THE EXPANSION OF FOR-PROFIT COLLEGES IN THE 21ST CENTURY AND ITS IMPLICATIONS FOR SOCIAL INEQUALITY

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Dafna Gelbgiser

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THE EXPANSION OF FOR-PROFIT COLLEGES IN THE 21ST CENTURY: REASONS AND IMPLICATIONS FOR INEQUALITY

Abstract

The dramatic expansion of for-profit colleges during the first decade of the 21st century is one of the most fascinating and controversial changes US higher education. This dissertation examines the sources of the growth of the for-profit sector of higher education and assesses the implications of this growth for socioeconomic inequality. Empirical research questions include: What organizational strategies enabled the expansion of these relatively peripheral and low-status institutions in the highly institutionalized field of higher education? How did these changes in the ecology of higher education influence the social environment students encounter on college campuses? How do educational outcomes differ for students who attend for-profit colleges compared to other types of colleges, especially community colleges? To what extent can inequality in outcomes be traced to differences in the types of students who attend for-profit colleges, and to what extent can we isolate a causal effect of institution type?

These questions are answered using two large, nationally representative samples, one for a cohort of high school students that entered higher education prior to the expansion of for-profit colleges (NELS 1988-2000) and one for a cohort of high school students that entered during the expansion (the ELS 2002-2012), along with detailed

panel data on all accredited for-profit institutions in the U.S between 2000 and 2010. I find that the expansion of for-profit colleges was supported by organizational strategies of imitation and differentiation, in which for-profit colleges "borrowed" institutional arrangements from non-profit colleges to legitimize their activity, but at the same time differentiate their activity from traditional colleges by offering student-focused services. I also find that for-profit colleges are consequential for socioeconomic inequality. Socioeconomic inequality increased not only because of greater institutional "sorting" by socioeconomic status, but also because low-SES students who attended for-profit colleges were much less likely to graduate than observationally similar low-SES students who attended other types of open admission postsecondary institutions. The expansion of for-profit colleges and other open admission colleges also increased overall income segregation in higher education. As a result, students in higher education today may have fewer opportunities to engage with students from different social background.

BIOGRAPHICAL SKETCH

Dafna Gelbgiser was born and raised in Arad, Israel. After completing her BA and MA in Sociology at Tel Aviv University, she moved to Ithaca, NY, to pursue a PhD in sociology at Cornell University.

To Romy and Jonathan

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INTRODUCTION

The expansion of for-profit colleges during the first decade of the 21st century is one of the most fascinating and controversial changes US higher education. In just one decade, for-profit colleges expanded faster than any other sector in higher education, more than quadrupling the size of their student population (Tierney and Hentschke 2007; Brenerman, Pussar and Turner 2006; Bennett et al 2010; Deming et al. 2012). By 2010, over 4 million students were enrolled at for-profit colleges, accounting for 14.7 percent of all students in higher education.

The expansion of the for-profit sector was met with increasing suspicion about the benefits and contributions of profit-maximizing organizations in educational systems (Tierney and Hentschke 2007; Brenerman, Pussar and Turner 2006; United States Senate 2012). For-profit colleges attracted a high share of disadvantaged students low-income students, underrepresented minority, and older students—who rely primarily on Pell Grants and federal student loans to fund their education. As a result, estimates suggest that 75% of the revenues of accredited for-profit colleges are derived from federal aid money, and they receive almost a quarter of federal subsidized loans and Pell grant dollars today (The College Board 2013: Figure 8, Mettler 2014; Deming et al. 2012). Because these funds are meant to support the upward mobility of disadvantaged students, it is imperative to understand how these colleges impact the outcomes of disadvantaged students.

Arguments for and against the expansion of for-profit colleges are many. Critics of the for-profit sector question the quality of education and degrees awarded by for-profit colleges and argue that for-profit colleges take advantage of underserved populations by using questionable and aggressive marketing methods. They convince students with little information on higher education to incur large amounts of educational debt that they will be unable to repay (U.S.

Senate 2012; Hechinge 2005; GAO 2010; NPR 2011). Advocates of for-profit colleges, in contrast, argue that opening the market of higher education and increasing competition can promote the upward mobility of disadvantaged students (e.g. Ruch 2003; Breneman 2005). Many proponents of for-profit college suggest that the flexible, adaptive, and student-focused structure of for-profit colleges make them better suited than traditional colleges to address students' needs. As a result, they expand educational opportunities to traditionally underserved populations (Wilson 2010; Ruch 2003).

But arguments and opinions without empirical support do little to promote sociological theory and understanding or efficient policies. Despite the heated debates surrounding these recent changes in higher education, few efforts were made to empirically examine the recent expansion of the for-profit sector, and its implications for socioeconomic inequality.

Existing scholarship on the for-profit sector has focused primarily on comparing returns to education obtained from for-profit college (e.g., Lang and Weinstein 2012; Chung 2008; Denice 2015; Cellini and Chadhary 2014), or uses case studies and descriptive findings to discuss broad changes in the sector (e.g., Ruch 2003; Kinser 2006). These studies, valuable though they are, tell us little about the implications of for-profit colleges for inequality because the majority of students at for-profit colleges (as well as at other open admission colleges) do not obtain degrees (e.g., Deming et al. 2014, see also Study 2 in this dissertation). Moreover, to investigate the growth and impact of the for-profit sector we need high quality longitudinal information on for-profit colleges that can help to track changes in the organizational structure of for-profit colleges that preceded the expansion.

This dissertation locates the expansion of for-profit colleges in the broader literature on social stratification, educational expansion, and organizational success. The expansion of for-

profit colleges provides a unique opportunity to examine core questions in these distinct, yet related, literatures: What enabled the expansion of for-profit colleges in higher education? How does increased competition in educational markets, in the form of relatively unregulated profit-maximizing businesses, impact the educational opportunities available to disadvantaged students? To what extent do the educational opportunities available to students at for-profit colleges differ from those offered at other open admission colleges? How did the growing number of slots at open admission colleges impact the educational experience and outcomes of disadvantaged students? This dissertation explores these broad questions using two nationally representative samples of high school students in the 1990s, prior to the expansion of for-profit colleges, and in the 2000s, in the midst of their expansion, along with detailed information on all accredited institutions in US higher education between 2000 and 2010. In doing so, it provides new evidence-based insights about the expansion of for-profit colleges and its implications for inequality, and offers several theoretical lenses for understanding the expansion of for-profit colleges.

The dissertation consists of three stand-alone studies, each of which examines a new and unexplored aspect of the expansion of for-profit colleges. The first study in this dissertation focuses on the puzzle of the expansion itself, in which a group of controversial and low-prestige institutions were able to rapidly expand in the market of higher education. This study use ten years of detailed panel data on the entire population of accredited for-profit colleges that were operational in 2001, compiled by the US Department of Education (the Integrated Postsecondary Education Data System [IPEDS] data) to assess the short- and long-term changes in enrollment at for-profit colleges associated with organizational strategies of differentiation and imitation. Examining the expansion of for-profit colleges through the lenses

of competing theories of organizational success not only extends the theoretical understanding of the expansion of for-profit colleges, but contribute to our understanding of how marginal organizations may succeed in fields characterized by strong normative environments like higher education (e.g., Scott 2005).

