

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

Charlie Eaton

Sabrina T. Howell

Constantine Yannelis *

April 4, 2019

Abstract

This paper studies 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 CODES: I22, I23, G34, G38

*UC Merced, NYU Stern & NBER, and Chicago Booth. Email: ceaton2@ucmerced.edu, sabrina.howell@nyu.edu, constantine.yannelis@chicagobooth.edu. Acknowledgements: We are grateful to discussants Pierre Azoulay, Michael Ewens, Jonah Rockoff, and Richard Thakor and also for comments from Raji Chakrabarti, Francesca Cornelli, David Deming, Michael Dinerstein, Michael Ewens, Caroline Hoxby, Will Gornall, Arpit Gupta, Justine Hastings, Steve Kaplan, Larry Katz, Theresa Kuchler, Alexander Ljungqvist, Holger Mueller, Thomas Philippon, Larry Schmidt, Antoinette Schoar, Albert Sheen, Doug Staiger, Lesley Turner, Jeff Wurgler, David Yermack and seminar participants at the NBER Labor Studies and Education Summer Institute, MIT Sloan, Harvard Business School, Yale School of Management, Berkeley Haas School of Business, The Federal Reserve Bank of New York, the NBER Entrepreneurship meeting, the FMA Napa Conference, the SFS Cavalcade, and NYU Stern. We are also grateful to Suzanne Chang, Dalya Elmalt and Katerina Nikalexi for superb research assistance. Sabrina Howell thanks the Kauffman foundation for generous financial support, and thanks the Stern Infrastructure Initiative for Preqin data. Constantine Yannelis thanks the Fama Miller Center and the Becker Friedman Institute for generous financial support.

1 Introduction

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, Haltiwanger, Handley, Jarmin, Lerner, and Miranda 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 post-secondary 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. 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.

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

²Fund 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).

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, and Cohn, Nestoriak, and Wardlaw 2017). In line with the aforementioned channel, we find that chief executive turnover increases after a buyout by around 36 percent.

The higher revenue that we observe comes partly from a \$1,600 increase in tuition, which is approximately half average total tuition at community colleges. It also comes from almost 50 percent higher enrollment. Reliance on federal aid increases after private equity buyouts and approaches the 90 percent of revenue threshold that is the statutory limit. Per-student borrowing and per-student federal grants increase by about 12 and 14 percent 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 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 purely rent-seeking phenomenon and is unambiguously 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 percent 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 other for-profits. We show that education inputs, including the ratio of faculty to students, the share of

spending devoted to instruction, decline after the buyout. 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 alternatives to this interpretation. 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 thus unlikely to fully explain the effects.

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 two-year programs who are already enrolled before a buyout occurs but have at least one 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, that fully treated cohorts experience. 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 non-selective community college.³ If the source of expansion is substitution away from community colleges, 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 towards 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 of recruiting rule violations, 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 percent of private equity deal value and 99 percent of volume.⁵ 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 pre-existing, 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,

³See 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).

⁴For example, see Arcidiacono et al. (2014, 2016); Stinebrickner and Stinebrickner (2013); Wiswall and Zafar (2014); Hastings et al. (2017). 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.

⁵Based 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>.

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. Their inability or unwillingness to take advantage of new opportunities is related to the reason why in settings such as healthcare and education, where consumers depend on implicit contracts with the firm, many service providers are nonprofit (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

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

mechanism requires consumers to rationally choose nonprofit firms over for-profit ones. It may be infeasible for consumers to make this choice when 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 towards 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

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 healthcare, infrastructure, and defense.⁸

2 Data and Descriptive Statistics

This section first describes the for-profit higher education industry, and explains why it may feature incentive misalignment (Section 2.1). We both describe private equity’s role in the industry and also introduce our private equity deal data in Section 2.2. We summarize the data from the Department of Education on schools and students in Section 2.3.

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

⁸See Appendix Figure B1. The healthcare economics literature has examined how incentives and the ownership of healthcare providers affects the price and quality of care, though there has been no study of private equity. While providers do appear to respond to incentives, there are mixed results regarding ownership (Dafny et al. (2016), Duggan (2000), Clemens and Gottlieb (2014), Adelino, Lewellen, and Sundaram (2015), Sloan et al. (2001), Hackmann and Pohl (2018)).

2.1 Institutional Context

For-profit schools (“for-profits”) have existed in the U.S since the early 1900s, but enrollment grew substantially in recent decades (left graph of Figure 1). As of 2016, about 1.2 million students were enrolled at for-profit schools. In 2011, the last year for which two-year default rates are available, for-profits accounted for about 40 percent 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 post-secondary 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 post-secondary school (Stinebrickner and Stinebrickner 2012, Arcidiacono et al. 2014, Wiswall and Zafar 2014, and 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 percent. The school faces a tradeoff 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).

For-profits devote far more resources to recruiting than other types of schools, which compounds these information frictions. Due to 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 non-instructional activities (right graph), by school type and ownership between 2012 and 2015, the years during which data is available for this variable. While public and non-profit

schools have less than one percent of employees in sales, private equity-owned schools have over seven percent of their employees in this area. Other non-private equity-owned for-profits have four percent. Government investigations have found evidence of deceptive marketing practices among for-profits (Senate 2012).

About 90 percent 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 of incentives between for-profit school owners and consumers (see 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.

Most of our school characteristic and student outcome data come from the U.S. Department of Education Integrated Post-secondary 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 percent of for-profits (Cellini and Goldin 2014) Most variables are reported at the school level according to a unique “UnitID” that remains constant over time and across ownership changes. There are no UnitID mergers in our sample. We create a unique identifier, “SystemID”, to represent the parent institution, including parent companies of for-profit college chains. This is important because for-profit college companies often operate multiple schools.¹⁰

⁹Legislation proposed in the U.S. Congress in November, 2017 would require 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.” See <https://www.wsj.com/articles/house-gop-to-propose-sweeping-changes-to-higher-education-1511956800>.

¹⁰The data used for analysis are comprised of 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 dataset due to closure or cessation of Title IV reporting prior to the last year for which data is 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

2.2 Private Equity in Higher Education

Private equity buyouts of publicly traded firms in the 1980s were thought 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 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 researched the parent ownership history of every for-profit college in the U.S. from 1987 through 2016 that was eligible for federal aid (termed “Title IV eligible”). We used a variety of sources, which was 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 began with a comprehensive list from IPEDS for all 7,034 Title IV schools that ever reported for-profit ownership. We then manually researched the ownership history of each

close or cease Title IV reporting prior to the last year for which data is available.

school and its parent company. One way that we identified parent firm ownership was by matching schools to firms based on the Employer ID Number reported in IPEDS. Two sources were especially useful. First, schools have been required since 2008 to describe their ownership history in online course catalogues, which we obtained via Internet archives.¹¹ Second, we used unpublished documents from the 2012 Senate HELP Committee report of for-profit colleges and 10-K statements for publicly traded firms. The next step was to identify private equity buyouts of parent firms by searching the ThomsonOne and Preqin databases.

We identified 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 percent 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.¹² Figure 1 shows the private equity-owned share of total enrollment and defaults over time. Defaults are measured at least three 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 percent of total for-profit enrollment in our data on the near-universe of for-profits. 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 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

¹¹We provide an example of these course catalogues in Appendix E.

¹²Based on data from Preqin and Mitch Leventhal. 62 out of a total of 118 firms match to Preqin.

