construct a single tuition and fees price measure for public institutions, I take the weighted average of these two rates where the weights are fall full-time freshman enrollment shares for in-state and out-of-state students. For these weights, I use enrollments reported at the campuses two years prior to the merger. If these enrollments are not available, I use enrollments three years prior. The results are also robust to variable weights using year-specific enrollments in the pre-period. Tuition and fees for full-time students indicate student charges for a full-academic year, generally September to June and two semesters for schools on a semester system or three quarters for schools on a quarter system.

One limitation of these price measures is that they are “sticker prices” that do not account for financial aid. To construct an average net revenue measure, I subtract the average institutional grant aid per student from the average tuition and fees for full-time students. I cannot construct an analogous measure for part-time students because the financial aid data are reported only for full-time, first-time degree/certificate seeking undergraduates. Another limitation is that for 11 of the merger events in the analysis sample, one or more of the institutions fails to report financial aid data to IPEDS, so this measure is missing for those 11 merger events.

I implement two primary restrictions for the analysis sample. First, I drop private for-profit institutions, which collectively enrolled only 6% of degree-seeking students in 2016, since many for-profit chains do not report data at the branch/campus level, making it difficult to reliably identify mergers in this sample (U.S. Department of Education, 2017). Second, I drop institutions in US territories (2% of institutions). For institutions involved in two mergers over my time period, I use the year of first merger in the analysis. I also drop merger events that involve institutions in different states because I want to flexibly allow for state-specific time effects in all regression specifications (4 merger events; 0.14% of institutions).

Figure 1 shows the number of institutions directly involved in mergers between 2000 and 2015 broken out by sector (public or private non-profit) and type (two year or four-

year). Mergers are most common among public two-year institutions and private non-profit four-year institutions. Between 2000 and 2015, 2% of public institutions and 1% of private non-profit institutions were involved in a merger. Collectively, these institutions enrolled 3% of students over this time period.

In addition to identifying institutions directly involved in mergers, I also identify competitors to the merging institutions using lists of peer institutions. About half of institutions submit a custom list of comparison institutions to IPEDS which lists all institutions the submitting institution considers to be its set of peers. For institutions that do not submit a custom comparison group, the National Center for Education Statistics (NCES) creates an automatic comparison group based on the size, sector, and research-intensity of the institution. For private non-profit institutions, I treat all institutions appearing on the comparison list as competitors.⁸ For public institutions, I only use institutions operating in the same state because comparison groups submitted by public institutions often include similar institutions in other states that are likely not direct competitors. For example, the 2014 custom comparison group of the University of North Carolina at Charlotte includes the University of Wisconsin-Milwaukee (U.S. Department of Education, National Center for Education Statistics, 2014). While these are similar institutions in terms of enrollments and sector, it is unlikely they are directly competing for students. However, the results are robust to using all institutions on a public institution's comparison list. For each merger event, I assign every comparison institution the merger year of the competitor's merger. If more than one competitor merges, I take the year of the first competitor's merger.

⁸I use the custom comparison lists for institutions when these are reported. If an institution never submits a custom comparison list, I use the automatic comparison group created by NCES. Automatic comparison groups are available for 2004-2015, and custom comparison groups were submitted in 2010-2015. I append the lists from all these years together to generate an institution's competitor list.

3.1 Collapsing to to the Merged Institution Level

Following Gordon & Knight (2008), the unit of observation in my analysis is a post-merge institution with variables aggregated up to this level in pre-merger years. Specifically, I combine separate institutions that will eventually merge by summing their expenditures and taking enrollment-weighted averages of tuition and fees and retention rates. I choose these pre-merger aggregations so that there will be no change in the aggregated outcome from the pre-period to the outcome reported by the merged institution in the post-period if the merger has no effect (i.e. all the campuses operate as before and have no changes in enrollments, tuition and fees, spending, or retention rates). Note that I cannot track outcomes at the level of initially separate institutions because after the merger, data are typically reported at the merged institution level. Because tuition and retention rates are reported as an average for undergraduate students in IPEDS, I use measures of undergraduate enrollment for the weighting.

To understand the choice of these aggregations, consider the following illustrative example. Suppose institution A and institution B merge. Suppose further that prior to the merger institution A had 200 full-time students who paid \$20,000 per year in tuition and fees, and institution B had 100 full-time students who paid \$50,000 per year in tuition and fees. If after the merger, the campuses did not change their enrollment or tuition levels, the merged institution would report an average undergraduate tuition and fees for full-time students of \$30,000 ($\frac{200 \cdot 20,000 + 100 \cdot 50,000}{300} = 30,000$). I create a synthetic “merged” institution observation for institution A/institution B in the pre-period by performing this enrollment weighted average calculation. Similarly for financial expenditures, if institution A spent \$20 million and institution B spent \$30 million, the total spending if reported as a merged entity would be the sum (i.e. \$20 million + \$30 million = \$50 million). Thus, I create the synthetic “merged” institution pre-period expenditure by summing expenditures of the merging institutions.

3.2 Summary Statistics

Table 1 displays summary statistics for merging and non-merging private non-profit and public institutions. The data are reported for 2000, the first year of the panel. Column 1 reports the mean for institutions that merge sometime between 2001 and 2015, where the data has been collapsed to the merged institution level; column 2 reports the mean for never merging institutions. Among private non-profit institutions, merging institutions have larger enrollments but charge similar tuition and fees to non-merging institutions. They have similar shares of full-time students, similar shares of students receiving institutional grant aid, and similar average institutional grant aid awards. Both merging and non-merging institutions offer substantial tuition discounts (about 50%) through institutional grant aid. There is price dispersion among private non-profits that will merge. Subtracting the maximum tuition and fees from the minimum of merging partners yields an average difference in price of \$3,400 per year for full-time students and \$100 per credit for part-time students.

Public merging institutions have similar enrollments but lower tuition and fees than non-merging institutions. They have comparable shares of full-time students, in-state students, and students receiving institutional grant aid. There is pre-merger price dispersion among merging public institutions of \$300 per year for in-state students, \$1,200 per year for out-of-state students, and \$10 per credit for part-time students. These differences in pre-merger enrollments for private non-profit institutions and prices for public institutions motivate the use of specifications with (merged) institution fixed effects, which by construction, focus the analysis on within-institution differences in outcomes before and after mergers.