I find that despite the focus of the for-profit literature on organizational differentiation in the for-profit sector, differentiation alone was not very effective in promoting growth in enrollment at for-profit colleges. Imitation strategies were more effective in promoting short- and long-term growth. Interestingly, however, it was the combination of differentiation and imitation practices that was associated with the largest gains in enrollment at for-profit colleges. These results imply that marginal actors can thrive if they adapt to changes in their technical environments and imitate arrangements of established organizations to legitimize their organizational activity.

The second study of the dissertation addresses longstanding debates about the benefits of for-profit colleges to the educational opportunities available to disadvantaged students. On the one hand, opening the market of education to profit maximizing businesses can increase the competition for students in higher education, and consequently improve the services they receive in higher education. On the other hand, profit-maximizing educational businesses may overlook quality considerations in favor of financial growth and efficiency. In this case, the quality of educational opportunities for may be compromised, which can be especially damaging for disadvantaged students who have, on average, less academic preparation and lower test scores (e.g., Reardon 2011).

This study therefore examines how attendance at for-profit colleges affect the educational outcomes (measured here as bachelor's degree attainment) of students from different social

backgrounds, relative to other opportunities available to them in higher education, most notably, community colleges. This question is addressed using detailed longitudinal information on a recent cohort of high school students that entered higher education in the midst of the expansion of for-profit colleges (the Educational Longitudinal Study of 2002 [ELS]). I find that for-profit colleges have a strong negative effect on the likelihoods that low-SES students earn a bachelor's degree, even when compared with students who attended other open admission colleges like community colleges. High-SES students, however, experienced no penalty when attending for-profit colleges relative to community colleges. Given the growing concentration of low-SES students at for-profit colleges and the high tuition rates at these colleges, these results imply that for-profit colleges contribute to the intergenerational transmission of inequality: the students with the fewest resources are investing more in their education, but are less likely to reap the benefits of their investment.

The massive expansion of for-profit colleges, as well as other open admission colleges, altered the ecology of higher education and impacted patterns of college access among students from different social backgrounds. Although much has been written on the impact of these trends on educational outcomes, fewer efforts were made to examine how changes in the participation patterns may impact the social environments that students from different social backgrounds encounter while in college.

The third paper in this dissertation fills this gap. Using data from two nationally representative cohorts of high school students in the 1990s and the 2000s (NELS 1988 and ELS 2002), and information on the average family income on college campuses compiled by the US Department of Education, I show that students in higher education are more segregated by family income than in previous cohorts. Low-income students in the 2000s were more likely to enroll in

colleges in which the average family income is lower than in those attended by observationally similar students in the 1990s. High-income students in the 2000s, by contrast, were less likely than observationally similar students in the later cohort to attend institutions characterized by low average family income. These trends hold even when changes in income inequality and compositional shifts between the cohorts are taken into account. I show that the majority of these changes are due to the strengthening of the relationship between student social background, college type, and the social environment in these colleges rather than changes in student characteristics. This implies that even though the expansion of open admission colleges may have increased enrollment and degree attainment rates among low-income students, it also increased the income segregation in higher education and consequently influenced the opportunities of students to engage and socialize with students from different social backgrounds.

These trends are especially consequential for low-income students today, which are more likely than their counterparts in the 1990s to attend colleges that serve primarily low-income students. These results imply that low-income students in higher education today have fewer opportunities than their counterparts in the 1990s to form social, professional and romantic ties with more affluent students. As a result, their access to various social resources that can support their efforts for social mobility may be compromised.

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Study 1:

Organizational Change and Enrollment Growth at For-Profit Colleges During the 21st Century

ABSTRACT

For-profit colleges responded to the increase in demand for postsecondary education with a variety of organizational strategies. Using ten years of detailed longitudinal data on all accredited for-profit colleges that were operational in 2000, this study assesses the extent to which organizational strategies of differentiation and imitation are associated with changes in enrollment during the first decade of the 21st century. Results from mixed-effects and fixed-effects models indicate that (1) strategies aimed at differentiating for-profit colleges from other institutions had only a small short-term effect, and no significant long-term effect on growth in enrollment; (2) imitation strategies were more successful than differentiation in promoting growth; (3) for-profit colleges that used differentiation strategies to distinguish themselves from traditional colleges, but simultaneously "borrowed" organizational practices from nonprofit colleges to legitimize their academic activity, experienced the largest growth in enrollment. These results underscore the strategic nature of organizational change, and imply that marginal actors can thrive by strategically switching organizational categories in order to open new markets.

INTRODUCTION

The dramatic expansion of for-profit colleges is one of the most fascinating, puzzling, and controversial social and organizational changes in US higher education. Between 2000 and 2010, the for-profit sector more than quadrupled, increasing from around 1 million students in 2000 to over 4 million students in 2010 (Deming et al. 2012). About half of this expansion in enrollment occurred among for-profit colleges that were operational in 2000. Public and private non-profit colleges, by comparison, expanded by only 22 percent during that time period (the Integrated Postsecondary Education Data System [IPEDS] data, author's calculations). By 2010, the for-profit sector had become a major player in U.S. higher education, enrolling about 14 percent of all students, up from only about 4 percent in 2000 (NCES 2012: Table 4).

What enabled the fast growth in enrollment in the for-profit sector? Rising demand for postsecondary education among students, especially non-traditional students (e.g., Goyette 2008), along with cuts in direct funding for community colleges and other public colleges created new opportunities for for-profit colleges to attract more students (Turner 2006; Deming et al. 2012). But demand alone cannot account for the dramatic gains in enrollment at many for-profit colleges. Organizations may identify changes in their environment, but do not have perfect information regarding the best strategy to rationally address changes. Thus, rather than following pre-determined rational calculations, organizations experiment in their response to changes in their environment. Indeed, for-profit colleges responded to the changes in their environment, including rising demand, by adding new programs and student services, increasing their geographic spread and investing large sums in marketing and advertisement.

Students, in turn, are not perfectly informed consumers, with accurate information about the costs and benefits of particular educational choices, nor has their demand for college

education been stable. Other commentators have noted the emergence of a "college-for-all" culture that increased educational aspirations of underserved students, including low-income students and minority students (Rosenbaum 2001). This college-for-all culture does not, however, provide underserved students with the guidance about what they can expect from different types of degrees, or different types of colleges. Examining the association between the organizational responses of for-profit colleges and changes in student enrollment can therefore provide important insight into the mechanisms that supported the recent expansion of for-profit colleges.

