

When Investor Incentives and Consumer Interests Diverge: Private Equity in Higher Education

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We study how private equity buyouts create value in higher education, a sector with opaque product quality and intense government subsidy. With novel data on 88 private equity deals involving 994 schools, we show that buyouts lead to higher tuition and per-student debt. Exploiting loan limit increases, we find that private equity-owned schools better capture government aid. After buyouts, we observe lower education inputs, graduation rates, loan repayment rates, and earnings among graduates. Neither school selection nor student body changes fully explain the results. The results indicate that in a subsidized industry, maximizing value may not improve consumer outcomes. (*JEL* I22, I23, G34, G38)

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Private equity buyouts are known to increase firm value (Kaplan 1989; Boucly, Sraer, and Thesmar 2011; Davis et al. 2014).¹ How they create value may differ across industries in ways that have important implications for target firm stakeholders. Prior work has identified at least three mechanisms through which private equity buyouts increase firm value: (1) reducing financial constraints (Boucly, Sraer, and Thesmar 2011); (2) improving operational efficiency (Davis et al. 2014, Bernstein and Sheen 2016); and (3) adopting information technology (Agrawal and Tambe 2016).² Shleifer and Summers (1988) identify a fourth potential mechanism in the context of hostile takeovers: the breach of implicit contracts with stakeholders. In competitive industries where incentives are aligned between stakeholders, the first three mechanisms enable private equity buyouts to create value for both consumers and equity holders, as Bernstein and Sheen (2016) and Fracassi, Previtro, and Sheen (2017) find in the case of fast food restaurants and big box retail stores. Conversely, in sectors with intensive government subsidy and opaque product quality, value for equity holders may come at the expense of consumers as a result of the fourth mechanism.

We study private equity buyouts in postsecondary education, where information frictions combined with government loan guarantees and direct subsidies contribute to incentive misalignment among stakeholders. We examine value creation and its consequences among three stakeholders: equity holders, taxpayers, and consumers. Proxies for value creation from the equity holder perspective include enrollment and profits. Proxies for value creation for the government (taxpayers) and for consumers (students) include graduation rates, earnings, loan burdens and repayment rates, and tuition. We show that private equity buyouts positively affect proxies for firm value and find results consistent with the three established mechanisms. We also show that the buyouts lead to greater capture of government aid and deteriorating student outcomes, consistent with implicit contract violation.

We employ novel data on 88 deals in which private equity firms acquire independent, privately owned schools. These deals are associated with 557 school-level ownership changes, of which 218 occur after the deal through acquisitions. Private equity-owned school systems establish an additional 437 new schools. Using regressions with school and year fixed effects as well as a matching estimator, we confirm findings from the existing literature that private equity ownership leads to higher profits; in our data, profits triple after a buyout. Existing literature has also found better management among private equity-owned firms (Muscarella and Vetsuypens 1990; Bloom, Sadun, and Van Reenen 2015; Cornelli and Karakaş 2015; Cohn, Nestoriak, and Wardlaw 2017).

¹ See also Cao and Lerner (2009), Guo, Hotchkiss, and Song (2011), and Bernstein, Lerner, and Mezzanotti (2017).

² Fund managers can increase value through operational changes because buyout contracts give them substantial control rights over the firm. Private equity contracts are complex and state contingent, usually giving the investor substantial control rights (Lerner and Schoar 2005). For overviews, see Kaplan and Strömberg (2009) and Metrick and Yasuda (2010).

In line with the new management channel, we find that chief executive turnover increases after a buyout by around 50%.

The higher revenue that we observe comes partly from a \$1,600 increase in tuition, approximately half the average total tuition at community colleges. It also comes from almost 50% higher enrollment. Reliance on federal aid increases after private equity buyouts and approaches the 90% of revenue threshold that is the statutory limit. Per-student borrowing and per-student federal grants increase by about 12% and 14% of their respective means. We exploit a 2007 student loan borrowing limit expansion to test whether private equity-owned schools are more responsive to changes in federal loan guarantees. Relative to other institutions, private equity-owned schools respond to the limit increase by raising tuition faster than other for-profit schools, which induces higher levels of borrowing. Superior capture of government aid is thus a channel through which high-powered incentives of private equity ownership translate to higher profits. This is a rent-seeking phenomenon and not in students' or taxpayers' interest.

We find sharp declines in student graduation rates, loan repayment rates, and labor market earnings after private equity buyouts (the declines are 13%, 5.6%, and 5.8% of their respective means). Enhanced recruiting and reduced instructional quality can reconcile the otherwise puzzling combination of higher enrollment despite higher tuition and deteriorating student outcomes. Private equity-owned schools have twice the share of employees in sales as do other for-profit schools. We show that education inputs, including the ratio of faculty to students and the share of spending devoted to instruction, decline after buyouts. Transitions to online education could produce declines in faculty ratios. Online education could both reduce transportation costs for students and enable economies of scale for the school. However, we find a small effect of buyouts on the propensity of a school to become primarily online and no effects on the share of distance students, and the effects on student outcomes are not attenuated when online schools are omitted from the sample.

Private equity buyouts may lead to changed operations that are detrimental to student success. There are two obvious alternative explanations. One is a selection mechanism, in which private equity firms are skilled at selecting targets on trajectories to the changes we observe. For all outcomes, we show visual event studies among switcher-schools around the buyout year. These reveal discontinuous breaks in outcomes and sharp changes to trends around the buyout year. There are no meaningful observable pre-trends. Private equity firms clearly do not acquire schools at random, but this visual evidence indicates that a selection mechanism is unlikely to fully explain the changes we observe after buyouts.

The second alternative channel is student composition. Students who attend after the buyout may be less prepared than those who attended before. This channel has ambiguous implications for student welfare and depends on school value-added, which we do not directly observe. To hold any composition effects

fixed, we use partially treated cohorts. These are students in 2-year programs who are already enrolled before a buyout occurs but have at least 1 year at the now private equity-owned school. For graduation and loan repayment rates, we compare the cohort with partial treatment to the previous one with no treatment. Partially treated cohorts experience more than half the negative effect on graduation rates and the full effect on repayments rates of fully treated cohorts. This does not reflect the elimination of degree programs after the buyout, a possible short-term channel. We cannot rule out that the mechanism in the cohort analysis is different from the primary longer term effect, but the cohort analysis strongly suggests that composition does not explain our main results.

Whether additional students enrolled as a result of post-buyout expansion are better or worse off depends in part on their outside option. A large literature finds that the expected labor market returns to for-profit education are lower than the returns to nonselective community college.³ If the students who would otherwise have attended community colleges are the source of expansion, the new students are unlikely to be better off. Indeed, we find suggestive evidence that a new private equity-owned school in a commuting zone siphons student enrollment growth from community colleges. Consistent with this finding, Cellini, Darolia, and Turner (2017) show that community colleges and for-profit schools are direct substitutes. Substitution toward a school with lower returns is not as surprising as it may seem. In addition to for-profits using much more sophisticated and aggressive marketing, college students are known to be poor forecasters of their future earnings.⁴

The evidence against composition and selection channels does not allow us to rule out that mechanisms besides reduced quality (evidenced by declines in instructional support) explain the negative effects on student outcomes. However, the results offer substantial evidence consistent with private equity ownership leading to implicit contract violations. An important further piece of evidence is that we find dramatic increases in law enforcement actions after buyouts, most of which stem from accusations that the school violated recruiting rules, such as quotas for sales staff, and misrepresentations of student loan terms, graduation rates, and student employment outcomes.

Our results shed light on how private equity creates value. This is an especially interesting question in the context of private-to-private transactions, which make up over 90% of private equity deal value and 99% of volume.⁵

³ See Deming et al. (2012), Liu and Belfield (2014), Cellini and Chaudhary (2014), Cellini and Turner (2016), Deming et al. (2016), and Armona, Chakrabarti, and Lovenheim (2017).

⁴ For example, see Arcidiacono et al. (2014, 2016), Hastings et al. (2017), Stinebrickner and Stinebrickner (2013), and Wiswall and Zafar (2014), and . This literature has found that students from low-income backgrounds are particularly prone to overestimating the earnings of past graduates in their major and institution and that students who are overly optimistic about their earnings and academic ability are particularly prone to dropping out.

⁵ Based on Pitchbook data between 2010 and 2018; see <https://pitchbook.com/news/reports/2018-annual-us-pe-breakdown> and <https://pitchbook.com/news/articles/2017-was-an-down-year-for-take-private-buyouts>.

When a private equity investor takes a public firm private, agency conflicts decline as control becomes more tightly bound to ownership (Jensen 1989). The mechanisms may be more nuanced in a private-to-private transaction. Compared to the preexisting, private owners, private equity owners have higher-powered incentives to maximize firm value because fund managers are compensated through a call option-like share of the profits, employ substantial amounts of leverage, usually aim to liquidate investments within a short time frame, and do not have existing relationships with target firm stakeholders.

Private equity is often treated as a monolith, either praised for creating value or maligned for supposed “strip and flip” strategies. Together, the existing literature and our results suggest that there is important heterogeneity. When incentives between investors and consumers are aligned, quality improvements should accompany firm value creation (Hart, Shleifer, and Vishny 1997). In contrast, for-profit colleges feature severe information frictions and misaligned incentives. There is low price elasticity of demand, in part because tuition is not salient; students often enroll with zero up-front costs. Education quality is extremely opaque, allowing for reducing instructional resources while pursuing misleading marketing and recruiting strategies. The for-profit target population is vulnerable to these approaches because it is extremely socioeconomically disadvantaged (Deming, Goldin, and Katz 2012). While dropouts may increase when instructional resources decline, rolling admissions enable rapid enrollment of new students. The required recruiting expenditures, especially with new sales technology adoption, may be lower than the cost of retaining existing students.⁶ The sector also features intensive government subsidy, separating revenue from the consumer. In particular, the expansion of federal student loan programs since the early 1990s created opportunities to increase firm value through implicit contract violations.