4 Price Effects

With data for merging institutions collapsed to the merged institution-level, I estimate specifications to test for effects on merging institutions and competing institutions. The regressions take the following form:

$$y_{isct} = \beta M_{it} + \theta C_{it} + \gamma_{sct} + \alpha_i + \varepsilon_{isct} \quad (1)$$

where y_{isct} is an outcome for institution i in state s in sector c (public or private non-profit) in year t . M_{it} is an indicator that takes value 1 in every year after a merger involving institution i , C_{it} is an indicator that takes value 1 in every year after the merger for competitors of institution i , and α_i are institution fixed effects. Year by state by sector fixed effects (γ_{sct}) allow for separate state-specific trends for public and private non-profit institutions. I cluster standard errors at the (merged) institution level.

Obtaining unbiased estimates of β and θ requires that merging institutions and competitors follow similar counterfactual trends as institutions unaffected by mergers in the same state and sector. This parallel trends assumption would be violated if the exact year a merger is consummated is correlated with other institution-specific factors driving changes in outcomes of interest. To provide evidence on whether the parallel trends assumption holds, I estimate event study models using the unbalanced panel where I include leads and lags ranging from 5 years before up to 10 years after the merger for institutions directly involved (I_{it}^j) and competitor institutions:

$$y_{isct} = \sum_{j=-5}^{10} \beta_j I_{it}^j + \sum_{j=-5}^{10} \theta_j C_{it}^j + \gamma_{sct} + \alpha_i + \varepsilon_{isct} \quad (2)$$

A key advantage of using an event study approach rather than a structural approach for assessing merger effects is that precise market definitions are not required (Vita & Sacher, 2001). The event study approach is particularly attractive in the context of higher education where it is not clear whether “markets” consist of commuting zones, states, one national market, or some other geographic boundary and whether there are different markets depending on the degree level, field of study, type of institution, or other characteristics of the degree. With an event study approach, looking at pre and post merger outcomes is sufficient to estimate the causal effect of the merger, provided the model controls for other factors changing concurrently with the merger that impact the outcomes of interest. By including year by state by sector fixed effects, identification comes from differences in prices relative to other institutions in the same state and sector. It is plausible that colleges in the same

state are subject to similar demand and cost conditions, which helps control for other factors influencing prices and quality that may be changing at the time of the merger.

4.1 Sticker Price Effects

Figure 2 shows the event study plots for undergraduate average tuition and fees for full-time students and average tuition and fees per-credit for part-time students (equation 2).⁹ Since this price measure corresponds to undergraduates, I use only the 60 merger events that involved mergers of institutions enrolling undergraduates. The tuition and fees for full-time students follows a parallel trend to non-merging institutions in the state and sector prior to the merger. Then, there is a discontinuous jump in tuition and fees coinciding with the year the merger takes place. A similar pattern holds for tuition and fees for part-time students. Prior to the merger, tuition and fees are, if anything, trending downwards. However, tuition and fees increase after the merger, and the post-merge indicators are statistically significant for the first six years after the merger. The fact that increases begin in the year the merger takes effect is consistent with tuition hikes being directly related to the merger.

In contrast, I find no evidence of a statistically significant change in competitors' prices in response to mergers as shown in Appendix Figure A.2. Estimating pre/post specifications (equation 1) provides a magnitude for the own and competitor price effect. Columns (1) and (2) of Table 2 indicate that mergers increase own tuition and fees by 5% for full time students and 7% for part-time students, on average.¹⁰ There is no statistically significant effect on competitors' sticker prices, though the confidence intervals cannot rule out small effects in either direction for competitors.¹¹ One possible explanation for the lack of an obvious com-

⁹Appendix Figure A.3 shows balanced panel event studies where the event window is [-3,+3].

¹⁰In addition to my preferred empirical strategy, I have also tested robustness to other empirical approaches. See the "Additional Analyses" section of the appendix.

¹¹I have also tested for competitor price effects using a more restrictive definition of competitors: comparison institutions that operate in the same commuting zone. I, similarly, find no statistically significant impact of mergers on competitors' prices.

petitor price effect, other than insufficient statistical power, is that higher education markets may exhibit strategic heterogeneity where some institutions exhibit strategic substitutes and others exhibit strategic complements (Higgins *et al.*, 2005; Monaco & Sabarwal, 2016). I also investigate the possibility that competitors adjust net prices but not sticker prices later in the analysis.

I explore whether merger sticker price effects differ between public and private non-profit institutions by estimating effects separately by institution type. As shown in Table 2, the point estimates are somewhat larger for private non-profit institutions compared to public institutions. However, a formal test of equivalence cannot reject the null hypothesis that the two price effects are the same for any of the specifications. Based on this evidence, I decide to pool public and private non-profit institutions to increase statistical power in the analysis that follows.¹²

4.2 Financial Aid Awards and Net Prices

Even if institutions increase average tuition and fees, it is not obvious that all students will pay more for their education. If institutional financial aid is also increased, net prices may remain unchanged or even fall for some students. In this way, mergers may enable institutions to increase price discrimination. Andrews & Stange (2016) and Kim & Stange (2016) find that when tuition setting authority shifted from the state legislature to the governing board of each university in Texas, most institutions raised sticker prices but also increased grant aid for low-income students, partially offsetting the effects of higher sticker prices. More generally, Fillmore (2018) and Epple *et al.* (2006) show in the context of structural models that price discrimination is an important feature of higher education markets in the U.S.

I begin by investigating how institutional financial aid awards change with the merger.¹³

¹²Appendix Figure A.5 displays separate event study plots for public and private non-profit institutions for full-time and part-time tuition and fees.

¹³In the 2014-2015 academic year, 47% of students at public four-year degree-granting institutions and 78% at four-year private non-profit institutions received some form of in-

Table 3 shows that merging institutions do not change the percent of students receiving institutional grant aid, but they do increase average awards for students receiving aid. In particular, among institutional aid recipients, mergers increase average institutional grant aid awarded by 31%. Averaged over all students, institutional grant aid increases by 12% per student (column 3 of Table 3).¹⁴ Figure 3 displays the corresponding event studies. To assess the net revenue effects for merging institutions, I take the average tuition and fees for a full-time, first-time student and subtract the average amount of institutional grant aid. This is average net revenue per full-time student for the institution, not the average net price paid by the student, because federal and state grant aid can further offset the sticker price for the student. The average net revenue point estimate is close to zero, though the estimation is imprecise. I cannot reject a null that the increases in institutional grant aid are large enough to fully offset gains in revenue from higher sticker prices.