This study assesses the relationship between organizational responses and enrollment changes at for-profit colleges. To this end, I use 10 years of detailed, longitudinal information collected by the Department of Education on the academic, financial and organizational activity of all accredited for-profit colleges that were operational in 2000 (the Integrated Postsecondary Education Data System, hereafter "IPEDS"). Of course, there are other ways to conceptualize organizational success and expansion, including a categorical measure of survival vs. death, changes in revenues or in the number of employees. Moreover, organizations may choose different strategies to increase their revenues, like niche education. Yet, because the context of the investigation is the dramatic expansion of for-profit , measuring enrollment gains and loses at each college is the most straightforward outcome of interest.

Measuring organizational change is a challenge. Organizational scholars often disagree about what organizational changes are more consequential for organizational success. Resource dependency theory (e.g., Pfeffer and Salancik 1978; Hillman, Withers, and Collins 2009), for example, emphasizes adaptation and innovation as ways to respond to changes in the technical environment of organizations—their raw materials, consumer demand and base, and so on.

Similarly, the economic and management literatures on reputation (e.g., Fombrun and Van Riel 1977; King and Whetten 2008) suggest that organizations use innovation in order to differentiate their activity from other organizations in the field, and increase their appeal to potential consumers. Neo-institutional theory (e.g., DiMaggio and Powell 1983; Meyer and Rowan 1977; Zucker 1987), by contrast, emphasizes isomorphism and imitation as strategies for legitimizing organizational activity, reducing the cost of information processing among potential consumers, and increasing the organizations' likelihoods of survival. To accommodate these conflicting perspectives, I assess how two modes of organizational change—differentiation and isomorphism— are associated with changes in enrollment in the for-profit sector. Indeed, as I describe below, during the first decade of the 21st century, differentiation and isomorphism were both evident in the for-profit sector. This variation in organizational responses provides a unique opportunity to assess the scope and limits of existing theories of organizational change.

To foreshadow my results, I find that (1) differentiation was more common in the for-profit sector than isomorphism, although over time about half of the for-profit colleges in the study used both differentiation and isomorphism strategies. (2) Differentiation alone did not produce any significant effect on the growth of for-profit colleges, but when it was accompanied by isomorphism, it yielded the highest short- and long- term gains. (3) Isomorphism alone was more effective than differentiation alone, or not using any isomorphism or differentiation strategies, but less effective than simultaneously using differentiation and isomorphism. These results imply that for-profit colleges were able to tap into new markets by conforming to organizational norms of traditional colleges and universities, but also by differentiating their activity from those of more established organizations.

THE FOR-PROFIT SECTOR IN U.S HIGHER EDUCATION

The for-profit sector in US higher education has a long history of change, expansion, and decline. For-profit colleges have been around since the late 18th century, primarily operating as small, career-oriented schools that provide non-degree education in business-related skills (Deming et al 2012). For-profit colleges were the dominant providers of business-related education until the late 1890s, when they were challenged by private and public universities and began to decline (Kinser 2006). Small and local career schools, like cosmetology or secretary schools, still exist today, alongside newer types of for-profit colleges.

The GI bill marked a new era in the relationship between for-profit colleges and the federal government. Before the GI bill, most federal legislation referred to public non-profit education. For-profit colleges lobbied to be included in the second draft of the GI bill, and succeeded in lifting the majority of restrictions based on sector in favor of restrictions based on institutional accreditation (Kinser 2006). In 1952, the association of for-profit colleges (The National Association and Counsel of Business Schools) formed the Accrediting Commission for Business Schools to satisfy these requirements. This accreditation allowed for-profit colleges to be included in later federal educational policies, including the 1965 Higher Education Act. Eligibility for federal funds in the for-profit sector solidified with the reauthorization of the Higher Education Act in 1972, although for-profit colleges were placed in a separate category of colleges: proprietary schools of higher education (Pelesh 2010).

The relationship between the for-profit sector and the federal government in the 1970s and 1980s was rocky. Many for-profit colleges were accused of fraudulent behavior, federal investigations of the sector were frequent, and general suspicion of for-profit colleges posed challenges to their expansion. In order to address these issues, the reauthorization of the Higher

Education Act in 1992 placed additional restrictions on the eligibility of for-profit colleges for federal funds (Pelesh 2010; Kinser 2006). In addition to general limitations on acceptable default rates, guidelines for program length and recruiting bonuses, two important regulations were placed only on for-profit colleges: the "two-year rule", which requires for-profit colleges to be operational at least two years before they are eligible for federal student aid funds; and the "85-15 rule", which limits the percent of revenues for-profit colleges can obtain from Title IV programs to 85%. This increased to 90% in the 2008 reauthorization of the HEA, thanks in large part to lobbying by the for-profit sector of a pro-privatization Congress.

The reauthorization of the higher education act in 1992 also included new regulations for accrediting agencies, including the separation of accreditation agencies from individual colleges and professional associations (Pelesh 2010:96). National accreditation agencies, the main accreditors of for-profit colleges, were required to adopt quantifiable measurements and adhere to guidelines regarding placement and default. Regional accreditation agencies, which accredit the majority of non-profit colleges, were not subjected to these new regulations. These new restrictions have shaped the regulatory environment of for-profit colleges throughout the first decade of the 21st century and their relationship with the federal government. Yet, this relationship is constantly changing, as for-profit colleges continued to lobby to improve their position (Mettler 2014; Pelesh 2010).

Since the late 1990s, for-profit colleges have faced more stringent federal regulations, growing competition for students from private and public nonprofit colleges, especially community colleges, and challenges to the legitimacy of their academic activity (Kinser 2006; US Senate 2012; GAO 2010). Pressures to increase regulations on the sector have been rising, as manifest in the new gainful employment regulation that tie eligibility for financial aid with

employment outcomes of students, and, more recently, President Obama's call to reshape college funding (Department of Education Press Office 2014).

The regulatory and social environment for for-profit colleges has, then, been characterized by increasing stringency and distrust since at least the 1970s, well before the expansion of the for-profit sector. Despite these pressures, the for-profit sector expanded faster than any other sector in higher education. But not all for-profit colleges experienced growth in enrollment. While some for-profit colleges expanded, other declined and even disappeared altogether. What, then, made some for-profit colleges better at capturing the rising student demand than others? While some of this variation is likely related to local variations in student demands and competition, some of it can also be associated with variation in strategy different for-profit colleges used in order to expand. The next section discusses some of the organizational changes in the for-profit sector, and how they may relate to prominent theories of organizational success.

ORGANIZATIONAL CHANGES IN THE FOR-PROFIT SECTOR

Because colleges provide non-tangible social goods, consumers lack objective measurements for evaluating the products colleges offer. As a result, consumers often rely on reputation, ranking systems, other consumers, student outcomes, and signals that can convey information about the relative benefits of the product (Zuckerman 1999; Davis and Powell 1992; Scott 1995; Gumport and Snydman 2006; DiMaggio 1997). For-profit colleges can strategically add services and institutional arrangements that signal something about their products, their value, and their relationship to their environment to potential consumers in order to compete with other colleges (Zuckerman 1999; Tolbert 1985). In this section I discuss two general organizational strategies

— differentiation and isomorphism—in the for-profit sector, and how they may be associated with uneven rates of growth in enrollment among organizations in the for-profit sector.