As a new owner, the private equity investor may be well-positioned to take advantage of these opportunities for value creation. In order to establish the school, previous owners may have had to commit to implicit contracts with stakeholders; in exchange for government revenue, they would provide a valuable education. Previous owners may have been unable or unwilling to take advantage of new opportunities for value creation that would have required violating these implicit contracts. In fact, the potential profit from implicit contract violation is one reason nonprofit ownership is prevalent in settings such as health care and education, where consumers depend on complex, long-term, implicit contracts with service providers (Hansmann 1980). Glaeser and Shleifer (2001) discuss how in such settings, weaker incentives to maximize profits or increase value for investors can make nonprofit status optimal. This mechanism requires consumers to rationally choose nonprofit firms over for-profit ones. It may be infeasible for consumers to make this choice when

⁶ Reducing expenditures on instruction is a well-established cause of lower graduation rates (Bound and Turner 2007; Webber and Ehrenberg 2010).

subsidy separates revenue from the consumer and quality is hard to observe. In our context, it seems likely that improved subsidy design could better align incentives. This might be one avenue toward addressing the growth in federally guaranteed student debt—which increased from \$241 billion in 2003 to \$1.6 trillion in 2019—and possible accompanying adverse effects, including high levels of default and reduced entrepreneurship.⁷

A caveat of our analysis is worth mentioning. Private equity ownership is not randomly assigned to schools, and it is impossible for researchers to observe all possible outcomes. We cannot entirely rule out that changes in student body composition affect our results, or that the expansion of online education benefits many students. Additionally, while we observe sharp breaks for many outcomes around the buyout, it is possible that private equity firms time buyouts to, for example, periods in which schools would experience sharply deteriorating student outcomes for other reasons.

Our paper contributes to the literature on private equity and the real effects of acquisitions, including Brown, Gredil, and Kaplan (2013), Ewens, Rhodes-Kropf, and Strebulaev (2016), and Ma, Ouimet, and Simintzi (2018). In addition to Bernstein and Sheen (2016), two papers offer insights related to ours. Matsa (2011) shows that highly levered supermarket firms, which sometimes become highly levered through private equity buyouts, experience higher inventory stock-outs. Ljungqvist, Persson, and Tag (2016) study the misalignment between private and social incentives in private equity-backed stock delistings. Furthermore, our findings may be relevant to other sectors with similar characteristics that also receive large amounts of private equity investment, such as health care, infrastructure, and defense.⁸

1. Data and Descriptive Statistics

This section first describes the for-profit higher education industry and explains why it may feature incentive misalignment (Section 1.1). We both describe private equity's role in the industry and also introduce our private equity deal data in Section 1.2. We summarize the data from the Department of Education on schools and students in Section 1.3.

1.1 Institutional context

For-profit schools (for-profits) have existed in the United States since the early 1900s, but enrollment substantially grew in recent decades (left graph

⁷ See Looney and Yannelis (2015), Bleemer et al. (2017), Krishnan and Wang (2017), and Mueller and Yannelis (2019).

⁸ See Figure OB1 (in the Online Appendix). The health care economics literature examines how incentives and the ownership of health care providers affect the price and quality of care. However, private equity within this setting has not been studied. Providers appear to be motivated by incentives; however, results regarding ownership are mixed (Dafny et al. 2016; Duggan 2000; Clemens and Gottlieb 2014; Adelino, Lewellen, and Sundaram 2015; Sloan et al. 2001; Hackmann and Pohl 2018).

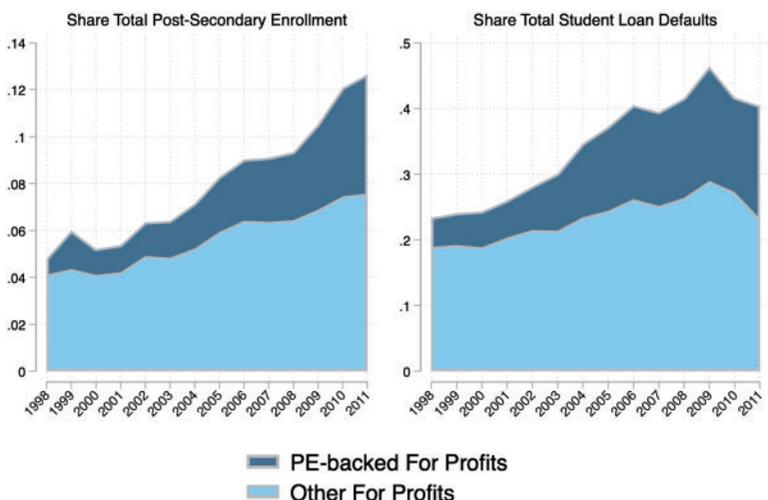


Figure 1
For-profit schools' share of loan defaults and enrollment

The left graph shows the for-profit share of total U.S. postsecondary enrollment by whether a school was ever private equity owned. The right graph shows the share of total student loan defaults within 2 years of entering repayment by whether a school was ever private equity owned.

in Figure 1). As of 2016, about 1.2 million students were enrolled at for-profit schools. In 2011, the last year for which 2-year default rates are available, for-profits accounted for about 40% of student loan defaults. For-profits attract more socioeconomically disadvantaged students than community colleges, which are the closest comparison (Deming, Goldin, and Katz 2012; Looney and Yannelis 2015).

There are well-known information frictions in postsecondary higher education. An absence of accessible information, the difficulty of assessing returns to education, and long lags between enrollment and job placement impede the transmission of product quality to future sales (Bettinger et al. 2012; Stinebrickner and Stinebrickner 2013; Wiswall and Zafar 2014). Students are poorly informed about their own ability, their school's quality, and expected earnings from the program they have chosen before starting postsecondary school (Stinebrickner and Stinebrickner 2012; Arcidiacono et al. 2014; Wiswall and Zafar 2014; Arcidiacono et al. 2016). For example, Hastings et al. (2017) find that students who apply to low-earning college degree programs overestimate earnings of recent graduates by approximately 100%. The school faces a trade-off between the potential costs to its reputation of failing to educate students, and the direct costs of providing that education. A significant body of work suggests that the former may be low, because students are not well informed about which programs are optimal for them, programs are difficult to compare to each other, and prospective students rarely have visibility into previous cohorts' outcomes (Lang and Weinstein 2013).

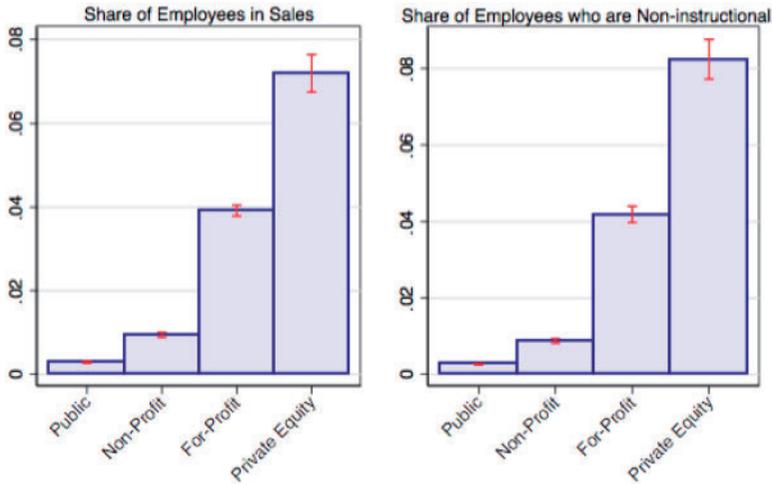


Figure 2

Employees in sales and noninstructional activities

The figure shows the share of employees who perform sales and noninstructional activities by institution type from 2012 to 2015 (data available only for these years).

For-profits devote far more resources to recruiting than other types of schools, which compounds these information frictions. Because of federal loan and grant programs, salespeople can market zero upfront costs to low-income students, despite higher average tuition among for-profits than alternatives. Figure 2 shows the share of school employees in sales (left graph) and noninstructional activities (right graph), by school type and ownership between 2012 and 2015, the years during which data are available for this variable. While public and nonprofit schools have less than 1% of employees in sales, private equity-owned schools have over 7% of their employees in this area. Other nonprivate equity-owned for-profits have 4%. Government investigations have found evidence of deceptive marketing practices among for-profits (Senate 2012).

About 90% of revenue at for-profits comes from public sources (CFBP 2012; Kelchen 2017). They are incentivized to target low-income students, who qualify to pay tuition primarily with federal grants and loans and so need not be billed regularly. Tuition is the most important determinant of the amount of federal aid a student may receive, which incentivizes for-profits to increase tuition above cost (Cellini and Goldin 2014). Federal revenue arrives when the student begins school and is largely disconnected from graduation rates and labor market outcomes. The taxpayer bears the cost of student defaults.⁹ Thus, government aid and loan guarantees create a potential misalignment

⁹ Legislation proposed in the U.S. Congress in November 2017 would have required schools to repay a portion of defaulted student loans. A *Wall Street Journal* article noted that “This so called skin-in-the-game proposal has been long fought by the powerful higher education lobby” (Belkin, Mitchell, and Korn 2017).

of incentives between for-profit school owners and consumers (see Online Appendix Sections A.1–A.3 for further discussion). From a profit maximization perspective, government loan guarantees make the school indifferent to whether a student defaults on her debt.

Most of our school characteristic and student outcome data come from the U.S. Department of Education Integrated Postsecondary Education Data System (IPEDS). All schools that are Title IV eligible must report to IPEDS, and this includes the vast majority of the higher education sector, including at least 73% of for-profits (Cellini and Goldin 2014). Most variables are reported at the school level according to a unique “unit ID” that remains constant over time and across ownership changes. There are no merges between multiple unit IDs in our sample. We create a unique identifier, “system ID,” to represent the parent institution, including parent companies of for-profit college chains.¹⁰ This is important because for-profit college companies often operate multiple schools.¹¹

1.2 Private equity in higher education

A primary goal of private equity buyouts of publicly traded firms in the 1980s was to align managers with investors’ interests in short-term profit maximization (Jensen 1989). In recent decades, however, managers of publicly traded firms have to some degree deterred leveraged buyouts through increased shareholder value creation, both through changes to governance and increased profitability (Holmstrom and Kaplan 2001; Kaplan and Strömberg 2009). Parallel to this shift, private equity investors increasingly turned to investments in smaller, privately held companies. Acquisitions of privately held firms made up a majority of all U.S. buyouts between 1980 and 2005 and constitute all but two of the buyouts in the for-profit college sector in the years for which we have complete data (Davis et al. 2014).

Private equity buyouts can affect target firm operations and finances. Operationally, Bloom et al. (2015) find that private equity- owned firms have superior management than other privately owned firms. Davis et al. (2014) show that private equity-owned manufacturing firms expand productive plants and shutter underperforming ones. Bernstein and Sheen (2016) demonstrate that restaurant worker training and incentive alignment improve after private equity buyouts. Fracassi, Previtro, and Sheen (2017) also find that consumers benefit from private equity buyouts of chain retail stores. Financially, private

¹⁰ We analyze chain acquisitions in Section 5.7.