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. 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 a SystemID-level changes in ownership.¹³ 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 Appendix Figure B2 Panel A 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 Appendix Figure B2 Panel B 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 UnitIDs, that ever come under private equity ownership.¹⁴

¹³Nearly 80 percent of the deals are known buyouts, while the other 20 percent may be minority stake purchases. For simplicity, we use the term “buyout” in the remainder of the paper.

¹⁴Some variables are reported at the OPEID level, which in some cases aggregates UnitIDs. There are a total of 374 switcher OPEIDs. This is smaller because OPEIDs sometimes encompass multiple UnitIDs and the data for which we use OPEIDs (repayment rates and earnings) are available for fewer years.

2.3 School Characteristics and Student Outcomes

Table 1 summarizes the variables we use in our analysis.¹⁵ 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 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 percent of normal time) averages 48 percent for private equity-owned schools, compared to 55 percent at other for-profits. We do not report IPEDS data on community college graduation rates because they 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 two-year cohort default rate (CDR), which is default rates two years after exit-year for exiting cohorts. 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 non-repayment options like deferments and forbearances (ICAS ICAS). Comparisons between for-profits and other types of colleges should therefore 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 three years after leaving school (by graduating or dropping out). Repayment rates are more sensitive than default rates, and capture failure to repay through legal channels such as deferment or income-driven repayment options. The repayment rate averages 34 percent among private equity-owned schools, 41 percent at other

¹⁵For comprehensive descriptions, sources, and years available for all variables used in analysis, see Appendix B Table 1. Data are presented at the school (UnitID 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.

for-profits, and 46 percent at community colleges.

Private equity-owned schools are larger, with mean enrollment of 747 students, compared to 387 at other for-profits. 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 non-private equity-owned for-profits, 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 Communications degree (18 percent of degrees awarded). Our online time-varying indicator variable follows Deming et al. (2012).¹⁶ 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 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 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 six 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 they are slightly lower for graduates of other for-profits.

We also use data on law enforcement actions. We observe 125 instances of a state or federal

¹⁶The 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 draw primarily from the surrounding area.

agency initiating an investigation.¹⁷ Most allegations relate to misrepresentation and false claims. For example, there are 28 cases of job placement statistic misrepresentation, 23 of credentials or accreditation misrepresentation, and 31 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 comprise just 4 percent of all school-years in our data, they are 58 percent of the first-time actions.

3 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, so when they all yield results with a similar economic interpretation, they provide powerful evidence of an effect.

The empirical 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 prior to the private equity buyout, so that there is a change of ownership, and 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.

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

¹⁷These are described in Appendix B Table 2. We collected data primarily from Republic Report. <https://www.republicreport.org/2014/law-enforcement-for-profit-colleges/>.

specification:

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

PE_{it} takes a value of one if the school is private equity-owned in year t . We include school fixed effects (α_i) and year fixed effects (α_t), which respectively absorb school and time invariant factors. \mathbf{X}_{it} is a vector of controls comprising 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 IPO). The sample consists of all institutions in our data. We include non-profits because private equity firms have occasionally purchased non-profits 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 (SystemID) and year in all specifications. This captures potential correlation across schools within the largest deals. Our results are not sensitive to alternative clustering approaches. Our main specification uses all years of available data, but all our results are robust to excluding pre-2000 data, as there may be concern that it is lower quality. 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 other for-profits. 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 and commuting zone (proxy for the local labor market) levels. Variables with predictive power are shown in Table 2. 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-profits. 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 percent threshold that is the legal maximum, and other student outcomes.

We deploy the variables with predictive power in a nearest-neighbor matching (NNM) estimator.¹⁸ 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, and the data required grows with each additional matched covariate. 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 pre-buyout year to other for-profits. We assess outcomes two years after the buyout in the matched sample. Considering outcomes two years after the buyout serves as a robustness test for the main 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 always be close in magnitude to the OLS estimates. Appendix Table B3 shows that the imbalance decreases dramatically after the NNM procedure.

¹⁸The variables used are number of community colleges in the commuting zone, number of pre-existing for-profits in the commuting zone besides the target, one-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 the final specification 5 of Table 2, where all variables are used, the sample size declines and some variables lose significance. We nonetheless match on these, as they appear to have some predictive power.

4 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 4.1). We present a test with causal interpretation using loan limit increases in Section 4.2.

4.1 Reliance on government aid

Table 3 contains financial outcomes. Columns 1-2 show that tuition per student increases by over \$1,600, relative to a mean across all schools of \$9,528 (note tuition at community colleges averages just \$3,673).¹⁹ 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 percent of the mean across all schools of \$5,147 (columns 4-5). The matching model yields a larger effect of \$641 (column 6). There is an immediate large increase in borrowing in the visual analysis, in Figure 3 Panel B. Note that less than 10 percent of loans at private equity-owned schools in our data are non-federal, and some of these come from state government. By comparison, 24 percent of loans are non-federal at non-profit 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 4-5 show that profits increase after a buyout by 77 percent, an effect that increases in the matching model. Appendix Figures B3 and B4 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 percent of its revenue from Title IV programs. Appendix Figure B5 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 percent of their revenue from Title IV programs. This fraction

¹⁹Note that tuition and loan amounts are not directly comparable, as loans are measured for full-time first-year students while tuition is measured across all students on a full-time equivalent basis.

increases to nearly 80 percent six 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 from all government sources, as there exist many non-Title IV loan, grant and subsidy programs.

4.2 The 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 1993.²⁰ This created growth options for for-profit schools. We examine whether schools already under private equity ownership were more 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 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

²⁰The increase occurred in two stages, with roughly one-third of the increase affecting the 2007–08 academic year, and the rest beginning with the 2008-09 academic year. There are two types of caps; for annual borrowing and 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) HERA took effect in 2007. It 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 non-dischargeable in bankruptcy. At the time of the legislation the rate was 6.8 percent for unsubsidized Stafford loans, and 3.4 percent for the 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, while Lucca et al. (2016) argue that the loan limits led to increases in tuition, which is consistent with the “Bennett hypothesis” that schools raise tuition to capture federal loans and grants.

at capturing aid, we would expect average loan amounts to rise at a faster rate relative to other institutions, and the coefficients 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 SystemID level to address potential serial correlation. The year 2007 is excluded, as it is somewhat ambiguous whether treatment occurs in 2007 or 2008 (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. Appendix Figure B6 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 percent of the mean (Panel 1). Columns 1-3 include all schools, while 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 run the following specification, interacting the private equity-ownership treatment with indicators for each year.

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

We again restrict PE_i to schools that were acquired by a private equity group before 2007. The results are plotted in the top panel of Figure 4. The solid line shows point estimates of the coefficients β_j . We do not observe any significant differences between the private equity-owned and other for-profit 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.²¹

In the Appendix, 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 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 naturally leads to higher profitability (Bachas, Kim, and Yannelis 2019).

5 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

²¹Additionally, Appendix Table B4 shows that there is no increase in faculty student ratios, suggesting that additional tuition increases are not being passed on to higher institutional quality.

and Batt 2014). Private equity general partners may be more disposed than the pre-existing 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 5.2 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. A third possibility is that buyouts affect students through changed operations. This is considered in Section 6. These three mechanisms are not mutually exclusive.