Innovation and Differentiation in the for-profit sector

Innovation and differentiation are central concepts in the literature on organizational success and change (e.g. Schumpeter 1942; Kirzner 1997; Luchmann 1986; Selznick 1949; 1957; 1996; Kraaz and Zaraj 1996; Murray and O'Mahony 2007; Tucker 2002). Resource dependency theory, for example, argues that organizations innovate as a response to changes in the technical environment of the organization, or to the emergence of new opportunities in that environment. Successful responses to changes in student demand, for-example, can open new markets and opportunities, increase the organization's appeal among their potential clients and consequently promote overall growth in the organization. Consistent with this argument, Kraaz and Zaraj (1996), examined organizational changes at private liberal art colleges in the 1970s and 1980s and the impact of these changes on organizational performance, as measured by student enrollment. They show that innovation in these colleges resulted in enrollment gains.

The management literature on organizational reputations offers a variation of the innovation thesis (e.g., Fombrun and Van Riel 1977; King and Whetten 2008). The central claim in this literature is that organizations compete with similar companies by differentiating their activity from that of other organizations. In particular, organizations strategically manage the impressions that observers have of them through innovative organizational change. The core insight of this theory, at least for my purposes, is that it explicitly considers the relationship between the organization and its' consumers. I therefore focus here primarily on methods of differentiation used by for-profit colleges during the study period.

Differentiation is indeed evident in the for-profit sector during the first decade of the 21st century. For example, for-profit colleges differentiate themselves from other organizations by offering a variety of student services that increase student choice and flexibility (Ruch 2003; Tireney and Lechuga 2010; Tireney and Hentschke 2007). For-profit colleges pioneered and advanced online education in higher education in US higher education, and many for-profit colleges today offer a variety of degrees and programs via online programs (Ruch 2003; Tierney and Hentschke 2010). In addition, for-profit colleges offer other student-focused services that most traditional colleges do not, including flexible academic calendars and weekend classes, multiple locations, and both part time and full time enrollment options, (Ruch 2003; Henschkle et al 2007; Turner 2006; Deming et al 2012).

These characteristics differentiate the academic activity and services of for-profit colleges from that of other colleges, including non-profit colleges (Ruch 2003; Tireney and Hentschke 2007; Deming et al 2012; Turner 2006). The homepage of the University of Phoenix, for example, list "flexible learning" as one of the unique features of the university, in which:

> "We offer convenient course schedules, whether you attend on campus or online. Plus, our mobile app lets you access your classroom from anywhere you have the Internet, 24/7 (University of Phoenix website, 2016).

Describing their MBA program, DeVry University boasts that

> "DeVry University's Keller Graduate School of Management offers program flexibility. Students are able to customize a portion of their program to best suit their interests. Keller students are able to fulfill course requirements from home, the office, or even while traveling" (DeVry University Website).

Similar messages are advertised on the websites of other many other large and small for-profit colleges. These services cater to the needs of underserved students—low-income students, minority students and older students, who are more likely to have many family- and work-related demands on their time.

Differentiation is also evident in the decision of many for-profit colleges to have multiple physical locations. By opening new branches or acquiring existing colleges, for-profits can offer greater flexibility to their students, tap new markets, and compete in existing markets (Henschkle 2010). Although traditional colleges may also have more than one physical location (e.g., Cornell University has campuses in Ithaca, New York City, and Qatar), for-profits have many more locations, can enter them in a matter of months rather than years (e.g., Ruch 2003), and, unlike traditional colleges, often offer identical degrees and programming at all locations. Importantly, for-profit colleges' multi-site strategy offers students a national brand but in a proximate location to their residences (Ruch 2003).

For-profit colleges also try to influence students' perceptions of the colleges and to increase their visibility to new students by, for example, investing in large marketing and sales teams, and by spending large sums on advertisement that set them apart from other colleges. A recent investigation of some accredited, for-profit colleges by the Senate Health, Education, Labor, and Pensions Committee, for example, revealed that for-profit colleges spend about 23 percent of their revenues on "marketing, advertising, recruiting, and admissions staffing," but only 17 percent of their revenues on instruction (U.S. Senate 2012; see also Bennett et al 2010).[1] These marketing practices may give for-profit colleges an edge, and cater to the dearth of information about higher education in the social networks of students from traditionally underserved populations, (U.S. Senate 2012).

[1] According to a recent report by the US Senate (2012), the share of revenues used by for-profit colleges for direct marketing is much smaller than in for-profit colleges.

Imitation in the for-profit sector

For-profit colleges may attract new students by innovating the delivery of educational services, and differentiating themselves from traditional colleges. However, differentiation is only one potential route to high enrollments. Indeed, in neo-institutional theories of organizational strategies, and in the more recent literature on social categories, isomorphism and adoption are believed to be more consequential for organizational survival (Scott 2005; DiMaggio and Powell 1983; 1991; Meyer and Rowan 1977; Zucker 1977; Tolbert and Zucker 1983; 1996; also see Hannan and Freeman 1977; 1984; Zuckerman 1999; Singh and Lumsden 1990). These theories challenge the assumption that organizational structures result from intentional strategies of change and rational calculations of how best to successfully adapt to changing technical environments. Instead, these theories emphasize that formal structures are often decoupled from the actual activities of the organization—rules are violated, resources are allocated to inefficient organizational practices, evaluation procedures are often ineffective, and old technologies are not abandoned despite lack of efficiency (Meyer and Rowen 1977; Zucker 1977; Tolbert and Zucker 1983; 1996). Legitimacy, not differentiation, is the main predictor of organizational survival and success.

The legitimacy thesis views organizations as deeply embedded in normative environments that exert pressures on organizations to adopt widely accepted institutional arrangements—rules, norms, organizational practices and structures—that are perceived by organizations in the field as adequate, proper and legitimate (Meyer and Rowen 1977; DiMaggio and Powell 1983; Tolbert 1988; Zuckerman 1999). Although earlier applications of neo-institutional theory focus on the relationship between different organizational actors (i.e., central vs. marginal organizations), more recent applications of the theory explicitly theorize the

relationship between organizations and their potential consumers (Tolbert 1985; Zuckerman 1999). Studying the stock market, for example, Zuckerman (1999) shows that appearing illegitimate is costly for the organization because it increases the investment of consumers in information processing, especially in markets of social goods. Organizations therefore strategically adopt certain minimum institutional arrangements in the specific organizational category in order to gain access to consumers.