¹¹ The data used in our analysis constitute an unbalanced panel. Exit, however, is much less common among private equity-owned schools. New schools enter the data set when they become Title IV eligible. Of the 994 schools that were ever Title IV eligible and under private equity ownership since 1987, 194 leave the data set because of closure or cessation of Title IV reporting prior to the last year for which data are available. Another 291 schools owned by private equity are excluded from our analysis in years following changes in their parent company to publicly traded ownership. Among the 7,034 for-profit schools that were ever Title IV eligible but never under private equity ownership, 4,410 close or cease Title IV reporting prior to the last year for which data are available.

equity buyouts are typically accomplished using debt that is collateralized by target firm assets (Metrick and Yasuda 2010). This paper focuses on student outcomes and does not address firm capital structure.

To collect higher education private equity deal data, we research the parent ownership history of every for-profit college in the United States from 1987 through 2016 that was eligible for federal aid (termed “Title IV eligible”). We use a variety of sources, which is necessary for two reasons. First, no single existing source contains comprehensive data on buyouts of for-profit colleges. Second, commercial databases do not track the individual schools that each portfolio firm operates. We begin with a comprehensive list from IPEDS for all 7,034 Title IV schools that have ever reported for-profit ownership. We then manually research the ownership history of each school and its parent company. One way that we identify parent firm ownership is by matching schools to firms based on the Employer ID Number reported in IPEDS. Two sources are especially useful. First, schools have been required since 2008 to describe their ownership history in online course catalogs, which we obtain via Internet archives.¹² Second, we use unpublished documents from the 2012 Senate HELP Committee report of for-profit colleges and 10-K statements for publicly traded firms. The next step is to identify private equity buyouts of parent firms by searching the ThomsonOne and Preqin databases.

We identify 88 private equity buyouts of for-profit college companies before 2016. None of the deals we use in analysis are secondary deals. In some cases, the private equity owner exits by selling to another private equity firm. We do not examine these deals; as far as our data are concerned, the school remains private equity owned. Of the firms involved in the deals, 35% have an education specialty and the average number of education deals is 2.1 (the median is zero). Median fund returns are roughly similar to industry benchmarks.¹³ Figure 1 shows the private equity-owned share of total enrollment and defaults over time. Defaults are measured at least 3 years after graduation, so we terminate both plots in 2011. We include formerly private equity-owned publicly traded schools. Private equity-owned schools account for approximately 35% of the total for-profit enrollment in our data on the near-universe of for-profit schools. Most of the increase in the for-profit share of student loan defaults since 2000 has been among private equity-owned schools.

Private equity investments in higher education have taken two forms. One is the purchase of independent (small, private) colleges, usually with consolidation intent. An example that illustrates the broader pattern we find in the data is TA Associates’ buyout of Florida Career College for \$53 million in 2004. At the time, Florida Career College had four campuses and 2,500 students. After adding three additional campuses and expanding enrollment

¹² Online Appendix E provides an example of these course catalogs.

¹³ Based on data from Preqin and Mitch Leventhal. Among the 118 firms, 62 match to Preqin.

to 4,000 students, TA Associates sold its stake in 2007 for \$192 million, almost quadrupling its investment. Later in 2007, federal investigators found employees producing fraudulent high school diplomas for applicants and encouraging students to lie about their high school status. The second type of deal is the buyout of an existing chain institution; the biggest have taken public companies private. For example, in 2007 KKR and SAC Capital took Laureate Education private for \$3.8 billion. Eaton et al. (2016) provide further evidence regarding publicly traded and privately owned schools. Other examples include Goldman Sachs taking Education Management Corp (EDMC) private in 2006 for \$3.4 billion, and various investors, including Vistria Group, taking Apollo Education Group (University of Phoenix) private in 2017 for \$1.1 billion. Online Appendix Section A.4 describes the role of private equity in for-profit higher education in detail.

At the firm level, we track the 88 buyouts as system ID-level changes in ownership.¹⁴ It is common for the company acquired in a buyout to own multiple schools. After the buyout, this parent company often purchases or establishes additional schools. The 88 buyouts involved changes in ownership for 339 schools. We observe 136 acquisitions of other for-profit companies by private equity owned firms after a buyout, which involved 218 subsequent changes in ownership. The bar graphs in Figure OB2, panel A (in the Online Appendix), plot the 88 buyouts and 557 school-level ownership changes over time. They show that these events are not concentrated in a few years. The histograms in Figure OB2, panel B (in the Online Appendix), contain the number of colleges per buyout and per acquisition. They illustrate a range in the number of colleges involved per buyout; most involve just one school, and the maximum is 35. In addition to the 557 college level ownership changes, firms under private equity ownership established 437 additional schools. This gives us 994 schools, or unit IDs, that ever come under private equity ownership.¹⁵

1.3 School characteristics and student outcomes

Table 1 summarizes the variables we use in our analysis.¹⁶ These descriptive statistics indicate that other for-profits are in some ways more similar to community colleges than to private equity-owned schools, suggesting that private equity-owned schools may drive many of the characteristics generally

¹⁴ Nearly 80% of the deals are known buyouts, whereas the other 20% may be minority stake purchases. For simplicity, we use the term “buyout” in the remainder of the paper.

¹⁵ Some variables are reported at the OPEID level, which in some cases aggregates unit IDs. There is a total of 374 switcher OPEIDs. This is smaller, because OPEIDs sometimes encompass multiple unit IDs, and the data for which we use OPEIDs (repayment rates and earnings) are available for fewer years.

¹⁶ For comprehensive descriptions, sources, and years available for all variables used in analysis, see Table O1 (Online Appendix B). Data are presented at the school (unit ID) level. The data span 1987 through 2016, but some variables are not available until the early 1990s. A year corresponds to the spring term of the academic year, which begins on August 1 and ends July 30. For example, observations for the 2008–2009 academic year are identified as 2009.

Table 1
Descriptive statistics by institution type

	Nonprofit, state	Community	For-profit, not PE	PE owned
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Schools per firm	1.03 (0.45)	1.05 (0.62)	1.49 (4.19)	8.07 (11.49)
Operating margin (mill 2015\$)	40 (102)	6 (16)	6 (34)	34 (63)
Publicly traded	0.00 (0.000)	0.00 (0.00)	0.14 (0.35)	0.000 (0.00)
Selective admissions	0.68 (0.467)	0.089 (0.29)	0.092 (0.29)	0.077 (0.27)
Highest degree offered**	1.12 (0.40)	2.12 (0.33)	2.32 (0.75)	2.01 (0.723)
Graduation rate*	0.52 (0.21)	0.55 (0.25)	0.55 (0.25)	0.48 (0.21)
Repayment rate (3 year) ^a	0.64 (0.17)	0.46 (0.13)	0.41 (0.16)	0.34 (0.14)
Mean earnings after school (2015 \$)	49,067 (15,121)	36,915 (7,9394)	31,769 (11,254)	33,523 (11,125)
Full-time faculty per 100 students ^b	6.28 (4.653)	4.38 (4.26)	4.48 (4.1)	3.62 (2.66)
Full-time faculty	261 (465)	109 (110)	16 (29)	25 (45)
Share spending on instruction	0.47 (0.14)	0.54 (0.13)	0.42 (0.24)	0.36 (0.15)
Spending on instruction (mill 2015 \$)	38 (70)	17 (23)	2 (6)	4 (7)
Students ^c	3,885 (5,656)	3,148 (3,866)	387 (1,232)	747 (1,413)
1st law enforcement action	0.00 (0.007)	0.00 (0.006)	0.00 (0.015)	0.004 (0.059)
Share students white	0.67 (0.28)	0.69 (0.25)	0.51 (0.32)	0.44 (0.26)
Loan per borrower(2015 \$)	5,177 (2,370)	4,008 (2,016)	6,700 (2,978)	8,124 (2,834)
Tuition revenue per student (2015 \$)	10,996 (7,110)	3,673 (3,883)	14,211 (7,678)	17,521 (7,303)
Online	0.000 (0.000)	0.000 (0.000)	0.016 (0.127)	0.027 (0.161)
Pell Grants per student (2015 \$)	1,351 (1,683)	1,726 (1,293)	4,109 (3,193)	4,609 (3,105)
Share students with federal grant aid	0.40 (0.23)	0.50 (0.21)	0.67 (0.24)	0.72 (0.20)
N (school-year obs)	55,104	29,678	34,285	4,540

This table contains summary statistics at the school (unit ID, or campus) level. The exception is profits, which are at the firm/institution-year (system ID) level; from left, N=47,834; 23,929; 8,254; and 438. ^aShare of students in repayment after 3 years (have paid back at least \$1 in principal). ^bFull-time faculty. ^{**}Highest degree offered is 1 for 4-year degrees and higher, 2 for 2-year degrees, and 3 for less-than-2-year degrees and certificates. ^cFull-time equivalent (applies to all below). *Graduation rate is the share of students that graduate within 150% of normal time for programs of 2 years or less duration.

associated with for-profits in, for example, Deming, Goldin, and Katz (2012), Cellini and Goldin (2014), Cellini and Turner (2016), and Deming, Yuchtman, Abulafi, Goldin, and Katz (2016). The graduation rate (fraction of students who graduate within 150% of normal time) averages 48% for private equity-owned schools, compared to 55% at other for-profit schools. We do not report IPEDS

data on community college graduation rates, because these data are neither accurate nor comparable. The average loan per borrower among full-time first year students is \$8,124 at private equity-owned schools, compared to \$6,700 for other for-profits and \$4,008 at community colleges.

There are two measures of loan repayment. The first is the 2-year cohort default rate (CDR), which is the default rate 2 years after the cohort exited. Students exit by either graduating or dropping out. We use this in Figure 1 because it has the longest time series. It is, however, known to be subject to manipulation through the use of allowable nonrepayment options like deferments and forbearances (ICAS ICAS). Comparisons between for-profits and other types of colleges therefore should be made with caution. We use the CDR time series to analyze potential bunching of default rates close to regulatory limits. The second measure is the share of students in repayment. This is the fraction of borrowers from a school who have not defaulted and have repaid at least \$1 of their initial balance 3 years after leaving school (by graduating or dropping out). Repayment rates are more sensitive than default rates and capture individuals' failure to repay through legal channels, such as deferment or income-driven repayment options. The repayment rate averages 34% among private equity-owned schools, 41% at other for-profits, and 46% at community colleges.