5.1 Effect of Buyouts on Student Outcomes

Graduation rates are a standard measure of school performance in the education literature, as failing to graduate is unambiguously 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 percent 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 get 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 six-percentage point decline in graduation rates, or about 13 percent 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, which is consistent with the fact that the buyout year is the first affected academic year. Given that the majority of programs are one-year programs, operational changes can take effect quickly. Falling graduation rates could be profit maximizing for schools, particularly for one-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 non-dischargeable 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 percent. The visual event study in Figure 5 Panel B shows a downward trend after the buyout.

Private equity buyouts are associated with 6.1 percent lower within-cohort average earnings six 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 3-4). There are insufficient data for the matching estimator.²² Earnings exhibit strong time trends, increasing over most of our sample period and decreasing in the Great Recession. Therefore, we

²²This is because we only observe six cohorts (as described in Section 2.3). We would need to match on the year prior to the buyout only for schools where, two 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.

graph coefficients from a fixed effects regression in Appendix Figure B7. The results contain no pre-trends and indicate a deterioration after the buyout in log earnings.

5.2 Selection and Student Body Composition

Screening ability, where the private equity firms choose targets that would have changed anyway (i.e., with no buyout), could explain the effects on graduation rates, repayment rates, and earnings. This selection mechanism is most plausible when the target firm is on a trajectory towards the post-buyout outcomes during the pre-buyout years. Instead, the visual event studies presented in this section as well as subsequently when we discuss operational changes are largely devoid of pre-trends. They instead reveal discontinuities in levels and trends immediately around the buyout year. Though we cannot rule out some influence of selection, a selection mechanism is unlikely to fully explain the results.

Private equity ownership could also 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 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 (Appendix Table B5). Therefore, observable demographic changes to the student body do not explain the main results.

We hold fixed composition using cohorts that are already enrolled at the school before the private equity acquisition occurs. We restrict the sample to two-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 two years before. The former cohort had one year of private equity treatment, while the latter had zero. We can conduct this test only for graduation and repayment rates.²³ The results are in Table 6. The partially treated cohorts experience a 3.6

²³There is inadequate earnings data (it only exists for six cohorts spaced three years apart). It is also not possible

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. Thus, a changing student body composition cannot explain the declines in graduation and repayment rates.

We cannot rule out that different mechanisms may explain the falling graduation rates among the partially treated and subsequent cohorts. However, the effects among partially treated cohorts is at least suggestive of quality decline. The student chose to enroll in the program and pay substantial up-front tuition, mostly through loans that are non-dischargeable in bankruptcy. Presumably students making these investments believed that the degree is valuable when they enrolled. In the following section, we show immediate and enduring declines in measures of education inputs. This makes it unlikely that quality initially declined, leading more already enrolled students to drop out, and then rebounded such that composition effects explain the results among subsequent cohorts.

6 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 4 and the deterioration in student outcomes observed in Section 5. 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 6.7).

6.1 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

for student loans, considered below, because they are measured only in the cohort's first year, in which they are either fully treated or not treated at all.

1), relative to a mean of 5.3 across all schools. The matching estimate is smaller and imprecise (column 3). The share of expenditure devoted to instruction declines by about three percentage points (columns 4-5), relative to a mean across all schools of 48 percent. Here the matching estimate is significant and larger (column 6). The visual event studies, in Appendix Figure B7, 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 documents that reductions in student support following private equity buyouts had negative impacts on educational quality with implications for student outcomes (Senate 2012). We summarize these in Appendix A.4. 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. Appendix Figure B9 Panels A and B 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, while schools that increase these education inputs experience graduation rate increases. Regressions in Appendix Table B6 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 and reallocating resources from instruction to sales would require more than a few months, in time for the buyout to impact

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. While 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 one year. Since payment is up-front, there are no tuition savings from dropping out mid-year. 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 (Appendix Figure B9 Panel C).

6.2 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 percent 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 occur immediately (Appendix Figure B10).

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 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.

6.3 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 (Cottom 2017). They 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.²⁴ The chances of a school having its first law enforcement action increase dramatically after a private equity buyout. The dependent variable in columns 4-5 of Table 7 Panel 2 is one if the school experienced its first action in a given year. The coefficient is .0036, significant at the .01 level, relative to a mean of .004. A visual comparison is in Appendix Figure B11. There are insufficient observations for the matching estimator.

6.4 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

²⁴An 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 comprised 39 percent 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)). Four students submitted complaints that (Senate, 2012, 306).

marketing. Gompers, Kaplan, and Mukharlyamov (2016) find that 31 percent of private equity investors recruit their own senior management teams before investing, which then replace the pre-buyout 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 three years of the buyout.²⁵ We find 5.2 percentage point effect. The sample mean is 10.5 percent, indicating that private equity buyouts increase CEO turnover by about fifty percent, to roughly half of 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.

6.5 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). 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 costs per student presents opportunities for economies of scale.

We show the effect of private equity ownership on a school's probability of transitioning from primarily brick-and-mortar to online in Table 7 Panel 2 columns 6-7. The effect is economically small and somewhat imprecise, significant at only the .1 level (the matching estimator is not possible here). In unreported analysis, we find that the effects on education inputs and student outcomes are robust to excluding online schools. We also find no effect of private equity on the intensive margin, measured as the number of out-of-state students (or "distance" learners). While

²⁵As 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.

we cannot rule out that one 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 explain the general patterns observed in the data, including the decline in labor inputs shown in Section 6.1.

6.6 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. Appendix Figure B12 shows the number of degree cuts by year around the private equity buyout, within schools that switched to private equity ownership. We separately consider one, two, and four-year programs. In no case is there an observable increase in the years following the buyout. Appendix Table B7 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.

6.7 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 (SystemID) that is not private equity-owned and that owns at least two schools (UnitIDs). These ownership changes 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. The results are in Appendix Table B8. 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 by 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.²⁶

7 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. We do not conduct a welfare analysis and cannot rule out that some students are made better off by the buyouts, but it seems that a focus on maximizing revenue from subsidies helps to explain the average declines in student outcomes that we observe.

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

²⁶We define “large” as the number of schools (UnitIDs) 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).

(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 reneging; 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, and low levels of government subsidy. Private equity groups have in recent decades invested significantly in sectors such as healthcare, 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 contrasts with much of the existing literature. Future work might study the role of private equity in industries with less competitive market structures.