Table 3 also reveals changes in financial aid policies of competitors.¹⁵ As a result of the merger, competitors decrease the percent of students receiving institutional aid but increase average institutional aid awards to aid recipients. This can also be interpreted a form of increased price discrimination since a greater number of students are paying tuition and fees without the help of institutional aid while students receiving aid experience price declines.

stitutional grant aid. Institutional grants are scarcer at two-year institutions where 12% of students at public institutions and 15% of students at private non-profit institutions received institutional grant aid (U.S. Department of Education, National Center for Education Statistics, 2016).

¹⁴The results for institutional grant aid are sensitive to the inclusion of institution-specific linear time trends. Adding institution-specific linear time trends to the data makes the coefficient for average grant aid fall to near near zero, though the 95% confidence interval is still quite wide: [-15%,+15%]. The 95% confidence interval for the effect on institutional grant aid for recipients is [-15%,+40%].

¹⁵Event studies are shown in Appendix Figure A.4.

These results are consistent with previous work on non-profit responses to increased market power. Andrews & Stange (2016) and Kim & Stange (2016) find that when higher education institutions can raise sticker prices, they simultaneously increase grant aid for the lowest-income students. In the context of hospitals, Gruber (1994) shows that in concentrated markets, increased competition due to price-shopping causes net revenues from paying patients to fall and decreases care to the uninsured. In other words, when hospitals had substantial market power, they were able to charge higher prices to insured patients to fund charity care. The analogous result for colleges is that by raising sticker prices they can afford to increase average institutional grant aid.

What effects might increased price discrimination have for students? At merging institutions in the sample, 66% of first-time, full-students students receive no institutional aid.¹⁶ Therefore, the previous sticker price results indicate that mergers raise prices for the majority of students. For the remaining third of students receiving institutional grant aid, estimated increases in financial aid awards are large enough to decrease the actual prices they pay. However, this will not necessarily increase access to college among lower-income students. Many students and parents are unaware of the actual net prices they would pay at various institutions and may respond to sticker prices, rather than actual net prices in application and enrollment behavior (Hoxby & Turner, 2013; Beleemer & Zafar, 2018). Therefore, even if institutional aid fully compensates for increases in sticker prices for student receiving financial aid, sticker price increases can still have important effects on student application and enrollments among this group.

¹⁶No financial aid information is reported for part-time students, but part-time students commonly attend two-year institutions where institutional grant aid is relatively less common, so it is unlikely that the majority of these students are receiving institutional grant aid.

4.3 Heterogeneity in Merger Price Effects

Though the previous results indicate that mergers raise prices on average, there is no single merger price effect. Price effects can vary dramatically depending on their competitive significance, (potential) cost synergies, the institution's tuition setting authority, or pricing strategy preferences. Carlton (2009) and Kwoka (2014) contend that retrospective studies are most informative for policymakers when they estimate effects separately for a representative set of mergers. My setting is ideally suited to this approach since data are available at the merger level for virtually the entire set of college mergers between 2000 and 2015. I estimated separate price effects for each merger, and Figure 4 shows the variation in estimated price effects. Though most effects lie in the -20% to +20% range, there are outliers with very small or very large estimated effects. In analysis not reported here, but available upon request, I found that variability in price effects could not be explained by whether the institutions were located in urban vs. rural settings or whether the institutions were two or four-year institutions. In the next section, I assess what other factors might account for the variation in estimated effects across mergers.

5 Interpreting the Price Effects of Mergers

The previous results indicate that, on average, mergers lead to increased tuition prices but also that there is a great deal of heterogeneity in price effects. This section explores five mechanisms which could lead to changes in sticker prices: market power, changing pricing strategies, rising costs, improved quality, and changes in degree offerings.

5.1 Market Power

As the conceptual model in the appendix demonstrates, sticker price increases would be expected from mergers if institutions seek to maximize profits and do not experience cost synergies. Unfortunately, directing investigating whether market power is responsible for the price increases is difficult in this setting because measuring changes in market power requires making assumptions about what constitutes a market. Furthermore, even with correct market definitions, I cannot directly measure changes in market concentration using

the enrollment data because enrollments are typically reported at the level of the merged entity rather than the campus level, so it would not be possible to calculate the actual change in the Herfindahl-Hirschman Index. Nevertheless, in this section, I use information about geographic locations, degree offerings, and the selectivity of institutions along with plausible assumptions about what constitutes a market to try to assess whether price effects are larger for mergers that consolidate market power. Though I am unable to directly measure changes in market concentration, I can simulate how each merger would likely change the market’s concentration.

I assume that commuting zones constitute appropriate geographic boundaries of markets and institutions compete with other institutions in their “market class” for students, where market class is either two-year colleges, open-admissions four-year colleges, less selective four-year colleges (midpoint of SAT scores for enrolled students <1100), selective four-year colleges (1100-1300), or very selective four-year colleges (1300+).¹⁷ With these boundaries, there are 1,498 markets. Then using these market definitions, I simulate the change in the Herfindahl-Hirschman Index (HHI) for each merger where HHI is defined using the formula $HHI = \sum_{i=1}^{N_m} E_{im}^2$ where E_{im} is the enrollment share for institution i in market m , and N_m is the total number of institutions in market m . The simulated change in HHI is then $\Delta HHI = (E_{im} + E_{jm})^2 - (E_{im}^2 + E_{jm}^2)$ when institutions i and j in market m merge using enrollments reported two years prior to the merger. Note that for any mergers involving institutions operating in different markets, ΔHHI is 0.

Table 4 presents descriptive statistics for the set of mergers. Sixty percent of mergers involve institutions that all operate in the same market, according to my definition. The set of markets affected by mergers are quite concentrated. The average pre-merger HHI

¹⁷For 11 out of the 68 merger events, one of the merging partners is a four-year institution that reports not having open admissions but fails to report SAT enrollment data. I am unable to assign a market class to these institutions, and they are omitted from the HHI calculation.

based on enrollments reported in 2000 is 0.59. Given that the DOJ/FTC Horizontal Merger Guidelines view markets with an HHI of more than 0.25 as highly concentrated, this suggests that these markets already offer very few options for students. The average simulated Δ HHI is 0.07, but there is a great deal of heterogeneity across mergers. Some are predicted to not change HHI at all while others are predicted to change HHI by as much as 0.49.