Private equity-owned schools are larger, with a mean enrollment of 747 students, compared to 387 at other for-profit schools. Per full-time equivalent student, tuition revenue averages \$17,521 at private equity-owned schools relative to \$14,211, \$3,673, and \$10,996 at nonprivate equity-owned for-profit, community colleges, and nonprofit/state schools, respectively. Community colleges and other for-profits respectively have 4.4 and 4.5 full-time faculty per 100 full-time equivalent students, while private equity-owned schools have 3.6. The share of students with federal grant aid and per-student Pell Grant revenue indicate the degree to which the student body is low income. They are similar at private equity-owned schools and other for-profits, while they are much lower at community colleges. We also compiled statistics on degrees and major types, though these are not reported for brevity. The most common degree type at a private equity target school (in the year before acquisition) is a 1-year healthcare related degree (17% of degrees awarded). Our indicator variable for a school being online follows Deming et al. (2012).¹⁷ We observe 126 school switches from not-online to online.

We observe average and median earnings using data from the NSLDS College Scorecard database. The source is a link between students and salaried (W-2) and self-employed (Schedule SE) earnings data from U.S. Department of the Treasury tax records. Wage outcomes cover individuals who (a) borrowed from the federal government and (b) were employees in the Social Security system

¹⁷ The method relies on the fact that a school either has "online" in its name or has no state constituting more than one-third of freshman enrollment. For-profits usually primarily draw from the surrounding area.

or were self-employed and filed a tax return. Average and median wages are therefore likely higher than if graduates who are unemployed or not in the labor force were included. Earnings are measured 6 years after cohort exit at the OPEID level for the 1998, 2000, 2002, 2004, 2006, and 2007 cohorts. Average earnings for graduates of private equity-owned schools are \$33,523 (in 2015 dollars). Earnings for graduates of community colleges are slightly higher, while earnings for graduates of other for-profits are slightly lower.

We also use data on law enforcement actions. We observe 125 instances of a state or federal agency initiating an investigation.¹⁸ Most allegations relate to misrepresentation and false claims. For example, there are 28 cases of job placement statistic misrepresentation, 23 cases of credentials or accreditation misrepresentation, and 31 cases of other types of false claims. Violations of sales and recruiting regulations and fraud also feature prominently (44 allegations). We use a school-year level indicator variable for the school experiencing its first law enforcement action. These are not concentrated in a few school systems, nor do any particular private equity firms or private equity firm types have disproportionate actions. The exception is the Fortis system, in which 13 unique schools experienced first-time actions. Although private equity-owned school-years compose just 4% of all school-years in our data, they account for 58% of the first-time actions.

2. Estimation Strategies

We use three primary empirical approaches to assess how private equity ownership affects school and student outcomes: visual event studies, within-school regressions, and a matching estimator. In this section, we describe each in turn. While none of the three have the causal rigor of an experiment, they are quite different approaches from an econometric perspective. When they all yield results with a similar economic interpretation, they provide powerful evidence of an effect.

The first approach is to plot outcome variable means around the year of the buyout, for schools that are acquired by private equity groups. This exercise tests for pre-trends, which sheds light on whether a selection mechanism most likely explains our results. It also demonstrates any raw effect within switcher-schools. We restrict the sample to schools that existed in the year before the private equity buyout, so that there is a change of ownership, and we do not include schools established by the private equity-owned school systems after the buyouts. After this restriction, there are small variations in sample size across years as schools enter and exit. A school that is not present in a given year for a given variable is recorded as missing.

¹⁸ Table OA2 (in the Online Appendix B) describes these instances. We primarily collected data from the Republic Report (<https://www.republicreport.org/2014/law-enforcement-for-profit-colleges/>).

The second empirical approach is a within-school regression, using variants of the following specification:

$$Y_{it} = \alpha_i + \alpha_t + \beta_1 P E_{it} + \gamma \mathbf{X}_{it} + \varepsilon_{it}. \quad (1)$$

$P E_{it}$ takes a value of one if the school i is private equity-owned in year t . We include school fixed effects (α_i) and year fixed effects (α_t), respectively absorbing school and time invariant factors. \mathbf{X}_{it} is a vector of controls including fixed effects for the highest degree that the school offers, whether the school is selective, and whether it is publicly traded (formerly private equity-owned schools are not identified as private equity-owned after they go public). The sample consists of all institutions in our data. We include nonprofits because private equity firms have occasionally purchased nonprofits and transformed them into for-profits, though the results are robust to excluding these instances. For each outcome variable, we present a second model with additional controls for the demographic composition of the student body. These include family income (Pell Grants per student in 2015 dollars) and the shares of students who are black, white, and Hispanic. We two-way cluster standard errors by parent company (system ID) and year in all specifications. This captures potential correlation across schools within the largest deals. Our results are not sensitive to alternative clustering approaches. As there may be concern that pre-2000 data could be lower quality, we highlight that while our main specification uses all years of available data, the results are robust to excluding pre-2000 data. The main results are also robust to restricting to switcher schools and collapsing the years on either side of the buyout into single averages, as suggested in Bertrand, Duflo, and Mullainathan (2004).

Our third approach is a matching estimator. To identify appropriate matching variables, we examine buyout predictors. For this exercise, the sample is restricted to for-profit schools. Further, among the target schools, the sample is restricted to the year before the buyout. In a logit model with year fixed effects, we tested a wide variety of observables at the school level and at the commuting zone level (which proxies for the local labor market). Table 2 shows variables with predictive power. Private equity firms target schools in areas with more community colleges and a larger number of total enrolled students, but a smaller number of existing for-profit schools. This suggests they are identifying areas with large target populations but few competitors. They target schools that have lower recent profit growth but higher profits than the average for-profit school. They also target schools with more students, a higher share of students who are white, and that have lower loan repayment rates. No other variables consistently predict being a target. These include education inputs, enrollment growth at the school and commuting zone level, the proximity of revenue to the 90% threshold that is the legal maximum, and other student outcomes.

Table 2
Private equity targeting

Dependent variable: Indicator for school experiencing private equity buyout in following year

	(1)	(2)	(3)	(4)
Community colleges in CZ	.023** (.011)			.05** (.022)
For-profits in CZ	-.0083** (.004)			-.035*** (.0084)
log FTE students in CZ	.11* (.063)			.35** (.14)
Profit growth (last year)	-.0014 (.0011)		-.0015 (.0011)	-.0036** (.0015)
log profits	.17*** (.043)		.19*** (.043)	.22*** (.081)
log FTE students	.46*** (.059)		.46*** (.061)	.42*** (.11)
3-yr repayment rate		-4.7*** (.57)		-2.1*** (.72)
Share students white			-.047 (.18)	-.55 (.39)
Year FE	Y	Y	Y	Y
N	21,436	13,738	20,892	10,340
Pseudo R^2	.13	.089	.13	.17

This table shows estimates from logit regressions in which the dependent variable is an indicator for the school-year immediately preceding a private equity buyout. All other years for target schools are excluded from the sample. The sample is restricted to for-profit, nonpublicly traded schools. Only variables with predictive power over buyouts are shown.

We deploy the variables with predictive power in a nearest-neighbor matching (NNM) estimator.¹⁹ Unlike propensity score matching, which uses the logit estimated probability of treatment, NNM flexibly (i.e., with no functional form assumption) uses the distance between covariate patterns to define the closest control for a given treated observation. The flexibility requires more data, a requirement that is increasing with the number of matched covariates. Therefore, we match only on the variables that have some predictive power (omitting the outcome variable if it is one of the matching covariates) and adjust for bias in matching on multiple continuous covariates. For each private equity-owned school, we match target schools in the prebuyout year to other for-profit schools. We assess outcomes 2 years after the buyout in the matched sample. Considering outcomes 2 years after the buyout serves as a robustness test for the main ordinary least squares (OLS) approach, which uses all years after the buyout. It ensures that the effects immediately follow the buyout and are not an artifact of something that occurs in later years. Together with the differences in estimating models, this means that the NNM estimates may not

¹⁹ The variables used are the number of community colleges in the commuting zone, the number of preexisting for-profits in the commuting zone besides the target, 1-year profit growth, log profits, the log number of FTE students, the 3-year loan repayment rate, and the share of students who are white. In specification 5 of Table 2, where all variables are used, the sample size declines, and some variables lose significance. Nonetheless, we match on these variables, as they appear to have some predictive power.

always be close in magnitude to the OLS estimates. Appendix Table OB3 shows that covariate imbalance dramatically decreases after the NNM procedure.

3. Capturing Government Aid

This section provides strong evidence that private equity ownership leads to better capture of government aid, which is a mechanism of value creation that is clearly not in the interest of taxpayers. We first establish the greater reliance of private equity-owned schools on federal aid (Section 3.1). We then present a test with causal interpretation using loan limit increases (Section 3.2).

3.1 Reliance on government aid

Table 3 contains financial outcomes. Columns 1 and 2 show that tuition per student increases by over \$1,600, relative to a mean across all schools of \$9,528 (note that tuition at community colleges averages just \$3,673).²⁰ The effect increases in the matching estimator, to \$2,107 (Column 3). The visual event study in Figure 3, panel A, shows a striking increase immediately after the buyout. Average loans per borrower increase by about \$580 (in 2015 dollars), or about 12% of the mean across all schools of \$5,147 (Columns 4 and 5). The matching model yields a larger effect of \$641 (Column 6). An immediate large increase in borrowing is evident in the visual analysis in Figure 3, panel B. Note that less than 10% of loans at private equity-owned schools in our data are nonfederal, and some of these come from state government. By comparison, 24% of loans are nonfederal at nonprofit schools. We also observe large increases in non-Pell federal grants per student (Table 3, panel 2, Columns 1–3), of about \$800. Finally, panel 2, Columns 4 and 5, show that profits increase after a buyout by 77%, an effect that increases in the matching model. Figures OB3 and OB4 (in the Online Appendix) show visual event studies for federal grants, revenues, expenditures, and profits.

To be eligible for federal aid, a school may not receive more than 90% of its revenue from Title IV programs. Figure OB5 (in the Online Appendix) shows the share of school revenue from Title IV sources, such as federal student loans and grants, before and after a buyout. Before the buyout, target schools receive 60%–70% of their revenue from Title IV programs. This fraction increases to nearly 80% 6 years after a buyout. The variance of the fraction of revenue from Title IV programs also decreases markedly. Private equity-owned schools' fraction of revenue from these programs is tightly clustered just below the statutory cutoffs for aid eligibility, suggesting management that more consistently targets the threshold. Note that the fraction of revenue coming from Title IV programs is a lower bound on the total fraction of revenue coming

²⁰ Note that tuition and loan amounts are not directly comparable, as loans are measured for full-time first-year students, whereas tuition is measured across all students on a full-time equivalent basis.