References

- Adelino, M., K. Lewellen, and A. Sundaram (2015). Investment decisions of nonprofit firms: Evidence from hospitals. *The Journal of Finance* 70(4), 1583–1628.
- Agrawal, A. and P. Tambe (2016). Private equity and workers' career paths: the role of technological change. *The Review of Financial Studies* 29(9), 2455–2489.
- Appelbaum, E. and R. Batt (2014). *Private equity at work: When Wall Street manages Main Street*. Russell Sage Foundation.
- Arcidiacono, P., E. Aucejo, A. Maurel, and T. Ransom (2016). College attrition and the dynamics of information revelation. *NBER Working Paper No. 22325*.
- Arcidiacono, P., J. Holz, A. Maurel, and T. Romano (2014). Modeling college major choices using elicited measures of expectations and counterfactuals. *Journal of Econometrics* 166(1), 3–16.
- Armona, L., R. Chakrabarti, and M. F. Lovenheim (2017). How does for-profit college attendance affect student loans, defaults and earnings? *NBER Working Paper No. 25042*.
- Bachas, N., O. Kim, and C. Yannelis (2019). Loan guarantees and credit supply.
- Bernstein, S., J. Lerner, and F. Mezzanotti (2017). Private equity and financial fragility during the crisis. *NBER Working Paper No. 23626*.
- Bernstein, S. and A. Sheen (2016). The operational consequences of private equity buyouts: Evidence from the restaurant industry. *Review of Financial Studies* 29(9), 2387–2418.
- Bertrand, M., E. Duflo, and S. Mullainathan (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics* 119(1), 249–275.
- Bettinger, E. P., B. T. Long, P. Oreopoulos, and L. Sanbonmatsu (2012). The role of application assistance and information in college decisions results from the H&R Block FAFSA experiment. *The Quarterly Journal of Economics* 127(3), 1205–1242.
- Bleemer, Z., M. Brown, D. Lee, K. Strair, and W. van der Klaauw (2017). Echoes of rising tuition in students borrowing, educational attainment, and homeownership in post-recession America. Federal Reserve Bank of New York Staff Report.
- Bloom, N., R. Sadun, and J. Van Reenen (2015). Do private equity owned firms have better management practices? *The American Economic Review* 105(5), 442–446.
- Boucly, Q., D. Sraer, and D. Thesmar (2011). Growth LBOs. *Journal of Financial Economics* 102(2), 432–453.
- Bound, J., M. Lovenheim, and S. Turner (2007). Understanding the decrease in college completion rates and the increased time to the baccalaureate degree. *Population Studies Center Research Report* 7, 626.
- Bound, J., M. F. Lovenheim, and S. Turner (2010). Why have college completion rates declined? An analysis of changing student preparation and collegiate resources. *American Economic Journal: Applied Economics* 2(3), 129–57.
- Bound, J. and S. Turner (2007). Cohort crowding: How resources affect collegiate attainment. *Journal of Public Economics* 91(5-6), 877–899.

- Bowen, W. G., M. M. Chingos, and M. S. McPherson (2009). *Crossing the finish line: Completing college at America's public universities*, Volume 52. Princeton University Press.
- Brown, G. W., O. Gredil, and S. N. Kaplan (2013). Do private equity funds game returns? *Working Paper*.
- Cao, J. and J. Lerner (2009). The performance of reverse leveraged buyouts. *Journal of Financial Economics* 91(2), 139–157.
- Cellini, S., R. Darolia, and L. Turner (2017). Where do students go when for-profit colleges lose federal aid? *Working Paper*.
- Cellini, S. R. and L. Chaudhary (2014). The labor market returns to a for-profit college education. *Economics of Education Review* 43, 125–140.
- Cellini, S. R. and C. Goldin (2014). Does federal student aid raise tuition? New evidence on for-profit colleges. *American Economic Journal: Economic Policy* 6(4), 174–206.
- Cellini, S. R. and N. Turner (2016). Gainfully employed? Assessing the employment and earnings of for-profit college students using administrative data. *NBER Working Paper No. 22287*.
- CFBP (2012). Private student loans report. *Report to the U.S. Senate*.
- Clemens, J. and J. D. Gottlieb (2014). Do physicians' financial incentives affect medical treatment and patient health? *American Economic Review* 104(4), 1320–49.
- Cohn, J., N. Nestoriak, and M. Wardlaw (2017). Private equity buyouts and workplace safety. *Working Paper*.
- Cornelli, F. and O. Karakaş (2015). CEO turnover in LBOs: The role of boards. *Working Paper*.
- Cottom, T. M. (2017). *Lower ed: The troubling rise of for-profit colleges in the new economy*. New Press, The.
- Dafny, L., K. Ho, and R. S. Lee (2016). The price effects of cross-market hospital mergers. *NBER Working Paper No. 22106*.
- Davis, S. J., J. Haltiwanger, K. Handley, R. Jarmin, J. Lerner, and J. Miranda (2014). Private equity, jobs, and productivity. *The American Economic Review* 104(12), 3956–3990.
- Deming, D. J., C. Goldin, and L. F. Katz (2012, dec). The for-profit postsecondary school sector: Nimble critters or agile predators? *Journal of Economic Perspectives* 26(1), 139–64.
- Deming, D. J., N. Yuchtman, A. Abulafi, C. Goldin, and L. F. Katz (2016). The value of postsecondary credentials in the labor market: An experimental study. *The American Economic Review* 106(3), 778–806.
- Duggan, M. G. (2000). Hospital ownership and public medical spending. *The Quarterly Journal of Economics* 115(4), 1343–1373.
- Eaton, C., J. Habinek, A. Goldstein, C. Dioun, D. G. Santibáñez Godoy, and R. Osley-Thomas (2016). The financialization of US higher education. *Socio-Economic Review* 14(3), 507–535.
- Ewens, M., M. Rhodes-Kropf, and I. A. Strebulaev (2016). Insider financing and venture capital returns. *Working Paper*.
- Fracassi, C., A. Previtro, and A. Sheen (2017). Is private equity good for consumers? *Working*

Paper.

- GAO (2014). Federal student loans: Impact of loan limit increases on college prices is difficult to discern. *United States Government Accountability Office Report GAO-14-7*.
- Gilpin, G. and C. Stoddard (2017). Does regulating for-profit colleges improve educational outcomes? What we know, what we don't know, and what we need to find out. *Journal of Policy Analysis and Management* 36(4), 942–950.
- Glaeser, E. L. and A. Shleifer (2001). Not-for-profit entrepreneurs. *Journal of Public Economics* 81(1), 99–115.
- Gompers, P., S. N. Kaplan, and V. Mukharlyamov (2016). What do private equity firms say they do? *Journal of Financial Economics* 121(3), 449–476.
- Goodman, S., A. Isen, and C. Yannelis (2017). A day late and a dollar short: Limits, liquidity and household formation for student borrowers. *Working Paper*.
- Guo, S., E. S. Hotchkiss, and W. Song (2011). Do buyouts (still) create value? *The Journal of Finance* 66(2), 479–517.
- Hackmann, M. B. and R. V. Pohl (2018). Patient vs. provider incentives in long term care. *NBER Working Paper No. 25178*.
- Hansmann, H. B. (1980). The role of nonprofit enterprise. *The Yale Law Journal* 89(5), 835–901.
- Hart, O., A. Shleifer, and R. W. Vishny (1997). The proper scope of government: Theory and an application to prisons. *The Quarterly Journal of Economics* 112(4), 1127–1161.
- Hastings, J., C. Nielson, and S. Zimmerman (2017). The effects of earnings disclosure on college enrollment decisions. *Working Paper*.
- Holmstrom, B. and S. N. Kaplan (2001). Corporate governance and merger activity in the United States: Making sense of the 1980s and 1990s. *Journal of Economic Perspectives* 15(2), 121–144.
- ICAS. Steps the Education Department should immediately take to curb default rate manipulation. Technical report.
- Jensen, M. C. (1989). Eclipse of the public corporation. *Harvard Business Review*.
- Kaplan, S. (1989). The effects of management buyouts on operating performance and value. *Journal of Financial Economics* 24(2), 217–254.
- Kaplan, S. N. and P. Strömberg (2009). Leveraged buyouts and private equity. *The Journal of Economic Perspectives* 23(1), 121–146.
- Kelchen, R. (2017, January). How much do for-profit colleges rely on federal funds? *Brookings Institution Chalkboard*.
- Krishnan, K. and P. Wang (2017). The cost of financing education: Can student debt hinder entrepreneurship? *Working Paper*.
- Lang, K. and R. Weinstein (2013). The wage effects of not-for-profit and for-profit certifications: Better data, somewhat different results. *Labour Economics* 24, 230–243.
- Lerner, J. and A. Schoar (2005). Does legal enforcement affect financial transactions? The contractual channel in private equity. *The Quarterly Journal of Economics* 120(1), 223–246.