To assess whether market power is likely responsible for the estimated price effects, I tested whether a larger simulated Δ HHI was associated with a larger merger price effect. The plots in Figure 5 reveal a positive, but not statistically significant, relationship between simulated change in HHI and a merger's estimated price effect. This positive relationship is consistent with what we would expect if price changes were due to increased market power.

I also investigated heterogeneity in price effects by whether merging institutions operated in the same commuting zone and offered degrees in many of the same fields. This is an alternative measure of whether institutions operate in the same market. Unfortunately, this analysis was also too underpowered to be informative. Finally, I assessed whether decentralization of tuition setting impacts price effects. Standard errors for estimated effects were large, and I could not reject the null that sticker price effects were the same across institutions with and without tuition-setting authority. The "Additional Analyses" section of the appendix presents the results of these two analyses in more detail. Taken as a whole, the evidence can neither definitively confirm nor definitively rule out market power as an explanation for merger price effects.

5.2 Pricing Strategies

Another potential explanation for why mergers may increase sticker prices is that mergers can introduce changes in leadership. New leaders may be more likely to favor a high-sticker price, high-aid pricing strategy. For 63 out of the 68 mergers in my sample, the chief administrative officer of the merged institution was previously the chief administrative officer of one of the merging partners. However, if the chief administrator that continues favors a high-sticker price, high-aid strategy, she might extend this strategy to the acquired campus(es). To

assess this possibility, I identified “dominant” institutions by considering a merging partner dominant if its institution identifier number was the institution identifier number adopted for the newly merged institution. Typically, this is the institution from which the new chief administrator comes and the institution that does the “acquiring.” Then, I constructed an event study measuring price effects relative to the “dominant” institution prior to the merger (Appendix Figure A.6). The point estimates for the merger price effects are smaller than before: +5% for per-credit tuition and fees and 0% for full-time tuition and fees, and neither is statistically significant. However, the confidence intervals are large enough that modest price increases even relative to the dominant partner cannot be rejected (up to +14% for per-credit tuition and fees and up to +4% for full-time tuition and fees). These results indicate that some of the price effect could be due to changes in strategy where the now merged institution follows the pricing strategy of the more dominant institution.

Sticker price effects could also be driven by cheaper merging partner(s) raising prices to match the more expensive campus. I benchmark the price effects by constructing an event study where the dependent variable in the pre-merge years is the highest undergraduate tuition and fees charged by any of the merging partners, and the dependent variable in the post-merge years is the average tuition and fees charged at the merged institution. Appendix Figure A.7 shows no statistically significant increase in tuition and fees relative to the tuition and fees charged by the most expensive merging partner in the pre-merge period. The pre/post point estimates are very close zero. However, the analysis cannot rule out modest price increases by all merging partners.

5.3 Costs

Efficiencies are the primary stated motivation for undertaking mergers. If there are economies of scale, and institutions do not reinvest cost savings to improve quality, institutions should experience decreases in spending per student. However, if the merger involves costs of reorganization, merging institutions could experience increased costs and pass these cost increases onto students paying the full sticker price. I estimate the following regression

model where where y_{isct} is the log of total, instructional, academic support, or student services spending per student at institution i operating in state s and sector c at time t .¹⁸

$$y_{isct} = \beta M_{it} + \gamma_{sct} + \alpha_i + \varepsilon_{isct} \quad (3)$$

I also estimate impacts on full-time equivalent (FTE) enrollment.

The results shown in the first column of Table 5 indicate that mergers have no significant effects on full-time equivalent enrollment.¹⁹ The point estimates for overall spending and spending on academic support, student services, and instruction per student are all positive, indicating that mergers increase spending. However, the standard errors are large, and these effects are not statistically significant. The 95% confidence interval for the effect on total spending from the preferred specification in column 4 is wide, ranging from -1% to +12%. Though the analysis cannot definitively rule out increases in costs as a explanation for higher prices post-merger, it is notable that the average merger over this time period did not generate substantial economies of scale. Not only does column 2 indicate that costs decrease by, at most, 1%, but also spending in the categories most likely to benefit from merger-induced cost efficiencies (instruction, academic support, and student services) does

¹⁸I use spending information reported on GASB (F1) forms for public institutions and on the FASB (F2) forms for private non-profit institutions. In the finance files, it is more common for institutions to report at the system level rather than the institution level with parent/child reporting. I collapse down to the parent-level based only on parent/child indicators reported in the finance file.

¹⁹The effects on FTE enrollment are estimated quite imprecisely. However, if we take the point estimate at face value, it suggests a decrease in FTE enrollment of 1%. Compared against an average sticker price increase of 5-7%, this implies an enrollment elasticity of roughly -0.14 or -0.2. This inelastic enrollment elasticity is in line with estimates from Hemelt & Marcotte (2011).

not decline.

5.4 Quality

If mergers increase college quality, higher prices may indicate that students are willing to pay for a better “product.” It is possible that increases in quality would be large enough to raise consumer welfare even if prices are higher. To investigate whether changes in institutional quality can explain changes in prices, I investigate whether mergers change the retention rates of undergraduate students. As with the price analysis, I drop any mergers where one of the merging partners enrolled only graduate students.

I choose student retention rates as a quality measure for several reasons. Unlike graduation rates, which may depend on a student’s experiences over the course of several years, the first year retention rate is only impacted by experiences in the first year. Moreover, each cohort either matriculates before or after the merger; there are no partially treated cohorts, which makes it easier to estimate impacts of mergers on retention rates as opposed to graduation rates. Furthermore, non-academic improvements in quality along other dimensions appealing to students and parents will likely be reflected in retention rates. For example, if the institution improves dorms and facilities, even if these changes do not impact the academic success of students, making parents and students more satisfied will likely increase retention rates. Most importantly, retention rates are a measure of whether the institution is moving students along towards earning a degree.