Table 3
Private equity ownership and financial outcomes

<i>Panel 1</i>						
Dependent variable:	Tuition per student			Loan per borrower		
	(1)	(2)	NNM ^a (3)	(4)	(5)	NNM ^a (6)
PE buyout	1610** (612)	1637*** (574)	2107** (973)	582*** (186)	591*** (185)	641** (278)
Composition controls ^b	N	Y	–	N	Y	–
School type controls ^c	Y	Y	–	Y	Y	–
School fixed effects	Y	Y	–	Y	Y	–
Year fixed effects	Y	Y	–	Y	Y	–
N	102,355	102,355	9,130	77,497	77,497	16,767
R ²	.82	.84	–	.67	.67	–

<i>Panel 2</i>						
Dependent variable:	Federal grants per student			Log profits		
	(1)	(2)	NNM ^a (3)	(4)	(5)	NNM ^a (6)
PE buyout	837*** (176)	784*** (219)	1450** (597)	.57*** (.14)	.57*** (.13)	.93*** (.17)
Composition controls ^b	N	Y	–	N	Y	–
School type controls ^c	Y	Y	–	Y	Y	–
School fixed effects	Y	Y	–	Y	Y	–
Year fixed effects	Y	Y	–	Y	Y	–
N	86412	86,412	20,947	104,459	104,459	17,785
R ²	.53	.55	–	.84	.84	–

This table shows estimates of the effect of private equity ownership on financial outcomes. ^aNearest-neighbor matching is performed like in previous tables. ^bWe control for the share of students who are white, black, and Hispanic, and the average amount of federal Pell Grants per student, a proxy for low-income students. ^cThese are indicators for having selective admissions, public ownership, and are fixed effects for highest degree offered. The latter includes less than 2 year (certificate), 2-year, or 4-year schools. Standard errors are two-way clustered by system ID and year. * $p < .1$; ** $p < .05$; *** $p < .01$.

from all government sources, as there exist many non-Title IV loan, grant and subsidy programs.

3.2 Effect of the 2007 loan limit increase

A regulatory change in 2007 increased student loan borrowing limits. Specifically, Congress raised the Stafford loan limits for all types of students for the first time since 1993.²¹ This created growth options for for-profit schools. We examine whether schools already under private equity ownership were more

²¹ The increase occurred in two stages, with roughly one-third of the increase affecting the 2007–2008 academic year, and the rest beginning with the 2008–2009 academic year. There are two types of caps: one for annual borrowing and the other for total borrowing over the course of the degree. One limit increase took effect in 2007, and another took effect in 2008. The 2006 Higher Education Reauthorization Act (HERA) took effect in 2007. HERA increased annual Stafford loan limits for freshmen, sophomores, and graduate students, but did not increase aggregate per-student limits. The Ensuring Continued Access to Student Loans Act of 2008 increased annual and aggregate unsubsidized Stafford loan limits for undergrads. Note that these loans are nondischargeable in bankruptcy. At the time of the legislation the rate was 6.8% for unsubsidized Stafford loans and 3.4% for the

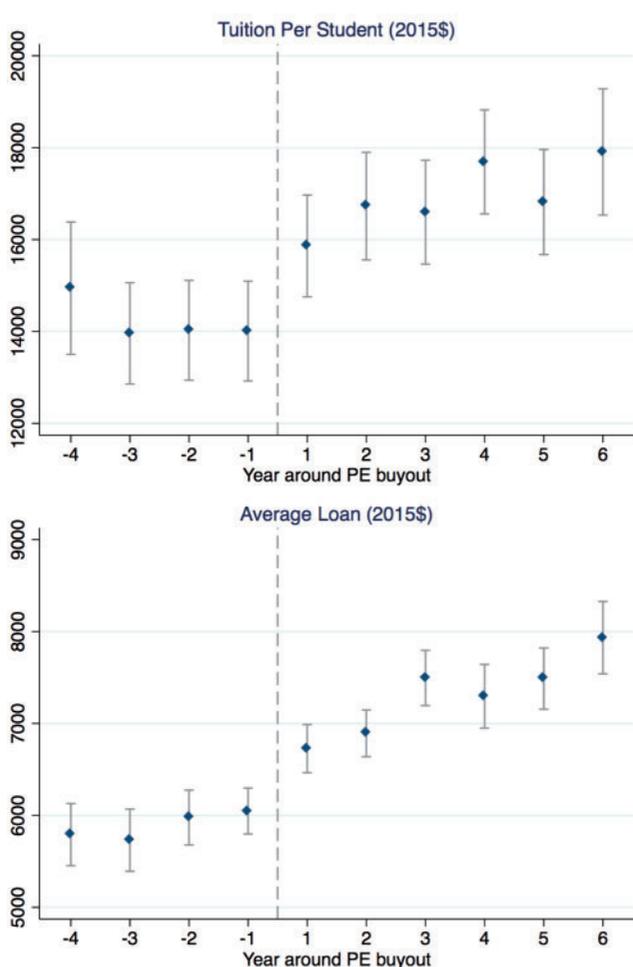


Figure 3
Per-student tuition and per-student loan event studies

The panels show, within the sample of school systems bought by PE, the means of tuition per student and average loan per student in the years around the ownership change. The level of observation is the school, or unit ID. We restrict the observations to schools that existed in the year prior to the buyout. Ninety-five percent confidence intervals shown.

responsive to this opportunity and increased tuition and borrowing faster than their counterparts. We employ a standard difference-in-difference framework. Our main coefficient of interest captures the differential effect of private equity

smaller unsubsidized loans. GAO (2014) found no effect on tuition or loans, in part because the recession had a strong negative effect on private student lending, whereas Lucca et al. (2016) argue that the loan limits led to increases in tuition. The former finding is consistent with the “Bennett hypothesis,” which premises that schools raise tuition to capture federal loans and grants.

ownership on outcomes of interest, relative to other schools before and after the loan limit increase. We compare private equity-owned schools to all schools and to other for-profit schools using the difference-in-differences specification in Equation (2):

$$L_{it} = \alpha_i + \alpha_t + \beta PE_i * Post2007 + \gamma X_{it} + \varepsilon_{it}. \quad (2)$$

The term L_{it} denotes average borrowing or headline tuition in school i in year t . The coefficient of interest is β , which captures the increase in average borrowing at private equity-owned institutions relative to other institutions after the limit increase. If private equity-owned institutions are better at capturing aid, we would expect average loan amounts to rise at a faster rate relative to other institutions, and the coefficient β should be positive and significant. We include school and year fixed effects (α_i and α_t) to capture trends, such as tuition inflation and school-specific factors, as well as school controls X_{it} as in Equation (1). Standard errors are clustered at the system ID level to address potential serial correlation. The year 2007 is excluded, as it is somewhat ambiguous whether treatment occurs in 2007 or 2008, though the results are not sensitive to including 2007.

The main identifying assumption of the analysis is that, in the absence of the limit increases, private equity-owned schools and other for-profits would have had similar borrowing trends. This implies parallel trends before 2007. Figure OB6 (in the Online Appendix) restricts the treatment group to institutions that were private equity-owned prior to 2007. Before the 2007 limit increase, the trends are parallel, but afterward the two series diverge, with a larger increase in average borrowing among private equity-owned schools. Table 4 presents estimates of Equation (2). Consistent with the graphical evidence, the results indicate that following the loan limit increases, average borrowing increased by at least \$800 at private equity-owned institutions relative to other schools, or around 10% of the mean (panel 1). Columns 1–3 include all schools, whereas Columns 3–6 include only for-profit schools. Reflecting increases in borrowing across all schools, the post-2007 indicator is positive. The coefficient on being private equity-owned is also positive, as borrowing was higher at private equity-owned schools before the reform.

To further establish parallel trends and explore the timing of the effects, we use the following specification, interacting the private equity-ownership treatment with indicators for each year:

$$L_{it} = \alpha_i + \alpha_t + \sum_{j=2002}^{2012} \beta_j PE_i * 1[Year = j] + \gamma X_{it} + \varepsilon_{it}. \quad (3)$$

Again, we restrict PE_i to schools that were acquired by a private equity group before 2007. The results are plotted in the top graph of Figure 4. The solid line represents the point estimates of the coefficients β_j . We do not observe any significant differences between the private equity-owned and other for-profit

Table 4
Effect of loan limit increases

<i>1. Borrowing</i>						
Dependent variable: Average loan per borrower (2015\$)						
	(1)	(2)	(3)	(4)	(5)	(6)
PE owned-Post-2007	909*** (90)	1,110*** (95)	1,086*** (100)	798*** (97)	1,009*** (106)	967*** (112)
PE owned	1,743*** (99)			930*** (97)		
Post-2007	2,032*** (24)			2,039*** (49)		
Controls	N	N	Y	N	N	Y
Sample	All	All	All	For-profits	For-profits	For-profits
School fixed effects	N	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	N	Y	Y
N	69,056	69,056	64,969	29,402	29,402	26,758
R ²	.29	.68	.68	.29	.63	.63
<i>2. Tuition</i>						
Dependent variable: Average tuition (2015\$)						
	(1)	(2)	(3)	(4)	(5)	(6)
PE owned-Post-2007	1,591*** (247)	1,656*** (262)	1,310*** (215)	1,193*** (262)	1,238*** (308)	1,161*** (256)
PE owned	5,427*** (246)			1,929*** (268)		
Post-2007	2,472*** (55)			2,708*** (110)		
Controls	N	N	Y	N	N	Y
Sample	All	All	All	For-profits	For-Profits	For-profits
School fixed effects	N	Y	Y	N	Y	Y
Year fixed effects	N	Y	Y	N	Y	Y
N	63,123	63,123	59,386	14,156	14,156	13,835
R ²	.26	.83	.86	.2	.62	.75

This table shows the difference-in-differences estimate of the effect of the 2007 loan limit increase on borrowing (panel 1) and tuition (panel 2). Standard errors are clustered at the system ID level. * $p < .1$; ** $p < .05$; *** $p < .01$.

groups before 2007. The coefficients are near and not distinguishable from zero. After 2007, borrowing increases faster at private equity-owned schools.