The use of imitation to increase organizational legitimacy is especially relevant in the case of for-profit colleges. During the first decade of the 21st century, many for-profit colleges began to offer programs that led to traditional degrees, including associates, bachelor's degrees and graduate degrees (Kinser 2006; Deming et al 2012). These organizational changes made for-profit colleges appear more similar to traditional colleges, and enabled them to compete for the same students who might otherwise attend non-profit colleges. However, the academization of most for-profit colleges has been mainly ceremonial, and in practice the majority of students at degree-granting for-profit colleges earn certificates (Deming et al. 2012). In the language of institutional theory, organizational rhetoric and organizational practices are decoupled.

Other forms of imitation are also evident in the sector. Academic accreditation is a condition for eligibility for financial aid, but it can also increase organizational legitimacy. Although many for-profit colleges are accredited by national agencies, especially the American Commission of Career Schools and Colleges (ACCSC), several for-profit colleges sought accreditation from regional accreditation agencies that also accredit elite universities (Floyd 2005; Kinser 2006). These regional accreditations are more difficult to achieve, more costly, and entail far more restrictions on organizational activity than national accreditation through ACCSC (Bennett et al 2010; Kinser 2006). Yet, they may be worth the investment, insofar as they signal

to potential students that the for-profit colleges who achieve regional accreditation are similar to traditional, and even elite, colleges. The University of Phoenix, for example, lists on its website that it is accredited by a regional accreditation agency—the Higher Learning Commission—and explains at length the superiority of regional over national accreditation.

The aforementioned review points to an important conclusion: during the first decade of the 21st century, many for-profit colleges implemented organizational changes that signal to prospective students the value and characteristics of the "products" of for-profit colleges. Some of these changes differentiated for-profit colleges from other colleges, but others made for-profit colleges appear more similar to traditional and established non-profit colleges.

The core question, and the focus of the empirical analysis, is whether and how these modes of organizational change—differentiation and imitation—are associated with differential rates of growth in enrollment in the for-profit sector.

DATA, VARIABLES AND METHODS

Data and sample

The empirical investigation is based on publicly available information obtained from the IPEDS on all accredited for-profit colleges between 2000 and 2010. The US Department of Education gathers information from every college, university, and technical and vocational colleges that participates in federal student financial aid programs. The Higher Education Act of 1965 requires that all colleges that participate in federal student aid programs report data on enrollment, program completion, graduation rates, faculty and staff, finances, degree offerings, student services and other characteristic in every year. I merged information from interrelated IPEDS surveys, including the "Institutional Characteristics", "12-Months Enrollment",

"Employees by Assigned Position", "Finance", and "Educational offerings" surveys between 2000 and 2010, and created a panel data for each accredited for-profit college that existed in higher education during these years. I complemented the information from the IPEDS with information provided by the U.S. Department of Education's Office of Postsecondary Education (OPE) to track all accreditation activity during the study period.[2]

The IPEDS data are uniquely suitable for the current investigation. First, because all Title IV postsecondary institutions are required to report their activity, it contains the most comprehensive data available on the for-profit sector. Second, because each college reports complete information every year, changes in the structure and size of for-profit colleges can be easily and accurately tracked. It is important to keep in mind, however, that the scope of the investigation is limited because non-accredited for-profit colleges are not required to report to the Department of Education, and are therefore excluded from the analyses. To date, data on non-accredited for-profit colleges are hard to obtain, and the quality varies significantly by state (Cellini and Goldin 2012). Still, recent estimates suggest that less than 15 percent of students in the for-profit sector are enrolled at non-accredited for-profit colleges. Moreover, non-accredited for-profit colleges tend to be smaller, have low tuition rates, and their consumer base likely differs from that of accredited for-profit colleges.

The analyses in this paper refer to the subset of 20,522 year by college records collected between 2000-2010 for all 2,500 accredited for-profit colleges that enrolled at least one student in 2000. Changes in enrollments are calculated based on comparisons between consecutive years (i.e., 2001 to 2000, 2002 to 2001, etc.); only 2,330 of the 2,500 colleges that were operational in 2000 had information from two consecutive years, and hence were included in the sample. To

[2] Available at: http://ope.ed.gov/accreditation

ensure consistency and to establish a clear temporal order, I included colleges that left the sample early, but excluded colleges formed after 2000. Appendix 1.A lists the share and number of colleges in the sample in each study year, and the total number of students they enroll.[3]

Focusing on colleges that were eligible for financial aid in 2000 provides a clearly defined population of organizations that was subjected to roughly similar regulatory and normative environments, and allows a closer examination of organizational changes and enrollment growth. Because the IPEDS data does not contain information about the age of organizations, limiting the population to this set of colleges reduces variation related to the age of colleges, including conditions at the time of formation. These organizations needed to adapt and respond to roughly similar regulatory, normative and technical environments throughout the decade.

This setup is not without limitations. About half of the growth in enrollment at for-profit colleges occurred at colleges that became eligible for federal financial aid after 2000 and are therefore not included in the sample. Figure 1.1 graphs enrollment at all accredited for-profit colleges between 2000 and 2010. The bottom section of the graph (in grey) accounts for enrollment at the for-profit colleges that existed in 2000 and are included in the sample. The top section in the graph (in black) accounts for the share of students at accredited for-profit colleges that are enrolled at the colleges that became eligible for financial aid after 2000 and hence not included in the sample. Growth in enrollment at for-profit colleges that existed prior to 2000, and

[3] To ensure consistency, colleges by year observations ineligible to be included in the sample if they changed meaningfully their name, sector (i.e., from for-profit to non profit), or were bought by or merged to a different college. In cases where colleges exited the sample and came back later (N=32), growth was calculated only for consecutive years the college was eligible. Colleges that had missing reports of enrollment during the study period (N=11) were excluded from the sample altogether due to questionable data reports. Sample weights were calculated to examine the impact of these exclusions but no difference between the weighted and unweight results were found. The weighted results are available from author. Missing values on the predictors were imputed using best-subset imputation procedures.