Table 6 shows there is no statistically significant impact of mergers on retention rates for full-time students. The 95% confidence interval corresponding to the estimate in column 1 rules out any effect larger than a 2.7 percentage point increase. Since the mean retention rate for full-time students is 69%, I am, thus, able to rule out decreases in first-year dropout among full-time students larger than 12%. There is a marginally statistically significant effect on retention rates for part-time students. The pre-post estimate indicates that mergers increase retention rates of part-time students by 4.7 percentage points. Given that the average part-time dropout rate is 52%, this is a 9% decline in first-year dropout among part-time students.

Interestingly, there is also no evidence that competitors respond to mergers by changing their college quality, at least as captured by retention rates.

I also assess whether improvements in perceived quality driven by combining institutions offering different degree levels could be supporting price increases. If a two-year institution combines with a four-year institution, the combined institution may be able to charge more to students in its two-year programs if the combined institution benefits from the prestige associated with the four-year institution. There are several merger events where institutions of different types combine (Appendix Table A.2), but these mergers are less common than those combining institutions of the same type, so it is unlikely that these mergers would be driving the price effect. Nevertheless, I estimate equation (1), limiting the sample to the mergers where all the merging partners operate in the same institutional category. Appendix Table A.3 shows that the estimates are slightly less precise than on the sample of all mergers, but there is still a positive and statistically significant price effect for full-time students and positive but statistically insignificant effect for part-time students. Thus, prestige effects driven by institutions of different levels combining are unlikely to fully explain the price effects. Of course, mergers could still change student and parental perceptions of quality, and institutions could be capitalizing on that change in perceived quality by raising prices.

5.5 Degree Offerings

Finally, I investigate whether mergers impact the number of degrees institutions offer. In the absence of cost savings, firms do not want their products to compete with one another, so merging will increase product differentiation. However, if there are cost reductions, multi-product firms may offer additional products, and additional offerings may increase consumer welfare (Berry & Waldfogel, 2001). Using IPEDS data on reported completions by 6-digit Classification of Instructional Program (CIP) codes, I tabulate the number of unique degree programs at each institution as well as the concentration of degrees. Examples of unique degrees in my data include a Bachelor's Degree in Aerospace Engineering and an Associate's Degree in Carpentry. Then, I estimate equation (2) where the dependent variable is the

natural log of the number of unique degree programs or the Herfindahl-Hirschman Index (HHI) for degrees constructed using the sum of shares for each CIP 6-digit code at the (merged) institution.

The event studies in Figure 6 show no statistically significant effect of mergers on the number of degrees offered or degree concentration. If anything, perhaps the number of unique degrees offered decreases and the degree concentration increases, but neither of these effects are statistically significant (Appendix Table A.4). The results are inconsistent with institutions offering degrees in many new fields as a result of the merger.

Taken as a whole, the cost, quality, and degree offering evidence is not definitive enough to determine whether the average merger over this time period was welfare-improving. I find no evidence of economies of scale but mixed evidence on quality effects. Furthermore, mergers are not associated with the introduction of many new degree programs. Given the likely heterogeneity in welfare impacts of mergers, these results point to the importance of analyzing individual mergers in more detail. See Russell (2019) for an example of such a study.

6 Conclusion

This paper conducts a retrospective analysis of non-profit college and university mergers. Exploiting variation in timing of merger consummation, I find that mergers increase own tuition and fees by 5-7%, on average, with no discernible effects on competitors' prices. At the same time, there is some evidence that merging institutions increase grants for students receiving institutional aid to offset sticker price increases. However, only one-third of students at merging institutions receive institutional financial aid, so actual prices increase for at least two-thirds of students.

It remains for future work to more definitively assess the welfare implications of mergers in non-profit higher education. Though the school-level data used in this analysis limit the extent to which quality effects can be assessed, I find no statistically significant change in retention rates for full-time students but some evidence that retention rates of part-time

students improve. Meanwhile, I find no increases in degree variety that could otherwise offset the effects of price increases. I also find no statistically significant changes in costs, and the 95% confidence interval rules out decreases in spending per student larger than 1%, indicating that the average merger did not generate notable economies of scale. Determining whether these mergers are beneficial for students will become an increasingly important policy question as public and private non-profit institutions continue to merge in the coming years.

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Figure 1: Number of Institutions Involved in Mergers 2000-2015