- Liu, Y. T. and C. Belfield (2014). The labor market returns to for-profit higher education: Evidence for transfer students. A CAPSEE Working Paper. *Center for Analysis of Postsecondary Education and Employment*.
- Ljungqvist, A., L. Persson, and J. Tag (2016). Private equity's unintended dark side: On the economic consequences of excessive delistings. *Working Paper*.
- Looney, A. and C. Yannelis (2015). A crisis in student loans? How changes in the characteristics of borrowers and in the institutions they attended contributed to rising loan defaults. *Brookings Papers on Economic Activity*, 1–89.
- Lucca, D. O., T. Nadauld, and K. Shen (2016). Credit supply and the rise in college tuition: Evidence from the expansion in federal student aid programs. *Working Paper*.
- Ma, W., P. Ouimet, and E. Simintzi (2018). Mergers and acquisitions, technological change and inequality. *Working Paper*.
- Matsa, D. A. (2011). Running on empty? financial leverage and product quality in the supermarket industry. *American Economic Journal: Microeconomics* 3(1), 137–73.
- Metrick, A. and A. Yasuda (2010). The economics of private equity funds. *The Review of Financial Studies* 23(6), 2303–2341.
- Mueller, H. and C. Yannelis (2019). The rise in student loan defaults. *Journal of Financial Economics* 131(1), 1–19.
- Muscarella, C. J. and M. R. Vetsuypens (1990). Efficiency and organizational structure: A study of reverse LBOs. *The Journal of Finance* 45(5), 1389–1413.
- Senate (2012). For profit higher education: The failure to safeguard the federal investment and ensure student success.
- Shleifer, A. and L. H. Summers (1988). Breach of trust in hostile takeovers. In *Corporate Takeovers: Causes and Consequences*, pp. 33–68. University of Chicago Press.
- Sloan, F. A., G. A. Picone, D. H. Taylor, and S.-Y. Chou (2001). Hospital ownership and cost and quality of care: is there a dime's worth of difference? *Journal of Health Economics* 20(1), 1–21.
- Stinebrickner, R. and T. Stinebrickner (2013). A major in science? Initial beliefs and final outcomes for college major and dropout. *Review of Economic Studies* 83(1), 426–472.
- Stinebrickner, T. and R. Stinebrickner (2012). Learning about academic ability and the college dropout decision. *Journal of Labor Economics* 30(4), 707–748.
- Webber, D. A. and R. G. Ehrenberg (2010). Do expenditures other than instructional expenditures affect graduation and persistence rates in American higher education? *Economics of Education Review* 29(6), 947–958.
- Wiswall, M. and B. Zafar (2014). Determinants of college major choice: Identification using an information experiment. *Review of Economic Studies* 82(2), 791–824.

Table 1: Descriptive Statistics by Institution Type

	Nonprofit, State	Community	For profit, not PE	PE owned
	Mean (Std Dev)	Mean (Std Dev)	Mean (Std Dev)	Mean (Std Dev)
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)	0.48 (0.21)
Repayment rate (3 year)†	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±	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‡	3,885 (5,656)	3,148 (3,866)	387 (1,232)	747 (1,413)

Continued on following page

Table 1 continued

	Nonprofit, State	Community	For profit, not PE	PE owned
	Mean (Std Dev)	Mean (Std Dev)	Mean (Std Dev)	Mean (Std Dev)
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

Note: This table contains summary statistics at the school (UnitID, or campus) level. The exception is profits, which are at the firm/institution-year (SystemID) level; from left, N=47,834; 23,929; 8,254; and 438. †Full-time equivalent (applies to all below). *Graduation rate is the share of students that graduate within 150 percent of normal time for programs of 2 years or less duration. ‡Full-time faculty. †Share of students in repayment after three years (have paid back at least \$1 in principal). **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.

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 f.e.	Y	Y	Y	Y
N	21436	13738	20892	10340
Pseudo R^2	.13	.089	.13	.17

Note: 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, non-publicly traded schools. Only variables with predictive power over buyouts are shown.

Table 3: Private Equity Ownership and Financial Outcomes

<i>Panel 1</i>						
Dependent variable:	Tuition per student			Loan per borrower		
	(1)	(2)	NNM [±] (3)	(4)	(5)	NNM [±] (6)
PE buyout	1610** (612)	1637*** (574)	2107** (973)	582*** (186)	591*** (185)	641** (278)
Composition controls [‡]	N	Y	-	N	Y	-
School type controls [†]	Y	Y	-	Y	Y	-
School Fixed Effects	Y	Y	-	Y	Y	-
Year Fixed Effects	Y	Y	-	Y	Y	-
N	102355	102355	9130	77497	77497	16767
R ²	.82	.84	-	.67	.67	-

<i>Panel 2</i>						
Dependent variable:	Federal grants per student			Log profits		
	(1)	(2)	NNM [±] (3)	(4)	(5)	NNM [±] (6)
PE buyout	837*** (176)	784*** (219)	1450** (597)	.57*** (.14)	.57*** (.13)	.93*** (.17)
Composition controls [‡]	N	Y	-	N	Y	-
School type controls [†]	Y	Y	-	Y	Y	-
School Fixed Effects	Y	Y	-	Y	Y	-
Year Fixed Effects	Y	Y	-	Y	Y	-
N	86412	86412	20947	104459	104459	17785
R ²	.53	.55	-	.84	.84	-

Note: This table shows estimates of the effect of private equity ownership on financials (Panel 1) and on government aid-related student outcomes (Panel 2). Dependent variables are in millions of 2015\$ in Panel 1, and 2015\$ in Panel 2. [±]Nearest-neighbor matching is done as in previous tables. Observations are at the SystemID-year level for profits, and the UnitID-year level elsewhere. [‡]We 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. [†]These 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. Standard errors two-way clustered by SystemID and year. Coefficients marked with *, **,***, denote $p < .1$, $p < .05$, $p < .01$, respectively.

Table 4: Effect of Loan Limit Increase

<i>Panel 1: Borrowing</i>						
Dependent Variable: Average loan per borrower (2015\$)						
	(1)	(2)	(3)	(4)	(5)	(6)
PE owned-Post 2007	909*** (90)	1110*** (95)	1086*** (100)	798*** (97)	1009*** (106)	967*** (112)
PE owned	1743*** (99)			930*** (97)		
Post 2007	2032*** (24)			2039*** (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	69056	69056	64969	29402	29402	26758
R^2	.29	.68	.68	.29	.63	.63
<i>Panel 2: Tuition</i>						
Dependent Variable: Average tuition (2015\$)						
	(1)	(2)	(3)	(4)	(5)	(6)
PE owned-Post 2007	1591*** (247)	1656*** (262)	1310*** (215)	1193*** (262)	1238*** (308)	1161*** (256)
PE owned	5427*** (246)			1929*** (268)		
Post 2007	2472*** (55)			2708*** (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	63123	63123	59386	14156	14156	13835
R^2	.26	.83	.86	.2	.62	.75

Note: This table shows the difference-in-difference estimate of the effect of the 2007 loan limit increase on borrowing, in Panel 1, and tuition, in Panel 2. Standard errors are clustered at the systemID level. Coefficients marked with *, **,***, denote $p < .1$, $p < .05$, $p < .01$, respectively.