It is possible that this increase in borrowing is beneficial to students. Indeed, Goodman et al. (2017) find that many young borrowers are credit constrained and use student loans as an additional source of liquidity. However, if schools are raising tuition to capture credit expansions, this is unlikely to benefit students. Table 4 Panel 2 presents regression results for tuition. We see sharp increases in tuition that completely offset the increase in borrowing. Figure 4, panel B, also shows that there was no pre-trend; the timing of the limit increase coincides with the tuition hike.²² In Online Appendix C, we conduct two additional tests for subsidy capture. One shows that private equity-owned schools are better at avoiding a threshold that determines access to federal aid. The other shows

²² Additionally, Table OB4 (in the Online Appendix) shows that faculty-to-student ratios do not increase, suggesting that additional tuition increases are not being passed on to higher institutional quality.

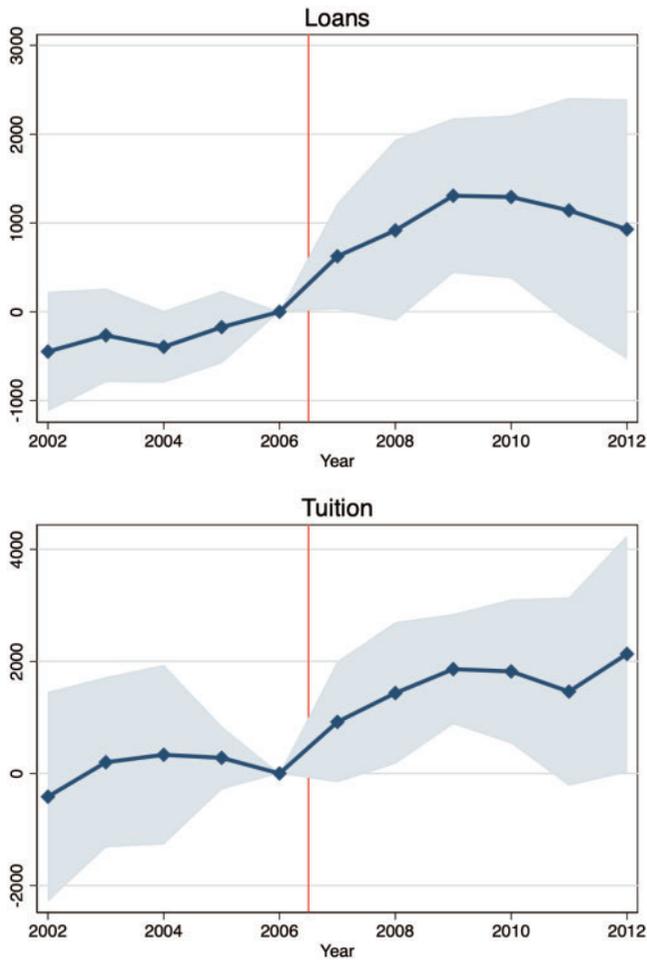


Figure 4

Loan limit increase difference-in-differences coefficients over time

The figure shows coefficients β_j from the following specification: $L_{it} = \alpha_i + \alpha_t + \sum_{j=2002}^{2012} \beta_j PE_i * 1[Year = j] + \gamma X_{it} + \varepsilon_{it}$, where 2006 is the base year. The areas represent 95% confidence intervals. Results are enrollment weighted. The vertical line is positioned before 2007, when student borrowing limits were increased. Standard errors are clustered at the school system level.

that the market values of publicly traded for-profits are extremely sensitive to unfettered access to federal aid. They fell sharply when rules were announced that aimed to tie this access to student labor market performance, and then rose sharply when these rules were substantially weakened.

In sum, we find that private equity-held schools raise tuition and borrowing at a faster rate following loan limit increases, consistent with these institutions being better at capturing government aid. Their superior ability to capture this strategic opportunity is also evidence of operational changes; in particular,

different management that engages in rent-seeking behavior. The expanded capture of government subsidies and guaranteed loans leads to higher profitability (Bachas, Kim, and Yannelis 2019).

4. Buyouts and Student Outcomes

We have thus far established that private equity ownership increases capture of government aid, which is an adverse outcome from the taxpayer perspective. We now turn to a second group of stakeholders, students, who are the consumers and have different interests from equity holders, potentially leading to the violation of implicit contracts (Shleifer and Summers 1988; Appelbaum and Batt 2014). Private equity general partners may be more disposed than the preexisting owners to violate implicit contracts for three reasons. First, they are new owners and do not have the same established relationships or commitments. Second, their compensation structure incentivizes rapidly increasing operating profits and firm value in the service of a short-term exit. Third, they have less exposure to potential long-term liabilities from implicit contract violations, such as regulatory backlash or reputation effects.

This section first examines how private equity buyouts affect the student outcomes of graduation rates, loan repayment and earnings. Section 4.2 then considers two mechanisms for the effects: first, private equity firms may select schools on different trends and, second, the change in ownership may affect the composition of students. We turn to a third possibility in Section 5, which is that buyouts could affect students through changed operations. These three mechanisms are not mutually exclusive.

4.1 Effect of buyouts on student outcomes

Graduation rates are a standard measure of school performance in the education literature, as failing to graduate is in almost all cases detrimental to affected students (Bowen, Chingos, and McPherson 2009; Stinebrickner and Stinebrickner 2012; Arcidiacono et al. 2016). It may also harm their peers who do graduate if the degree is perceived as lower quality by employers. For example, in an experimental setting, Deming et al. (2016) show that employers prefer candidates with degrees from programs that have higher graduation rates.

The graduation rate metric that we observe is the share of students who graduate within 150% of the degree's normal time. This only includes full-time students (who are also the vast majority of students at for-profit colleges), so taking longer to obtain a degree does not mean that a student is working in the labor force and taking a light course load (see Gilpin and Stoddard 2017). Relatedly, Bound, Lovenheim, and Turner (2007) show that lower graduation rates do not reflect a longer time to degree or greater human capital acquisition (i.e., more credits); instead, longer times to degree are associated with dropping out and worse labor market outcomes. However, we cannot strictly rule out the

possibility that students are taking longer to graduate, which could generate higher profits for schools if the students are paying tuition.

In Table 5, panel 1, we show that private equity buyouts lead to a 6-percentage-point decline in graduation rates, or about 13% of the mean, across all schools. This relationship is consistent across models, though the matching estimate is somewhat lower. Figure 5, panel A, contains the event study plot. As in the following figure for loan repayment, it omits the year before the buyout because these students are partially treated, which we examine below. Both panels reveal a negative effect on graduation rates. The effect is immediate, consistent with the fact that the buyout year is the first affected academic year. Given that the majority of programs are 1-year programs, operational changes can take effect quickly. Falling graduation rates could be profit maximizing for schools, particularly for 1-year programs, even if they are bad for affected students. The school receives tuition from the government (and the student acquires debt) when the student has been in class for just one week at the semester's start. If the student drops out, the school no longer bears the instructional, service, and facilities costs associated with her attendance.

For the vast majority of borrowers, defaulting on student loans is an adverse outcome relative to repaying. This is in part because federal student debt is effectively nondischargeable in bankruptcy, so wages may be garnished. The share of students in repayment, shown in Table 5, panel 1, decreases after the buyout by 3.5 percentage points (Column 4), relative to a mean across all schools of 53%. The visual event study in Figure 5, panel B, shows a downward trend after the buyout.

Private equity buyouts are associated with 6.1% lower within-cohort average earnings 6 years after enrollment, relative to a mean across all schools of \$31,269, in 2015 dollars (Table 5, panel 2, Column 1). Median earnings decline by a similar, albeit slightly smaller amount (Columns 3 and 4). There are insufficient data for the matching estimator.²³ Earnings exhibit strong time trends, increasing over most of our sample period and decreasing in the Great Recession. Therefore, we graph coefficients from a fixed effects regression in Figure OB7 (in the Online Appendix). The results contain no pre-trends and indicate a deterioration after the buyout in log earnings.

4.2 Selection and student body composition

It may be that private equity firms choose target schools that would have experienced the changes we observe in graduation rates, repayment rates, and earnings in the absence of a buyout. That is, the effects might reflect screening ability rather than a causal channel. This selection mechanism is most plausible when the target firm is on a trajectory toward the post-buyout outcomes during

²³ This is because we only observe six cohorts (as described in Section 1.3). We would need to match on the year prior to the buyout only for schools where, 2 years later, we have cohort wage data. There is inadequate data to conduct a match that improves meaningfully on the within-school, composition-controlled regressions.

Table 5
Private equity ownership and student outcomes

Panel 1						
Dependent variable:	Graduation rate (share graduate in 150% normal time)			Repayment rate (3 year)		
	(1)	(2)	NNM ^a (3)	(4)	(5)	NNM ^a (6)
PE buyout	-.06*** (.012)	-.059*** (.012)	-.041* (.023)	-.035** (.011)	-.032** (.0091)	-.057* (.032)
Composition controls ^b	N	Y	-	N	Y	-
School type controls ^c	Y	Y	-	Y	Y	-
School fixed effects	Y	Y	-	Y	Y	-
Year fixed effects	Y	Y	-	Y	Y	-
N	56,965	56,839	7,883	28,201	28,201	4,623
R ²	.8	.81	-	.96	.96	-

Panel 2				
Dependent variable:	Log mean earnings		Log 50th pctlte earnings	
	(1)	(2)	(3)	(4)
PE buyout	-.061*** (.013)	-.05** (.012)	-.057** (.017)	-.043* (.016)
Composition controls ^b	N	Y	N	Y
School type controls ^c	Y	Y	Y	Y
School fixed effects	Y	Y	Y	Y
Year fixed effects	Y	Y	Y	Y
N	17,736	17,736	17,736	17,736
R ²	.97	.97	.97	.97

These panels show regression estimates (OLS) of the effect of private equity ownership on student outcomes, at the school (unit ID)-year level. ^aNearest-neighbor matching is performed within the sample of other for-profit schools. The dependent variable is measured the year after the treated school's buyout. Matching is exactly on the year before the treated school's buyout, and then on characteristics.^bWe control for the share of students who are white, black, and Hispanic, as well as the average amount of federal Pell Grants per student, a proxy for low-income students. ^cIndicators for having selective admissions, public ownership, and fixed effects for highest degree offered. The latter includes less than 2 year (certificate), 2-year, or 4-year schools. Standard errors are two-way clustered by system ID and year. * $p < .1$; ** $p < .05$; *** $p < .01$.

the prebuyout years. Instead, the visual event studies presented throughout the paper are largely devoid of pre-trends. They reveal discontinuities in levels and trends immediately around the buyout year.²⁴ Though we cannot rule out some influence of selection, the visual discontinuities make it unlikely that this mechanism fully explains the results.