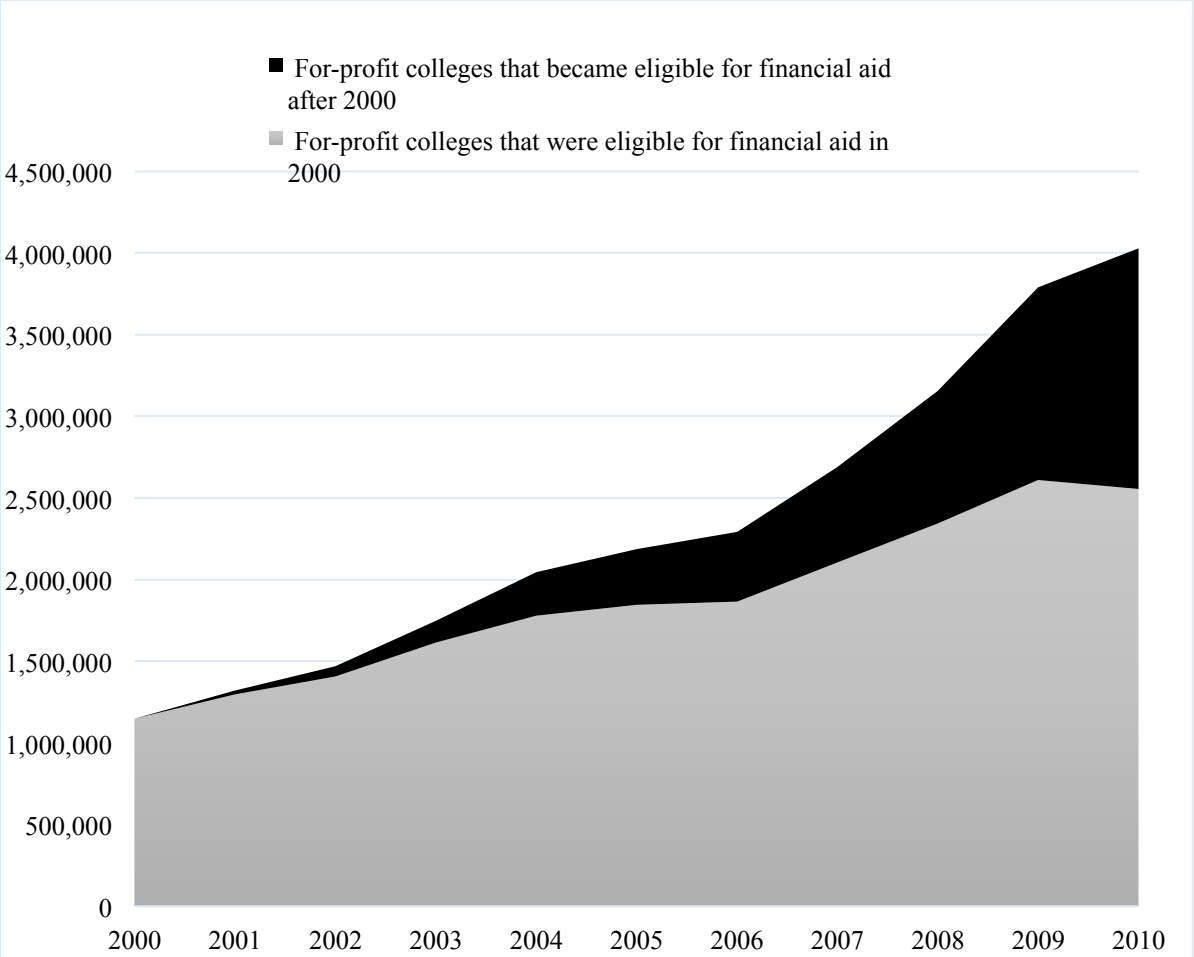

Figure 1.1: Enrollment in accredited for-profit colleges 2000-2010
Source: IPEDS
Notes: Based on 12-month unduplicated headcount

those that became eligible for federal aid after 2000 are relatively similar, although enrollment in the latter group grew at a faster rate after 2007. Enrollment at for-profit colleges in the sample declined slightly in 2010, and only slowed for colleges that are not in the sample. Overall, Enrollment at the for-profit colleges that existed in 2000 nearly tripled during the study period: from 1.1 million students in 2000, to about 2.6 million students by 2010.

How different are the organizational characteristics of for-profit colleges in the sample from those of for-profit colleges that entered the IPEDS universe after 2000? Appendix 1.B compares several characteristics of for-profit colleges that are included in the sample (i.e.,

enrolled students in 2000) to newer colleges. It shows that the organizational characteristics of for-profit colleges in the sample are relatively similar to for-profit colleges that were formed after 2000. However, a larger share of for-profit colleges that are in the sample are 2-year colleges (36% vs. 25%), award associates degrees or less (23% vs. 16%), and offer vocational training (82% vs. 75%). For-profit colleges that are in the sample are also larger, on average, than the for-profit colleges that became eligible for financial aid after 2000 (1377 vs. 931 students). The similarity in organizational characteristics implies that some of the processes that occurred at for-profit colleges in the sample likely also occurred at newer colleges. However, other processes, not investigated here, may be more consequential at newer colleges.

Variables

Growth in Enrollment: Enrollment growth, the main outcome of interest, is measured using two variables: (1) cumulative growth, which is defined as the percent increase in enrollment in each year relative to enrollment in 2000; and (2) yearly growth, which is defined as the percent increase in the number of students enrolled in the college relative to enrollment in the previous year. The benefit of using relative measure of growth over absolute measures is that relative measures are not influenced by differences in the initial size of the organizations.[4]

Strategies of organizational change: I use year by-year information on the characteristics of each college in the sample to track changes in the structure of each of the 2,330 organizations in the sample. I focus on differentiation and imitation strategies at for-profit colleges that are

[4] In additional analyses, not shown here, I replicated the results modeling survival and death of for-profit colleges. The core results were in line with those presented here. Measuring survival with IPEDS data, however, is problematic because there is no easy way to confirm whether the college "died" or simply exited the universe of Title IV eligible colleges.

potentially visible to prospective students. This is not, to be sure, an exhaustive list of all possible organizational changes that occur at for-profit colleges during the study period, but they are the changes for which the mechanisms linking the change and shifts in student behavior are most obvious. Put differently, students are not as likely to respond to changes in structures or practices that they cannot see.

Differentiation is operationalized here by the inclusion of strategies that increase student choice and flexibility *or* the visibility of for-profit colleges to prospective students: adding weekend classes, adding distance/online education, and offering non-traditional academic calendars. I also measure whether colleges increase their geographic coverage, with two indicators: whether the college purchased another institution, and whether the college opened another branch in another location. In addition, I measure whether colleges changed the overall level of personal services offered to students. Personalized services include day-care services, placement services for graduates, career counseling for students, and remedial courses. These services, although not new per-se, signal potential consumers about the overall commitment of colleges to student wellbeing and success.

As I argued above, college expenditures on sales and marketing are another indicator of how for-profit colleges innovate relative to traditional colleges. Because the IPEDS does not contain direct measurements of institutional expenditures on sales and marketing, I use two proxies: (1) the share of institutional expenses directed to non-instructional activity; and (2) the share of non-instructional employees. Because most for-profit colleges do not have research centers or athletic teams, measures of non-instructional activities are likely to be closely correlated with actual (and unobserved) measures of growth-oriented organizational expenditures. To guard against basing estimates on "noise" or small changes that may not

represent substantial shifts in strategy, I only consider an increase of 30 percent or more in either indicator to indicate a year-to-year organizational change in sales and marketing expenditures.

The use of imitation strategies, by contrast, is measured by year-to-year shifts toward structural arrangements that are most often found at non-profit colleges in the domains of academic degrees offered and accreditation. Specifically, I measure whether an organization (a) added programs that lead to academic degrees (i.e., AA, BA, or higher), assuming it formerly did not offer any such degrees; (b) increased the length of academic programs (i.e., from less than two-years to two years, two years to four-years, four-years to more than four years); or increased the highest academic degree offered (e.g., from certificate to AA, from AA to BA, from MA to PhD). I also measure whether the college attempted, successfully or not, to increase the level of accreditation or gain additional accreditation during the study period.