Table 5: Private Equity Ownership and Student Outcomes

<i>Panel 1</i>						
Dependent variable:	Graduation rate (share graduate in 150% normal time)			Repayment rate (3 year)		
	(1)	(2)	NNM [±] (3)	(4)	(5)	NNM [±] (6)
PE buyout	-.06*** (.012)	-.059*** (.012)	-.041* (.023)	-.035** (.011)	-.032** (.0091)	-.057* (.032)
Composition controls [‡]	N	Y	-	N	Y	-
School type controls [†]	Y	Y	-	Y	Y	-
School Fixed Effects	Y	Y	-	Y	Y	-
Year Fixed Effects	Y	Y	-	Y	Y	-
N	56965	56839	7883	28201	28201	4623
R ²	.8	.81	-	.96	.96	-

<i>Panel 2</i>				
Dependent variable:	Log mean earnings		Log 50th pctile earnings	
	(1)	(2)	(3)	(4)
PE buyout	-.061*** (.013)	-.05** (.012)	-.057** (.017)	-.043* (.016)
Composition controls [‡]	N	Y	N	Y
School type controls [†]	Y	Y	Y	Y
School Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
N	17736	17736	17736	17736
R ²	.97	.97	.97	.97

Note: These panels show regression estimates (OLS) of the effect of private equity ownership on student outcomes, at the school (UnitID)-year level. [±]Nearest-neighbor matching is done 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.[‡]We 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. [†]Indicators 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. Standard errors two-way clustered by SystemID and year. Coefficients marked with *, **,***, denote $p < .1$, $p < .05$, $p < .01$, respectively.

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)	Repayment rate
	(1)	(2)
PE buyout (partially treated cohort)	-.036*** (.012)	-.054*** (.013)
School type controls [†]	Y	Y
School Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
N	40088	21846
R^2	.76	.92

Note: These panels show regression estimates (OLS) of the partial treatment effect of private equity ownership on student outcomes, at the school (UnitID)-year level. We limit the sample to two cohorts in two-year programs: the cohort that enrolled in the year before the first private equity-owned year, and the cohort that enrolled two 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. [†]Indicators for having selective admissions and public ownership. Standard errors two-way clustered by SystemID and year. Coefficients marked with *, **,***, denote $p < .1$, $p < .05$, $p < .01$, respectively.

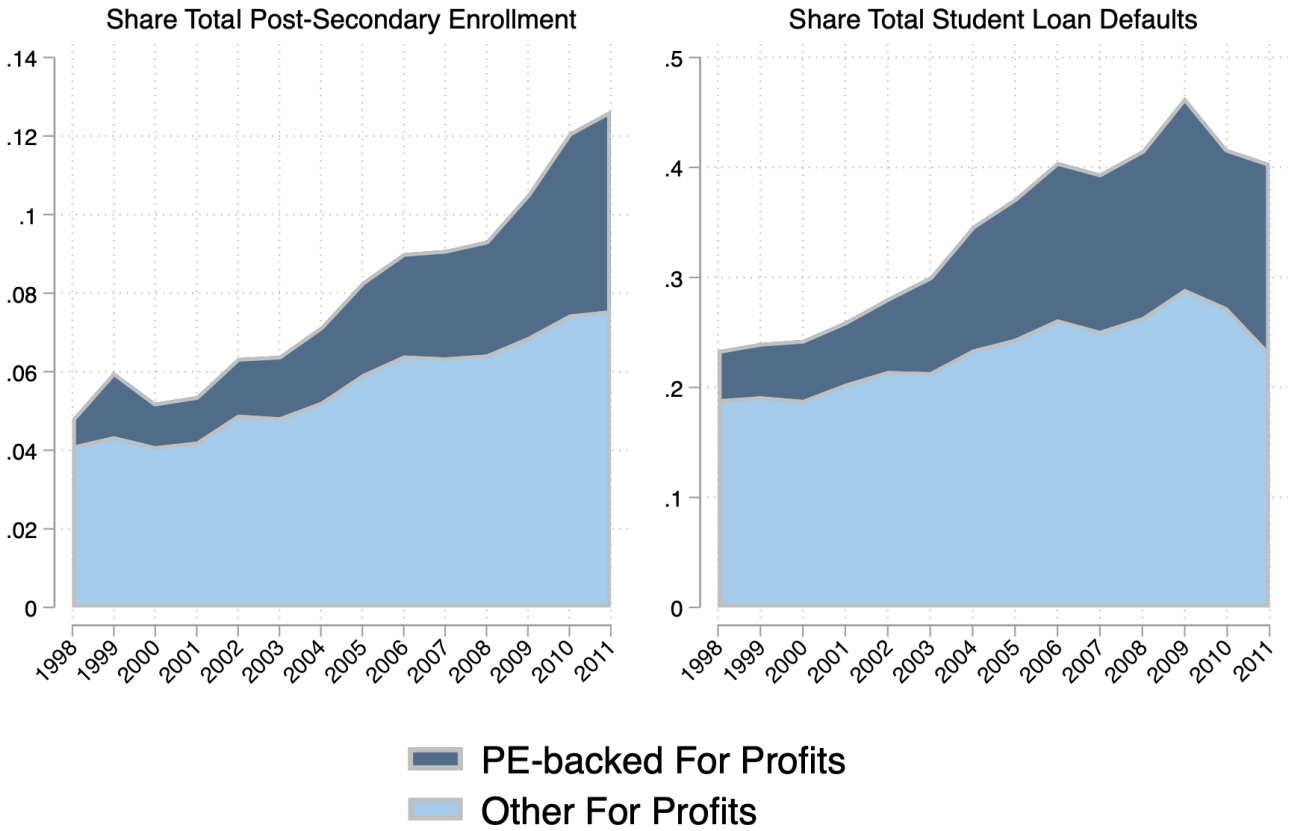
Table 7: Private Equity Ownership and Operational Outcomes

<i>Panel 1</i>							
Dependent variable:	Faculty per 100 students			Instruction spending share			CEO*
	NNM [±]			NNM [±]			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PE buyout	-.45** (.19)	-.36* (.18)	-.2 (.65)	-.028* (.016)	-.029* (.016)	-.049** (.024)	0.0517** (0.0215)
Composition controls [‡]	N	Y	-	N	Y	-	N
School type controls [†]	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	7833	97401	97401	9343	99137
R ²	0.83	0.83	-	.75	.75	-	.28

<i>Panel 2</i>							
Dependent variable:	Log FTE students			1st law enf. action		Online	
	NNM [±]						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
PE owned	.39*** (.056)	.37*** (.055)	.88*** (.1)	.0036*** (.00094)	.0036*** (.00091)	.015* (.0076)	.015* (.0076)
Composition controls [‡]	N	Y	-	N	Y	N	Y
School type controls [†]	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	123053	123053	33049	123023	123023	123053	123053
R ²	.97	.97	-	.16	.16	.55	.55