One potential mechanism for our findings is that private equity ownership could change the type of students that enroll. For example, new students may be less well qualified, with poorer labor market potential. This would be a causal effect of the buyouts, but has potentially different implications for value-added. Inconsistent with a composition mechanism, demographic controls do not significantly attenuate the results for any outcomes. We also find no effect

²⁴ A potential concern is the endogeneity of deal timing. For example, if private equity groups target schools after a particularly bad year of recruiting, this could also lead to the sharp observed breaks.

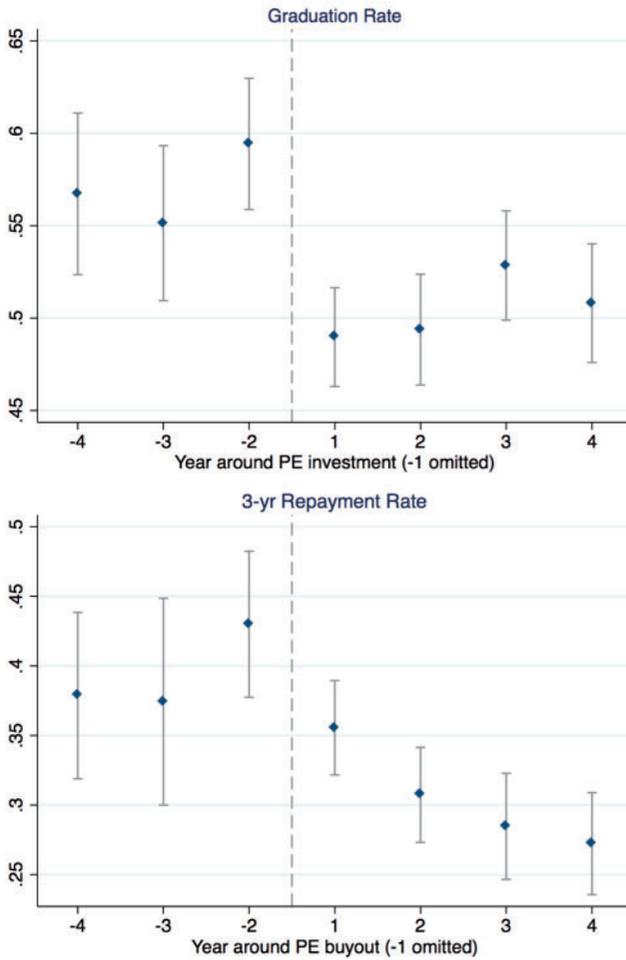


Figure 5
Graduation rate and repayment rate event studies

The panels show, within the sample of schools bought by PE, the means of the graduation rate and the repayment rate in the years around the ownership change. The level of observation is the school, or unit ID, level (N = 697). We omit partially treated cohorts. For 4-year schools, this consists of the cohorts enrolled starting in the 3 years preceding the buyout year. For 2-year schools, this consists of the cohort enrolled the year before the buyout year. There are no observations for repayment rates in years -5 or 5 (there is generally less coverage in the data). 95% confidence intervals shown.

of private equity buyouts on Pell Grants per student or the share of students on federal grants, and the small negative effect on the share of students who are white is not robust to the matching estimator (Table OB5 in the Online Appendix). This is inconsistent with observable demographic changes driving our main results.

Table 6
Cohort partial treatment effect of private equity ownership on student outcomes

Dependent variable (3 year):	Graduation rate (share graduate in 150% normal time) (1)	Repayment rate (2)
PE buyout (partially treated cohort)	-.036*** (.012)	-.054*** (.013)
School type controls ^a	Y	Y
School fixed effects	Y	Y
Year fixed effects	Y	Y
N	40,088	21,846
R ²	.76	.92

This table shows regression estimates (OLS) of the partial treatment effect of private equity ownership on student outcomes, at the school (unit ID)-year level. We limit the sample to two cohorts in 2-year programs: the cohort that enrolled in the year before the first private equity-owned year, and the cohort that enrolled 2 years before the first private equity-owned year. The variable “PE owned” is one for the former cohort, which had one year of private equity treatment, and zero for the earlier cohort, which had no private equity treatment. ^aIndicators for having selective admissions and public ownership. Standard errors are two-way clustered by system ID and year. **p* < .1; ***p* < .05; ****p* < .01.

We hold fixed composition using cohorts that are already enrolled at the school before the private equity acquisition occurs. We restrict the sample to 2-year programs at ultimately private equity-owned schools. We compare the cohort that enrolled the year before the first private equity-owned year with the earlier cohort that enrolled 2 years before. The former cohort had 1 year of private equity treatment, whereas the latter had zero. We can conduct this test only for graduation and repayment rates.²⁵ Table 6 provides the results. The partially treated cohorts experience a 3.6-percentage-point decline in graduation rates, slightly more than half the main effect among fully treated cohorts. There is a large effect on repayment rates, at 5.4 percentage points. This is inconsistent with a changing student body composition explaining the declines in graduation and repayment rates. In Section 5.6, we show that degree cuts do not explain the immediate fall in graduation rates.

It is important to caveat our analysis. We cannot entirely rule out that alternative mechanisms explain falling graduation and repayment rates among the partially treated and subsequent cohorts. However, the findings presented in this subsection suggest that changes to the composition of the student body do not explain our results. The effects among partially treated cohorts point to declines in school quality. To understand why, consider that students in these cohorts chose to enroll in the program and pay substantial up-front tuition, mostly through loans that are nondischargeable in bankruptcy. Presumably in making these investments, they believed at the time of enrollment that the degree was valuable, so significantly higher dropout rates are difficult to explain through other mechanisms.

²⁵ There are inadequate earnings data (data only exist for six cohorts spaced 3 years apart). It is also not possible for student loans, considered below, because they are measured in the cohort’s first year only, during which they are either fully treated or not treated at all.

5. Operational Mechanisms

To fully understand how private equity buyouts create firm value in higher education, we examine operational mechanisms that may explain the increase in profits shown in Section 3 and the deterioration in student outcomes observed in Section 4. In this section, we consider six areas of operational change: education inputs, enrollment, recruiting/sales, governance, online education, and degree cuts. Finally, we examine whether chain acquisitions yield similar effects as private equity buyouts (Section 5.7).

5.1 Education inputs

One possible mechanism is that education quality declines. Though we do not observe education quality directly, we show that measures of education inputs fall after private equity buyouts in Table 7. The number of full-time faculty per 100 full-time students falls by 0.45 (panel 1, Column 1), relative to a mean of 5.3 across all schools.²⁶ The matching estimate is smaller and imprecise (Column 3). The share of expenditure devoted to instruction declines by about 3 percentage points (Columns 4 and 5), relative to a mean across all schools of 48%. Here, the matching estimate is significant and larger (Column 6). The visual event studies, in Figure OB7 (in the Online Appendix), reveal that education inputs decline in the first year after the buyout and continue to decline through the sixth year thereafter. This decline in education inputs is consistent with case studies in a U.S. Senate report, which uses student complaint data to document that reductions in student support following private equity buyouts had negative impacts on educational quality with implications for student outcomes (Senate 2012). The Online Appendix Section A.4 details student complaints from the Senate report. Notably, student complaints consistently point to a heavy reliance on part-time instructors with minimal certification and high instructional staff turnover rates.

These declines in education inputs may be responsible for the deterioration in student outcomes that we observe. Bound et al. (2010) find that lower institutional resources per student, including the number of faculty, have contributed more than compositional changes to the overall decline in college graduation rates. Motivated by their analysis, we examine the association between education inputs and graduation rate changes immediately after buyouts. If operational changes are responsible for deteriorating outcomes, education quality declines should correlate with graduation rate declines. Figure OB9, panels A and B (in the Online Appendix), show that this is the case: in the year around the buyout, schools that decrease their faculty-to-student ratio or instruction share of spending experience graduation rate declines,

²⁶ Although the number of full-time faculty is a standard proxy for educational quality, it is important to caution that we cannot rule out that efficiency may improve through greater economies of scale. This could reflect the expansion of online programs; although, we present evidence in Section 5.5 that there does not appear to be a substantial shift to online education.

Table 7
Private equity ownership and operational outcomes

Panel 1							
Dependent variable:	Faculty per 100 students			Instruction spending share			CEO*
	(1)	(2)	NNM ^a (3)	(4)	(5)	NNM ^a (6)	(7)
PE buyout	-.45** (.19)	-.36* (.18)	-.2 (.65)	-.028* (.016)	-.029* (.016)	-.049** (.024)	0.0517** (0.0215)
Composition controls ^b	N	Y	-	N	Y	-	N
School type controls ^c	Y	Y	-	Y	Y	-	Y
School fixed effects	Y	Y	-	Y	Y	-	Y
Year fixed effects	Y	Y	-	Y	Y	-	Y
N	62,432	62,432	7,833	97,401	97,401	9,343	99,137
R ²	0.83	0.83	-	.75	.75	-	.28

Panel 2							
Dependent variable:	Log FTE students			1st law enf. action		Online	
	(1)	(2)	NNM ^a (3)	(4)	(5)	(6)	(7)
PE owned	.39*** (.056)	.37*** (.055)	.88*** (.1)	.0036*** (.00094)	.0036*** (.00091)	.015* (.0076)	.015* (.0076)
Composition controls ^b	N	Y	-	N	Y	N	Y
School type controls ^c	Y	Y	-	Y	Y	Y	Y
School fixed effects	Y	Y	-	Y	Y	Y	Y
Year Fixed Effects	Y	Y	-	Y	Y	Y	Y
N	123,053	123,053	33,049	123,023	123,023	123,053	123,053
R ²	.97	.97	-	.16	.16	.55	.55

This table shows regression estimates (OLS) of the effect of private equity ownership on education inputs and operational outcomes. Observations are at the school (unit ID)-year level. *Dependent variable is an indicator for a change in school CEO within the first 3 years after buyout. ^aNearest-neighbor matching is performed within the sample of other for-profit schools, where the dependent variable is measured the year after the treated school's buyout. Matching is exactly on the year before the treated school's buyout and then on characteristics. ^bWe control for the share of students who are white, black, and Hispanic, and the average amount of federal Pell Grants per student, a proxy for low-income students. ^cThese are indicators for having selective admissions, public ownership, and are fixed effects for highest degree offered. The latter includes less than 2 years (certificate), 2-year, or 4-year schools. Standard errors are two-way clustered by system ID and year. * $p < .1$; ** $p < .05$; *** $p < .01$.

while schools that increase these education inputs experience graduation rate increases. Regressions in Table OB6 (in the Online Appendix) also find that the negative effect of private equity on graduation rates in the year after the buyout is larger for schools with large negative changes in their faculty to student ratios.