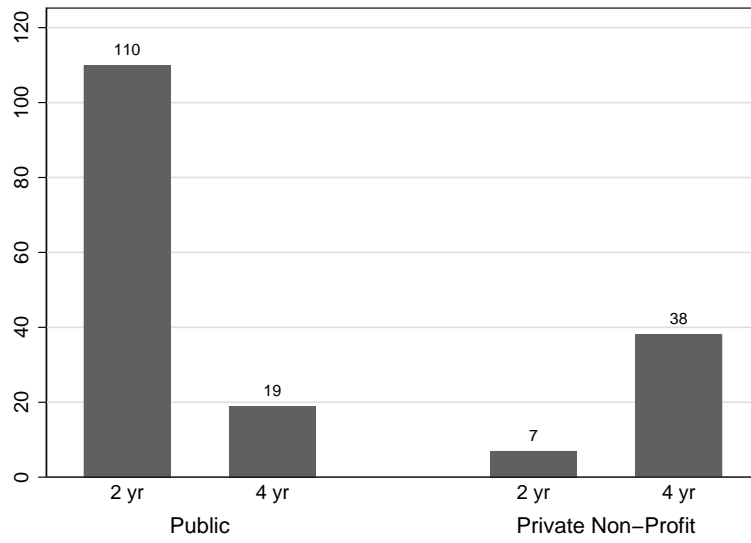
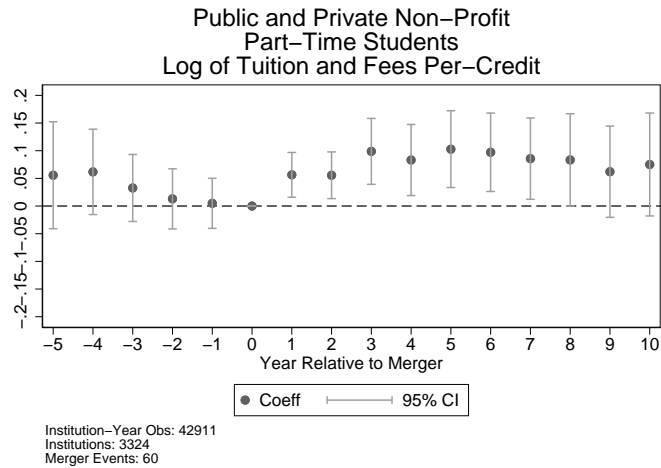
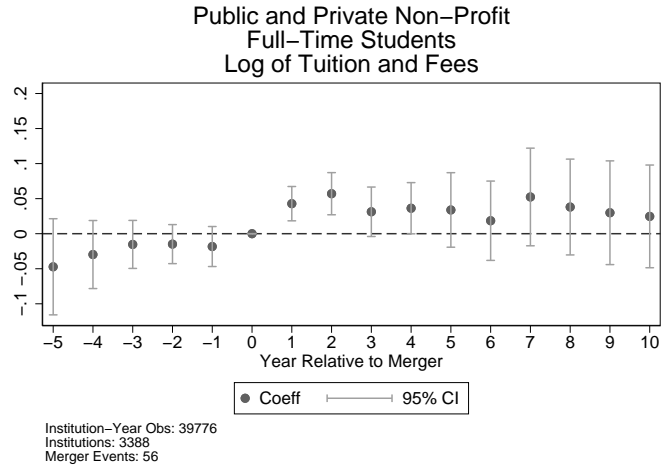
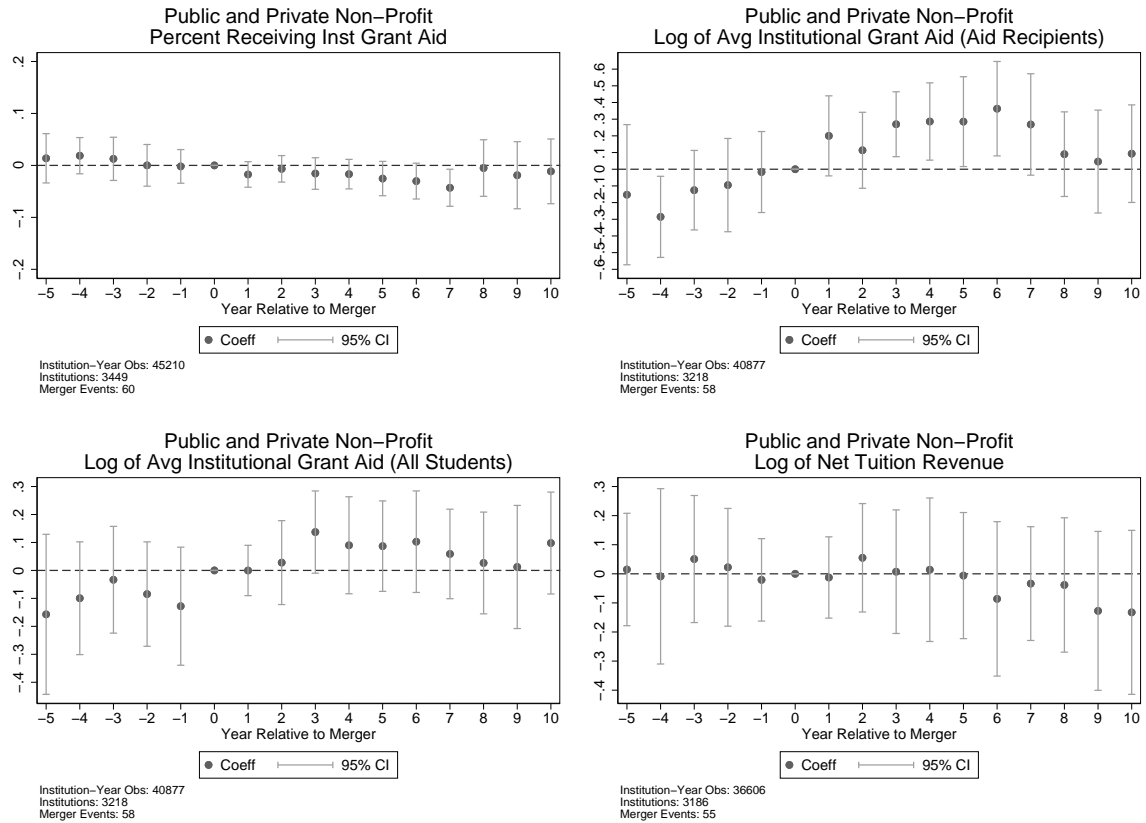


Figure 2: Effects of Mergers on Own Tuition and Fees



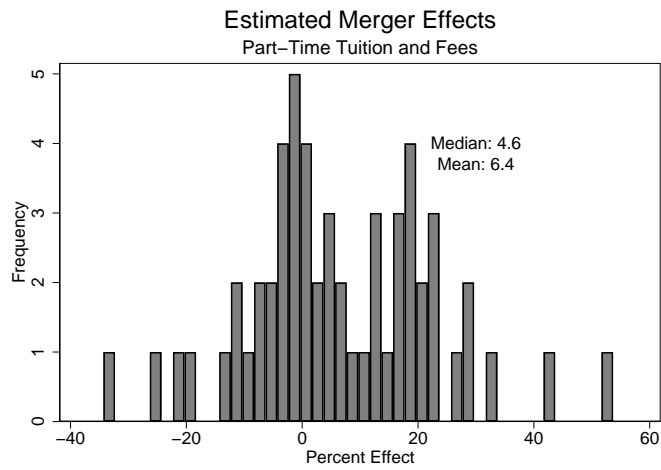
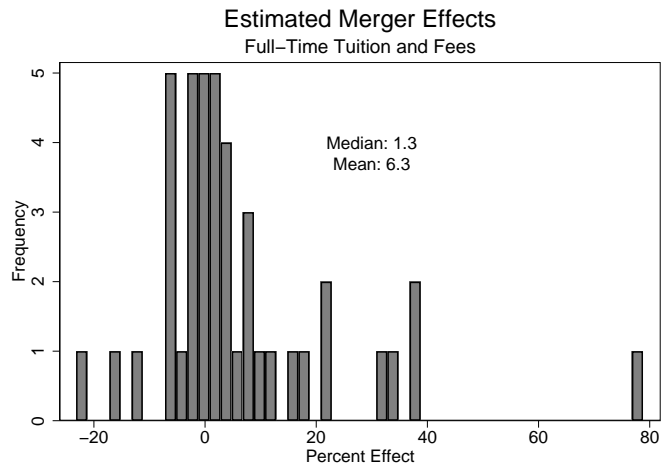
Notes: These event studies plot the coefficients and 95% confidence intervals for lead and lag indicators in a log tuition regression that includes (merged) institution fixed effects and state by year by public/private non-profit fixed effects. The dependent variable is the natural log of CPI-adjusted average undergraduate tuition and fees for full-time students or the national log of CPI-adjusted average per-credit undergraduate tuition and fees for part-time students. The omitted category is one school year before the institution was merged. Standard errors are corrected for clustering at the institution level.