As indicated above, some of the changes in the academic offerings of for-profit colleges did not resulted in meaningful change in the operation of the organization. To account for such decoupling, I include a binary indicator of whether the institution's level matches the modal degree awarded. This indicator flag colleges that, for example, are classified as four-year colleges, but primarily award lower degrees (i.e., associate degrees or certificates). For colleges classified as four-year colleges or above (i.e, granting BA, MA or PhD) a mismatch is considered *only* if the modal degree awarded at the college is lower than a bachelor's degree (i.e., associate degree or certificate).

I use these measures of organizational changes to distinguish between four, mutually exclusive strategies: (1) no differentiation or imitation, (2) differentiation only, (3) imitation only, and (4) imitation and differentiation.

It is important to emphasize that the scope of strategies defined here likely underestimate the degree of change in the for-profit sector. For-profit colleges that did not use any of the differentiation and/or imitation strategies specified above likely used other strategies to attract prospective students. For example, the local beauty school may add a program that specializes in natural products to attract other students. However, because this type of differentiation is within the realm of the traditional operation of for-profit colleges (i.e., non-degree career-related education), it is not defined here as differentiation organizational change.

Adjustment variables: The influence of organizational strategies on enrollment may be dependent on, or correlated with, other characteristics of the institution. The models include adjustments for *academic offerings in 2000 (*level of institution, highest degree offered, academic and occupational programs, mismatch between predominant degree awarded and the level of the institution); *student services in 2000* (nontraditional academic calendars, weekend classes, distance education, other special services for students); *finance and organizational characteristics in 2000* (the number of branches; share of expenditures and employees dedicated to non-instructional activity), and *structural characteristics* (geographic region, enrollment in each year, and the number of community colleges in the same zip code at each year).

Analytic strategy

I examine the impact of differentiation and imitation strategies on enrollment growth in several stages. I begin by assessing whether the use of different strategies is associated with other observed characteristics of the colleges in the sample. This assessment involves fitting several multilevel logit models that predict organizational strategy in year t+1, with covariates that

measure organizational change between year t and t+1. These models also include an indicator for year to account for overall trends in the field. I also examine whether differentiation is associated with imitation. [5]

I then examine the association between differentiation and imitation and yearly growth in enrollment using growth curve multilevel linear models and fixed-effects models. These models include indicators for organization strategy, year, and in the multilevel models, the comprehensive set of adjustment variables discussed above. To account for variation in the association between organization strategy and growth by year, I also include interaction terms between year and strategy. Based on these models, I calculate the actual and predictive scenarios to estimate the contribution of each strategy (neither, imitation only, differentiation only, and both) to the average yearly growth of for-profit colleges.

The aforementioned models examine short-term strategies and their effects. However, organizational strategies can have lagged effects, and colleges can employ long-term strategies whose impact on enrollment takes several years to emerge. In the last set of analyses, I estimate a series of linear models predicting cumulative growth as a function of 5- and 10-year strategy (defined as the occurrences of differentiation and/or imitation over a 5- and 10-year period). These models are estimated only for the subset of colleges that were included in the sample for the duration of 5- or 10-years, respectively. I explain the construction of the models further in the results section.

[5] These models were estimated using both multilevel logit models and logit models with clustered standard errors. These two estimation techniques produced relatively similar results for differentiation strategy, but not for imitation strategy. I present here the results from the multilevel logit models, in which the effect of each strategy is estimated as a random effect.

RESULTS

Change and growth in the for-profit sector

The dramatic expansion of the for-profit sector during the first decade of the 21st century is evident in Figure 1.2, which graphs the average cumulative growth in enrollment at accredited for-profit colleges since 2000 and its standard deviation. For-profit colleges that were operational in 2000 experienced growth of about 200 percent, on average, in enrollment by 2010, nearly tripling their size. Enrollment gains were especially large between 2000 and 2002, slightly lower between 2003 and 2005, and slowed substantially between 2006 and 2007. Enrollment growth increased again in 2008 and 2009, during the financial crisis, but plummeted in 2010. Although the average cumulative growth in the sector was positive throughout the decade, the large standard deviations indicate substantial variation in growth throughout the sector and decade: while some have expanded, others have experience declines in enrollment. I take advantage of this variation to examine whether, and how, different organizational strategies can account for these patterns of growth.

The variation in the growth of organizations, depicted in the large standard deviations in Figure 1.1, can be related to differences in the academic, organizational, and structural characteristics of for-profit colleges at the beginning of the period, as well as differences between states in the regulatory environment of for-profit colleges. Table 1.1 shows descriptive statistics for several academic, organizational and structural characteristics of the 2,330 accredited for-profit colleges in 2000. It reveals significant diversity in the for-profit sector on most measured dimensions. Over half of the colleges in the sample were classified as less than two-year colleges (56%), awarded only certificates (68%), and offered occupational training programs (86%). About a quarter of the colleges in the sample evinced a mismatch between their