This exercise also helps to explain the immediacy of the effects of buyouts on graduation rates. Firms can implement operational changes, particularly those that involve labor, relatively quickly. There is no reason that actions such as reducing the number of faculty per student and reallocating resources from instruction to sales would require more than a few months, in time for the buyout to affect what we term the first affected academic year. Adjustments involving fixed capital, such as the school's physical plant, might be expected to take years.

Tuition hikes could also explain the fall in graduation rates if students who are already enrolled decide that the program does not merit higher costs. Although this explanation is intuitive, two institutional features related to the incentive problems in education suggest that tuition may not play a significant role. First, just over half the programs in our data last 1 year. With up-front tuition payments, a student cannot recoup their spending on tuition by dropping out midyear. Second, students are price inelastic because the size of their loan package is not salient at the time of borrowing, and they have no reason to be sensitive to grant amounts (Bleemer et al. 2017). Consistent with this, we find no relationship between changes in tuition and graduation rates immediately around the buyout year (Figure OB9, panel C, in the Online Appendix).

5.2 Enrollment

Boucly, Sraer, and Thesmar (2011) find that private equity buyouts of privately held firms relax financial constraints at the target firms. In education, better access to capital can support investments needed to achieve rapid enrollment growth. Indeed, we find that after a buyout, the number of full-time equivalent enrolled students increases by about 40% in the OLS regressions, and twice this amount in the matching estimator (Table 7, panel 2, Columns 1–3). The visual event study shows that the increase begins in the second year after the buyout, which contrasts with the impacts on student outcomes that immediately occur (Figure OB10 in the Online Appendix).

In light of the negative effects on student success measures, buyouts are unlikely to make existing student types (i.e., that would have enrolled before the buyout) weakly better off. However, whether additional students—regardless of their preparedness—are better or worse off as a result of the buyout depends on their outside option. In Online Appendix D, we show that additional students enrolled as a result of expansion after buyouts appear to be drawn away from attending community colleges, which tend to have higher labor market returns than for-profit colleges (Cellini and Turner 2016). To the degree the additional students would have attended community college, they are likely not better off.

5.3 Recruiting and sales

It is puzzling that demand (i.e., enrollment) increases, while education quality and student outcomes decline. One explanation is that private equity-owned schools invest in sales and marketing operations to attract more students, as suggested by their much higher share of employees in sales (Figure 2). These activities are typically technology-intensive, relying on carefully targeted online and phone strategies (Cotton 2017). Marketing may be an area where private equity ownership enables investment in technology to advance growth, as in Boucly, Sraer, and Thesmar (2011) and Agrawal and Tambe (2016).

One way to observe the degree to which schools are more aggressively recruiting is to examine law enforcement actions, which are primarily related to recruiting violations, including predatory and misleading marketing, and

the use of excessive commissions or quotas for salespeople.²⁷ The chances of a school having its first law enforcement action increase dramatically after a private equity buyout. The dependent variable in Columns 4 and 5 of Table 7, panel 2, is one if the school experienced its first action in a given year. The coefficient is .0036, about 10% of the mean, and is significant at the .01 level. Figure OB11 (in the Online Appendix) visualizes a comparison. There are insufficient observations for the matching estimator.

5.4 Governance

Private equity investors often add value to their portfolio companies by changing governance (Kaplan and Strömberg 2009; Bloom et al. 2015). They exert control by joining the board of the portfolio firm and actively supervising portfolio firm managers (Cornelli and Karakaş 2015). At smaller privately held firms, the new owners may bring in experts in, for example, sales and marketing. Gompers, Kaplan, and Mukharlyamov (2016) find that 31% of private equity investors recruit their own senior management teams before investing, which then replace the prebuyout management team. We expect that private equity buyouts may affect operations through changes in management. We test this hypothesis in Table 7, panel 1, Column 7, where the dependent variable is an indicator for whether a school's Chief Executive changes within 3 years of the buyout.²⁸ We find a 5.2-percentage-point effect. The sample mean is 10.5%, indicating that private equity buyouts increase CEO turnover by about 50%, almost twice the average found in Gompers et al. (2016). Our results indicate that private equity owners more often change management, providing one channel for changed operations and increased firm value.

5.5 Online schools

As mentioned above, greater access to capital and managerial expertise may lead to informational technology upgrades under private equity ownership (Agrawal and Tambe 2016). This channel would be in line with prior research showing that private equity can enable firms to lever and invest in improving quality (Boucly et al., 2011). In our context, this could manifest in the expansion of online education, which might improve educational delivery and benefit students. For example, online education could reduce transportation costs for students and make enrollment possible for students who found transportation costs prohibitive. For the school, online education's low marginal

²⁷ An example comes from a U.S. Senate case study of a school acquired by Warburg Pincus. In the years after the buyout, marketing and recruitment composed 39% of expenditures. Students complained that they were deceived about financial aid and whether the program would provide adequate certification for occupational licenses, and a former recruiter testified that "if we don't have a degree they want, we are supposed to convince them that one of ours will work for them anyway" (Senate, 2012, 305).

²⁸ As defined in IPEDS, College Chief Executives are typically university presidents or another type of senior academic official. We define a Chief Executive change as an indicator of whether the last name of the Chief Executive listed in IPEDS changes from the previous year.

costs per student presents opportunities for economies of scale. Thus, private equity buyouts could benefit consumers by alleviating leverage constraints and allowing schools to invest in online education.

Table 7, panel 2, Columns 6 and 7 show the effect of private equity ownership on a school's probability of transitioning from primarily brick-and-mortar to online. We do find some evidence that schools transition into online status. However, the effect is economically small and somewhat imprecise, significant at only the .1 level (the matching estimator is not possible here). While we cannot rule out that a reason for the decline in the number of faculty is the addition of video or online learning, in general, the expansion of online education does not appear to fully explain the general patterns observed in the data, including the decline in labor inputs shown in Section 5.1.

5.6 Degree cuts

A potential operational change that might help explain the immediate fall in graduation rates is the elimination of degree programs. If private equity owners reduce degree offerings, students already enrolled in a cut program might be forced to drop out. In such a case, the effects that we show in the cohort partial treatment test, where composition effects are held fixed, might in fact reflect degree program cuts. We test this by identifying degree programs that are cut each year. We define a degree cut as a school-year in which there were no graduates of the degree, following a previous year with positive graduates. Figure OB12 (in the Online Appendix) shows the number of degree cuts by year around the private equity buyout, within schools that switched to private equity ownership. We separately consider 1-, 2-, and 4-year programs. In no case is there an observable increase in the years following the buyout. Table OB7 (in the Online Appendix) confirms this in regression analysis. Private equity ownership does not lead to cuts to degrees offered, so this cannot explain the immediate decline in graduation rates.

5.7 Private equity as an ownership type

A final step is to confirm the basic mechanism for our findings, which is that private equity ownership confers distinct incentives. If the results are driven by changes in management and control rather than the particular approach of private equity to value creation, we expect similar effects in transitions to chain ownership. To consider this, we create two new variables. First, we define a "chain" as any parent company (system ID) that is not private equity owned and that owns at least two schools (unit IDs). Ownership changes from an independent school into a chain are included as a separate indicator variable. Second, we restrict the "private equity buyout" indicator to instances where a private equity-owned school system acquires an independent school. This enables a more apples-to-apples comparison with non-private equity chain acquisitions. Table OB8 (in the Online Appendix) provides the results. The effects of chain acquisitions are smaller and in many cases

insignificant. However, they have a substantial negative effect on graduation rates and earnings, as well as a strong positive effect on enrollment. The results suggest a hierarchy of incentives and outcomes. Chains likely have more sophisticated corporate structures and arms-length owners than stand-alone, independent schools, giving them somewhat higher-powered incentives. Private equity ownership yields higher-powered incentives and leads to more adverse student outcomes.

We also examine variation among private equity firms. We find very similar results to the main model when we include lead private equity firm fixed effects. We also do not find that the effects vary with private equity firm characteristics, such as having a specialty in education, or being especially high- or low-performing. Finally, we find that our results are robust to omitting the largest three deals.²⁹

6. Conclusion

This paper shows that private equity buyouts lead to higher profits, tuition, and borrowing. They also lead to lower education inputs, graduation rates, repayment rates, and earnings. We show that following a government credit expansion, private equity-owned schools raise tuition faster than other schools, which increases student debt. Superior federal aid capture is a key channel for high-powered incentives to translate to higher firm value. It is important to caveat our results with the fact that we do not conduct a full welfare analysis. We cannot fully rule out that some students are made better off by the buyouts.

For-profit schools originally participated in an implicit contract: in exchange for federal grant and loan inputs, the school would increase the human capital of its students. Shleifer and Summers (1988) argue, in the context of hostile takeovers, that changes in ownership increase firm market value because they enable a transfer of rents from stakeholders (e.g., employees) to shareholders, and that such redistribution can destroy value from a social perspective. This paper focuses on two groups of consumer stakeholders in for-profit higher education: students and the government. From the private equity investor's perspective, it may be ex-post optimal to renege on the implicit contracts with them. In fact, students and the government differ from employees in ways that may increase the appeal of renegeing; students typically purchase a degree-program only once, and the government has largely not been a demanding counter-party.

The existing literature on private equity has focused on sectors characterized by high levels of competition and product transparency with little government subsidy. Private equity groups have in recent decades invested significantly

²⁹ We define "large" as the number of schools (unit IDs) purchased in the deal and subsequently acquired by the private equity-owned school system. The largest three are Empire Beauty Schools, which ultimately consisted of 82 schools, Corinthian (63 schools), and EDMC (49 schools).

in sectors such as health care, education, defense, and infrastructure, which are characterized by low levels of competition, product opacity, and high levels of government subsidy. Ours is the first study to focus on private equity investments in a heavily subsidized industry, and our findings contrast with much of the existing literature. Future work might study the role of private equity in industries with less competitive market structures.

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