Figure 3: Effects on Grant Aid and Net Revenue Per Student at Merging Institutions



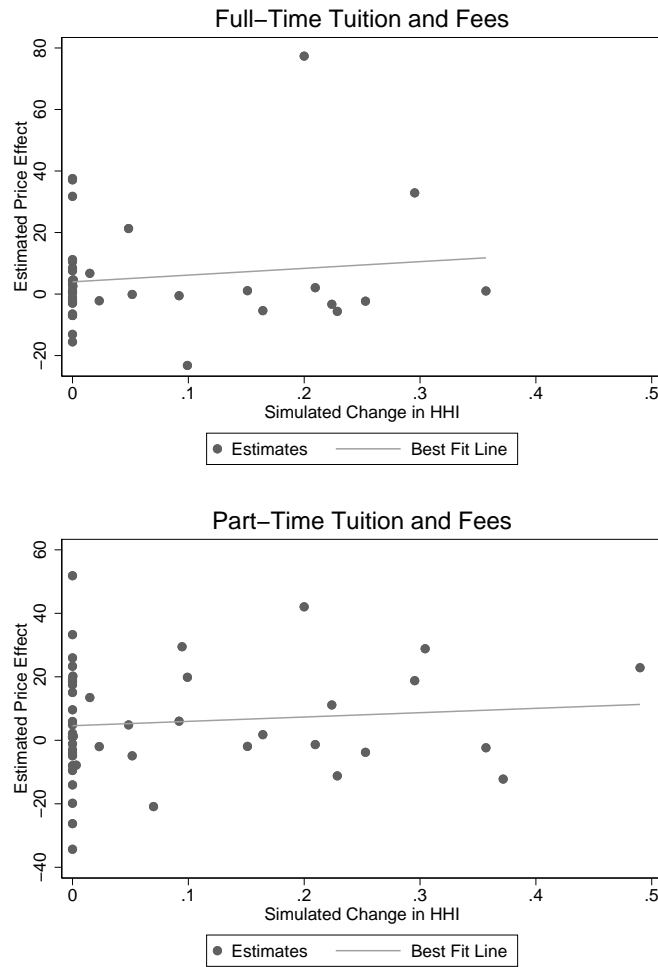
Notes: These event studies plot the coefficients and 95% confidence intervals for lead and lag indicators in a log average institutional grant aid regression that includes institution fixed effects and year by state by public/private non-profit fixed effects. The omitted category is one school year before the institution merged. Standard errors are corrected for clustering at the institution level.

Figure 4: Dispersion of Sticker Price Effects



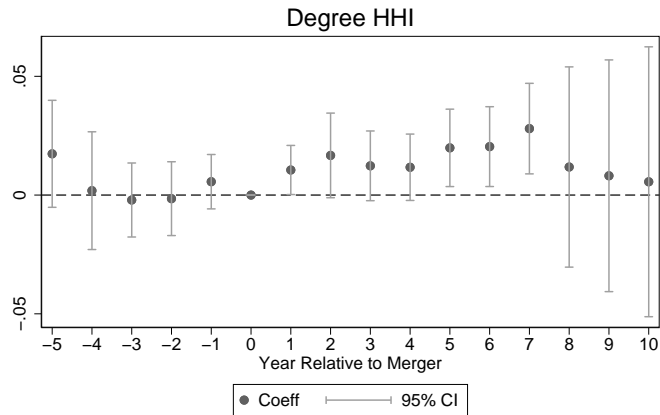
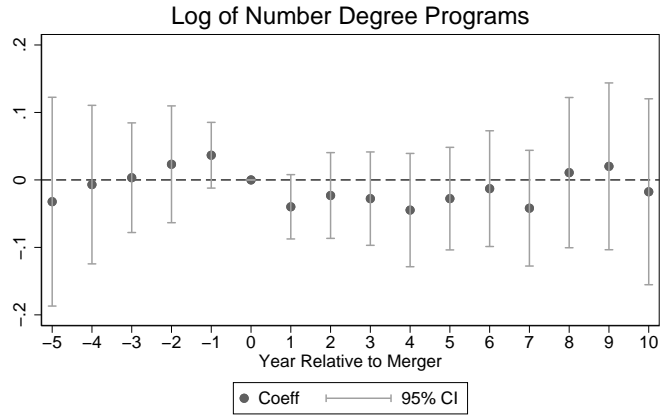
Notes: This figure shows a histogram of estimated sticker price effects for average undergraduate tuition and fees for full-time students and per-credit tuition and fees for part-time students.

Figure 5: Price Effects vs. Simulated Change in HHI



Notes: Each dot represents a merger. The estimated percent change in price is plotted against the simulated change in HHI.

Figure 6: Effects of Mergers on Degree Offerings



Notes: These event studies plot the coefficients and 95% confidence intervals for lead and lag indicators in a regression that includes institution fixed effects and year by state by public/private non-profit fixed effects. The omitted category is one school year before the institution merged. The dependent variable for the top plot is the natural log of the number of degree programs (as identified by 6-digit CIP code). The dependent variable for the bottom plot is degree HHI as described in the text. Standard errors are corrected for clustering at the institution level.