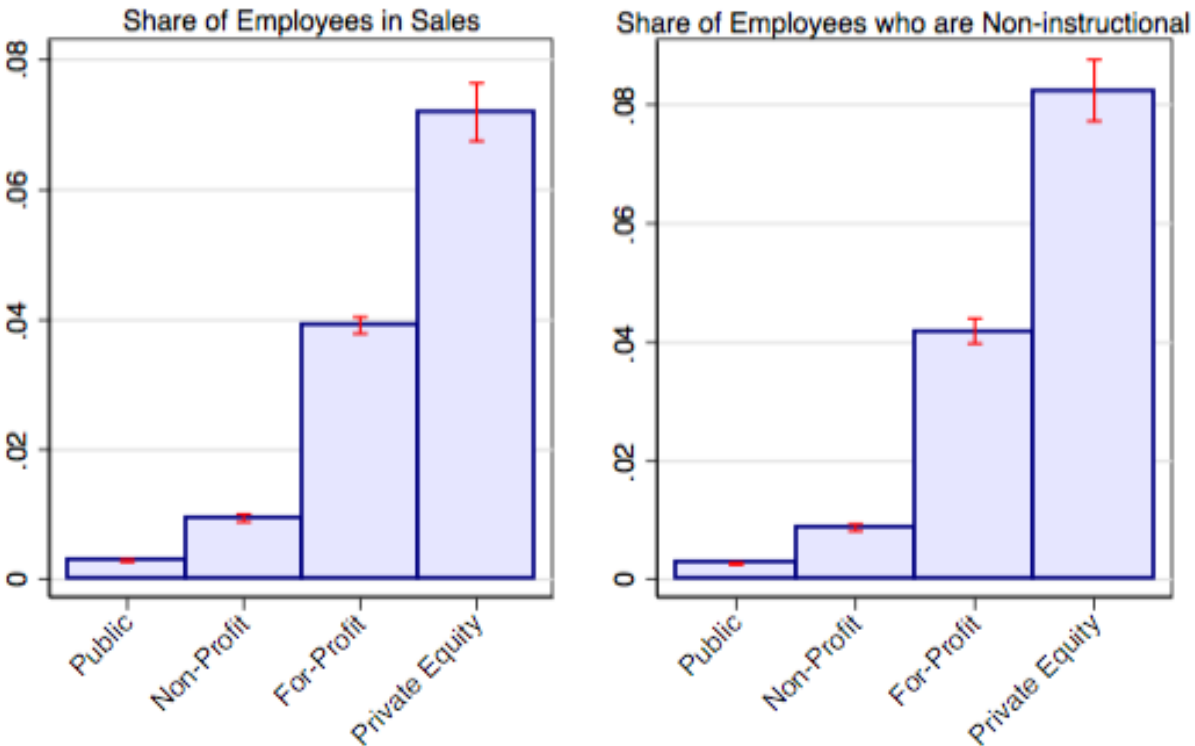
Note: This table shows regression estimates (OLS) of the effect of private equity ownership on education inputs and operational outcomes. Observations are at the school (UnitID)-year level. *Dependent variable is an indicator for a change in school CEO within first three years after buyout. [±]Nearest-neighbor matching is done 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. [‡]We 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. [†]These 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. Standard errors two-way clustered by SystemID and year. Coefficients marked with *, **,***, denote $p < .1$, $p < .05$, $p < .01$, respectively.

Figure 1: For Profit Schools Share of Loan Defaults and Enrollment



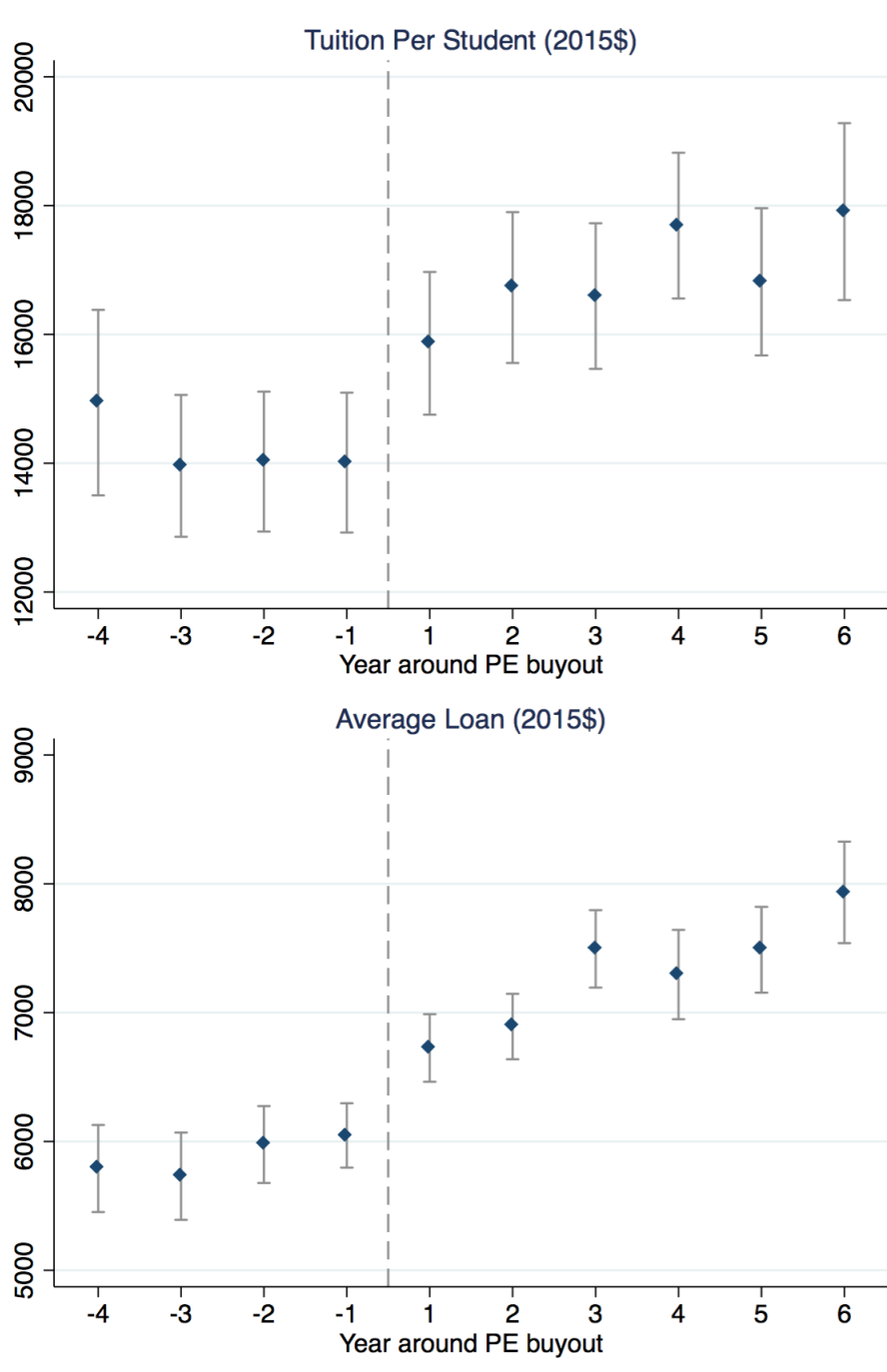
Note: The left graph shows the for-profit share of total U.S. postsecondary enrollment by whether a school was ever private equity-owned. The right graph shows the share of total student loan defaults within two years of entering repayment, by whether a school was ever private equity-owned.