Table 1: Characteristics of Merging and Non-Merging Institutions

	(1)	(2)	(3)
	Will Merge	Never Merging	Sig. Diff. P-value
Private Non-Profit Institutions:			
Fall Undergrad FTE Enrollment	3,928	1,084	[0.034]
Percent Full-Time	76	82	[0.119]
Avg. Full-Time Tuition and Fees	\$13,256	\$11,745	[0.328]
Tuition and Fees Per Credit	\$364	\$367	[0.951]
Percent Receiving Inst Grant Aid	71	63	[0.226]
Avg. Amount Inst Grant Aid	\$6,465	\$6,880	[0.631]
Max - Min of Merging Partners			
Full-Time Tuition and Fees	\$3,362		
Part-Time Tuition and Fees Per Credit	\$104		
N=	20	2,996	

Public Institutions:

Fall Undergrad FTE Enrollment	4,105	3,941	[0.834]
Percent Full-Time	53	58	[0.173]
Percent In-State	95	93	[0.273]
Avg. In-State Full-Time Tuition and Fees	\$1,423	\$2,516	[<0.001]
Avg. Out-of-State Full-Time Tuition and Fees	\$3,591	\$6,013	[<0.001]
Tuition and Fees Per Credit	\$45	\$71	[0.004]
Percent Receiving Inst Grant Aid	15	20	[0.310]
Avg. Amount Inst Grant Aid	\$1,170	\$1,700	[0.079]
Max - Min of Merging Partners			
Full-Time Tuition and Fees (In-State)	\$302		
Full-Time Tuition and Fees (Out-of-State)	\$1,238		
Part-Time Tuition and Fees Per Credit	\$9		
N=	46	2,148	

Notes: Each cell in columns 1 and 2 displays a mean corresponding to the indicated row variable for the indicated institutional category. The sample is undergraduate private non-profit or public institutions operating in 2000 that will merge in 2001 or later or never merge from 2001-2015. Standard errors clustered at the state level are used to compute the p-value in column 3. The results are quite similar if robust standard errors are used instead.

Table 2: Effects on Mergers Tuition and Fees

	(1)	(2)
	Ln Tuition and Fees (Full-Time Students)	Ln Per-Credit Tuition and Fees (Part-Time Students)
Public and Private - Pooled Mean (in logs)	9.176	5.447
Post-Merge x Merging	0.051*** (0.020)	0.068** (0.029)
Post-Merge x Competitor	0.007 (0.009)	-0.011 (0.017)
Public and Private - Separate Effects Public Mean (in logs)	8.460	4.715
Private Non-Profit Mean (in logs)	9.748	6.334
Merging x Public	0.047** (0.023)	0.062* (0.038)
Merging x Private Non-Profit	0.059* (0.037)	0.087*** (0.033)
Competitor x Public	-0.009 (0.017)	-0.052 (0.052)
Competitor x Private Non-Profit	0.012 (0.010)	0.009 (0.014)
Test: $\beta_{Public}^{Merging} = \beta_{PrivateNonProfit}^{Merging}$ F-Statistic	0.08	0.24
P-value	[0.782]	[0.622]
Observations	39,776	42,911
Institutions	3,388	3,324
Mergers	56	60

Notes: Each column in each panel is a separate regression. All tuition amounts are Consumer Price Index (CPI) adjusted to 2016 dollars. All specifications also include (merged) institution fixed effects and state by year by sector (public or private non-profit) fixed effects. Standard errors are corrected for clustering at the institution level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Effects on Institutional Grant Aid and Net Tuition and Fees Revenue

	(1)	(2)	(3)	(4)
	% Receiving Inst Aid	Ln Avg Inst Grant (Inst Aid Recipients)	Ln Avg Inst Grant (All Students)	Ln Net Rev Per Student
Public and Private - Pooled				
Mean (in logs)	0.439	9.381	8.163	8.583
Post-Merge x Merging	-0.016 (0.015)	0.269** (0.090)	0.111** (0.054)	-0.010 (0.066)
Post-Merge x Competitor	-0.015** (0.006)	0.048** (0.023)	0.022 (0.017)	-0.012 (0.018)
Observations	45,210	40,877	40,877	36,606
Institutions	3,449	3,218	3,218	3,186
Mergers	60	58	58	55

Notes: Each column in each panel is a separate regression. All amounts are Consumer Price Index (CPI) adjusted to 2016 dollars. All specifications also include (merged) institution fixed effects and state by year by sector (public or private non-profit) fixed effects. Standard errors are corrected for clustering at the institution level. Financial aid information correspond to full-time, first-time degree/certificate seeking undergraduates.

* p<0.10, **p<0.05, *** p<0.01.

Table 4: Characteristics of Mergers

	Share			
All Partners in Same Commuting Zone	0.63			
All Partners Same Degree Level	0.96			
Combines Two-Year Institutions	0.57			
Combines Four-Year Institutions	0.38			
Combines Two-Year & Four-Year	0.04			
All Partners Same Market	0.60			
	Mean	Std. Dev.	Min	Max
Pre-Merger HHI for Market(s) in 2000	0.59	0.24	0.09	1.00
Simulated Δ HHI	0.07	0.12	0.00	0.49

Notes: Markets are defined as described in the text. For mergers involving merging partners in more than one market, HHI for 2000 is coded as the average HHI across these markets. The simulated Δ HHI is the predicted change in HHI using enrollments two years prior to the merger. Note that Δ HHI is 0 if the merging partners are not all in the same market.

Table 5: Effects on Mergers on Costs per FTE Student

	(1)	(2)	(3)	(4)	(5)
	FTE	Total	Academic Support	Student Services	Instruction
Mean (in logs)	7.436	10.058	8.938	7.356	7.599
Post-Merge x Merging	-0.009 (0.042)	0.045 (0.029)	0.053 (0.036)	0.104 (0.054)	0.012 (0.055)
Observations	34,981	34,981	34,981	34,981	34,981
Institutions	3,260	3,260	3,260	3,260	3,260
Mergers	61	61	61	61	61

Notes: Each column is a separate regression. The sample includes all public or private non-profit institutions that have non-missing and non-zero amounts of spending on instruction, administration/academic support, student services, and current year spending. All spending amounts are per FTE student and Higher Education Price Index (HEPI) adjusted. All specifications also include (merged) institution fixed effects and state by year by sector (public or private non-profit) fixed effects. Standard errors are corrected for clustering at the institution level.

* p<0.10, **p<0.05, *** p<0.01.

Table 6: Effects of Mergers on Retention Rates

	(1)	(2)
	Full-Time Students	Part-Time Students
Public and Private - Pooled		
Mean	69.0	47.8
Post-Merge x Merging	0.7	4.7**
	(1.0)	(2.3)
Post-Merge x Competitor	-0.3	-0.8
	(0.5)	(2.2)
Observations	31,312	22,560
Institutions	3,624	2,970
Mergers	59	59

Notes: Each column is a separate regression. All specifications also include (merged) institution fixed effects and state by year by sector (public or private non-profit) fixed effects. Standard errors are corrected for clustering at the institution level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.