Figure 2: Employees in Sales and Non-Instructional Activities



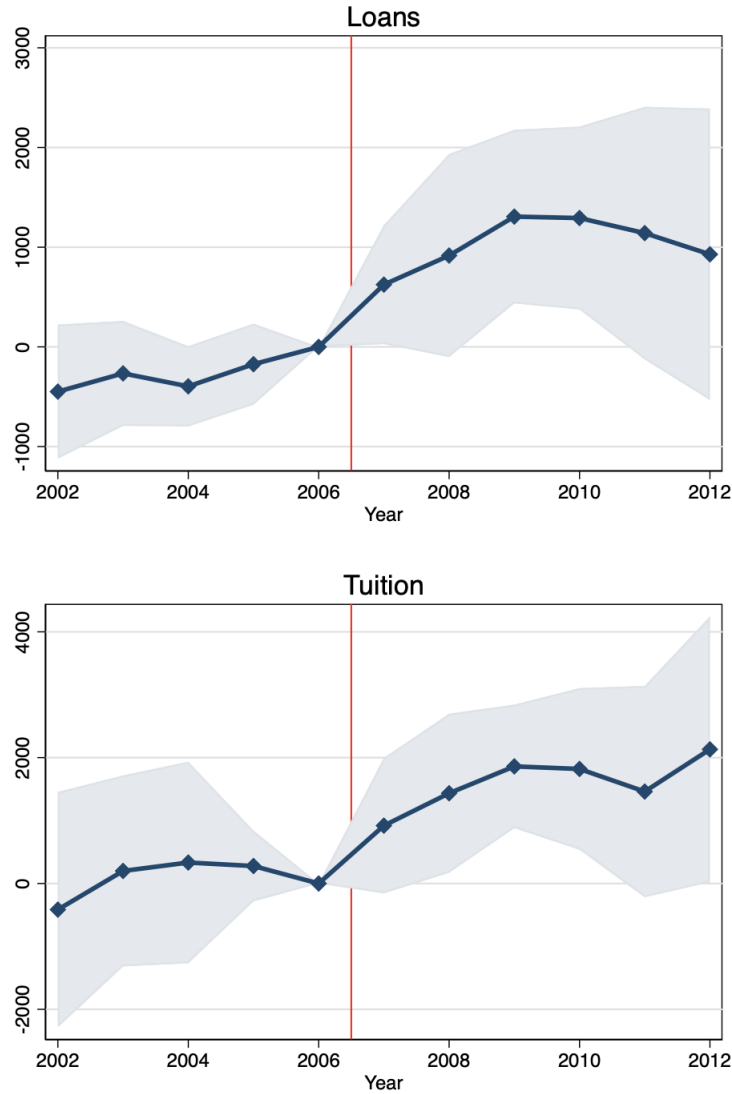
Note: The figure above shows the share of employees who do sales and non-instructional activities by institution type from 2012 to 2015 (data available only for these years).

Figure 3: Per-student Tuition and Per-student Loan Event Studies



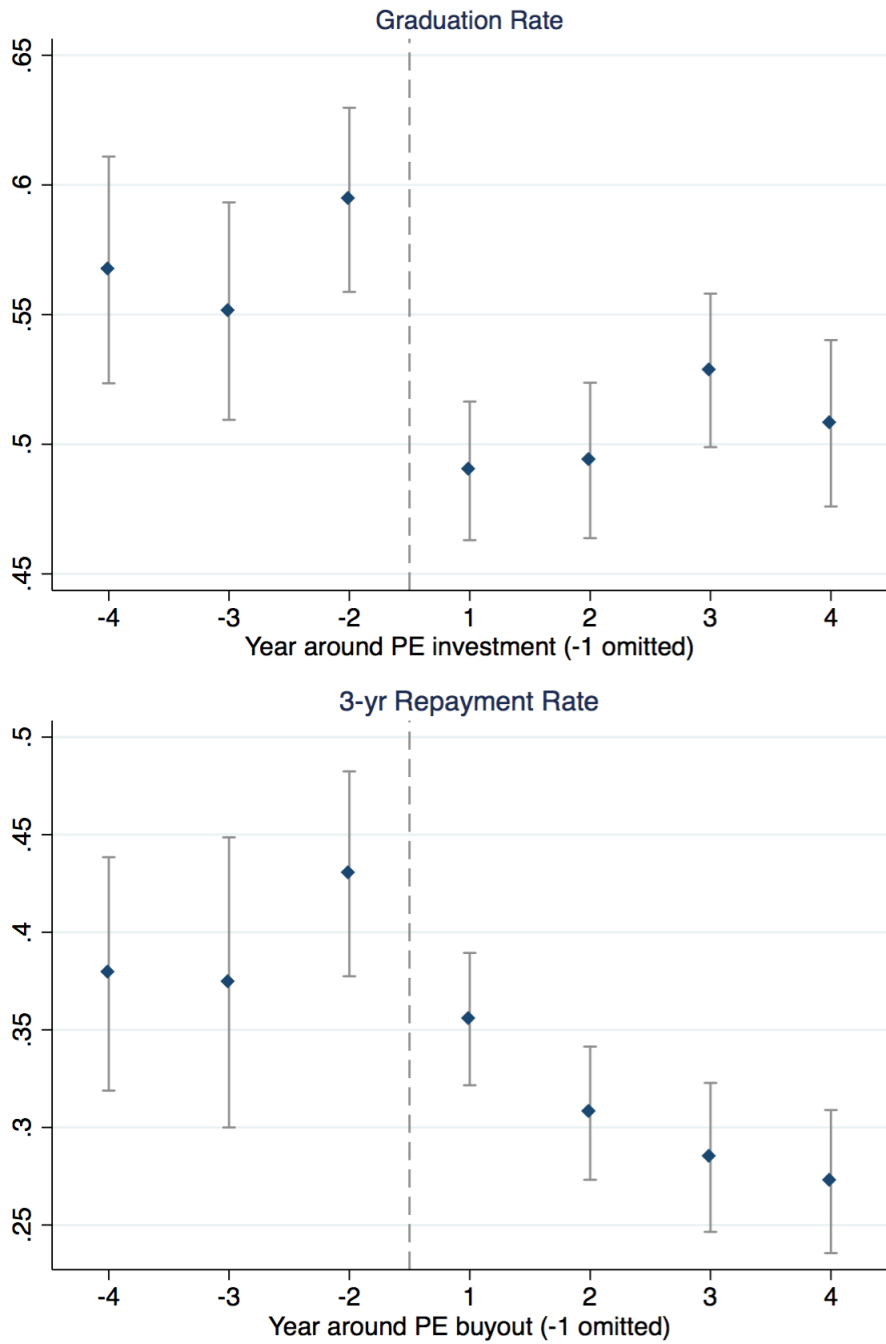
Note: The figures above show, within the sample of school systems bought by PE, the means of tuition per student and average loan per student in the years around the ownership change. The level of observation is the ultimate parent company, or SystemID level (N=88 in each year) for the average loan variable. It is at the school, or UnitID level for the tuition per student variable, for which we restrict the observations to schools that existed in the year prior to the buyout (N=697). We restrict the observations to schools that existed in the year prior to the buyout. 95% confidence intervals shown.

Figure 4: Loan Limit Increase Diff-in-diff Coefficients over Time



Note: The figure above shows coefficients β_j from the following specification $L_{it} = \alpha_i + \alpha_t + \sum_{j=2001}^{2015} \beta_j PE_i * 1[Year = j] + \gamma X_{it} + \varepsilon_{it}$, 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.

Figure 5: Graduation Rate and Repayment Rate Event Studies



Note: The figures above show, within the sample of school systems 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 UnitID level (N=697). We omit partially treated cohorts. For 4-year schools, this consists of the cohorts enrolled starting in the three 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.