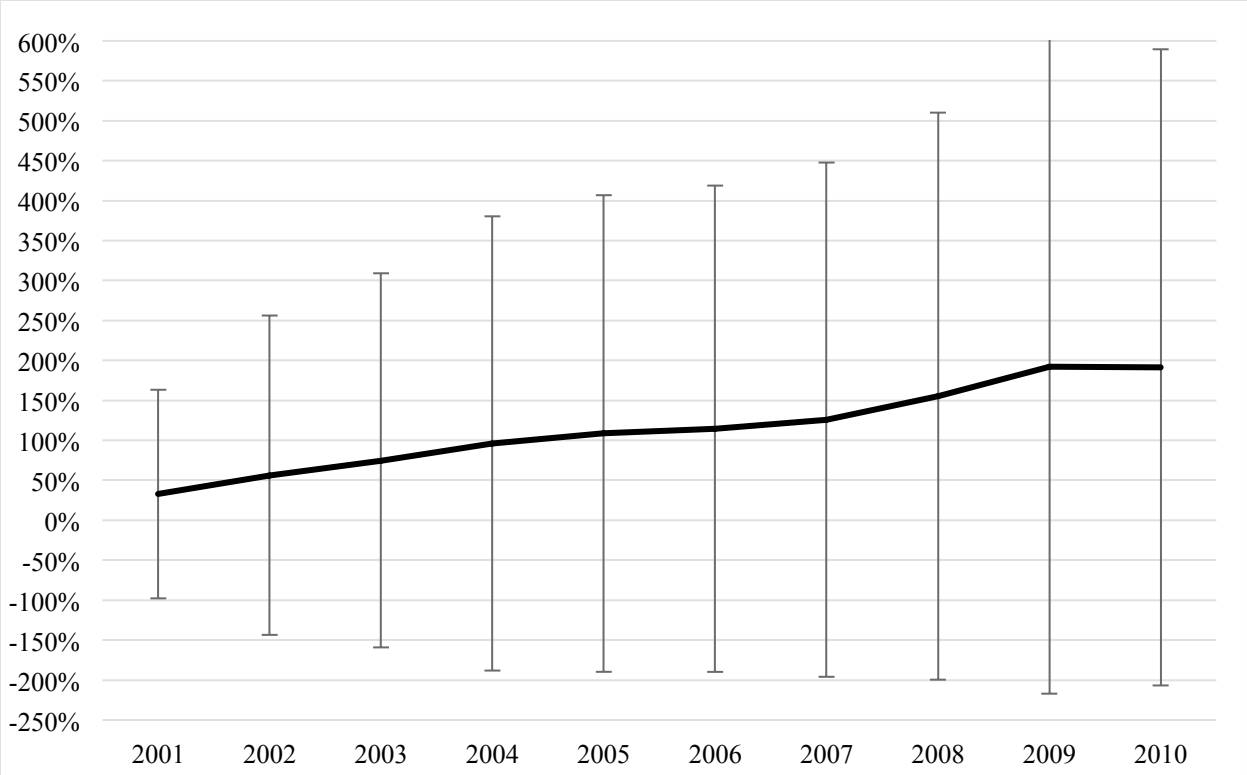

Figure 1.2: Average cummulative growth in enrollment at accredited for-profit colleges 2000-2010
Source: IPEDS
Notes: the bars denotes the standard deviation

level of instruction (i.e., less than 2-year, 2-year and 4-year) and the modal degree they awarded. Over two-thirds of the for-profit colleges in the sample offered nontraditional academic calendars, but only 4% offered weekend classes, and only 8% of colleges offered classes via distance education. Over half of the for-profit colleges in 2000 had over 50% of their employees in non-instructional role, and 50% of their expenditures directed at non-instructional activities. The average for-profit college in 2000 enrolled about 557 students, although the large standard deviation reflects the substantial diversity in the for-profit sector today: while some for-profit colleges resemble the historical prototype of for-profit colleges as small, local, career schools, others are substantially larger, and may be part of large national chains.

Table 1.1: Selected characteristic of accredited for-profit colleges in 2000

	Mean (sd)
Academic offering	
Level of institution	
Less than 2-year	56%
2-year	32%
4-year or more	12%
Highest degree offered	
Certificate	68%
AA	21%
BA	6%
Above BA	5%
Mismatch between predominant degree and level of institution	24%
Offer academic programs	35%
Offer occupational training	86%
Student services:	
Number of branches	2.45 (0.49)
Non traditional calendars	68%
Offer weekend classes	4%
Offer distance education	8%
Number of special services offered to students	2.49 (4.57)
Non instructional employees	
Less than 25%	10%
25-50%	37%
51-75%	28%
Over 75%	25%
Expenses on non-instructional activity	
Less than 25%	5%
25-50%	10%
51-75%	46%
Over 75%	40%
Structural characteristics:	
Geographic region:	
New England (CT, ME, MA, NH, RI, VT)	5%
Mid East (DE, DC, MD, NJ, NY, PA)	16%
Great Lakes (IL, IN, MI, OH, WI)	14%
Plains (IA, KS, MN, MO, NE, ND, SD)	7%
Southeast (AL, AR, FL, GA, KY, LA, MS, NC, SC, TN, VA, WV)	22%
Southwest (AZ, NM, OK, TX)	12%
Rocky Mountains (CO, ID, MT, UT, WY)	4%
Far West (AK, CA, HI, NV, OR, WA)	16%
Outlying Areas (AS, FM, GU, MH, MP, PR, PW, VI)	3%
Size of the institution (in students)	557.48 (2072.76)
Number of community colleges in the same zip code	1.53 (0.97)
N	2330

Notes: Only for-profit colleges that were operational until at least 2001 are included in the sample (see main text). Special student services include remedial services, academic/career counseling, employment services for students, placement services for completers, on campus day-care
Source: IPEDS 2000-2010

Variation in growth is also related to differences in strategies. Table 1.2 lists the share of for-profit colleges in the sample that employed differentiation strategies during the study period. Roughly a third of all for-profit colleges use differentiation strategies during each year of the study (see the "differentiation strategy" column). Some practices, like opening additional branches or increasing the share of non- instructional staff, were more common than others. Differentiation remains relatively stable until 2009 and increased substantially in 2010 (37%), primarily due to an increase in the share of for-profit colleges that opened additional branches (17%).

Many for-profit colleges also use imitation strategies. Table 1.3 lists the different imitation practices in the for-profit sector during the study period and the percentage of colleges who used them. Notably, imitation was a less common strategy in the sector than differentiation, although it became more prominent over time (see the "imitation strategy" column, Table 1.3). In 2001, only 10 percent of for-profit colleges in the sample used any imitative strategies, but this share more than doubled by 2010, peaking at 22 percent. Adding academic training was the most common form of imitation during the study period. The share of colleges seeking or obtaining accreditation also increased during the study period, although not as fast. The use of other strategies remained fairly stable during the period.

Are some colleges more likely than others to use differentiation or imitation strategies? Table 1.4 provides coefficients from multilevel logit models predicting the use of differentiation and imitation strategies. Model 1 and Model 4 are the baseline models for differentiation and imitation strategy, respectively. According to the interclass correlation (ICC), about 12 percent of the variance in the likelihoods of differentiation (model 1), and 64 percent of the variance in the likelihood to use imitation (model 4), is associated with differences between colleges. Model

Table 1.2: Differentiation at accredited for-profit colleges 2000-2010

Differentiation strategy:	Increasing flexibility and student choice:						Increasing visibility		Total differentiation strategy
Organizational change:	Add weekend classes	Add distance education	Added non-traditional academic calendars	Added student-focused services	Opened additional branches	Purchase another institution	Increased non instructional staff by more than 30 percent	Increased expenditures on non-instructional activity by 30 percent or more	
Year:									
2001	2%	2%	2%	6%	7%	0.70%	10%	6%	29%
2002	1%	3%	1%	5%	10%	0.20%	11%	6%	32%
2003	0%	1%	1%	7%	8%	0.10%	13%	5%	31%
2004	6%	1%	1%	4%	8%	0.20%	12%	4%	30%
2005	9%	1%	1%	5%	7%	0.30%	11%	6%	32%
2006	5%	1%	0%	3%	8%	0.00%	11%	4%	28%
2007	5%	1%	1%	4%	6%	0.10%	11%	5%	28%
2008	5%	2%	2%	4%	7%	0.10%	12%	4%	30%
2009	4%	2%	2%	3%	12%	0.10%	6%	5%	29%
2010	4%	3%	1%	4%	17%	0.10%	10%	4%	37%

*Notes: E*ach dimension is only counted once between 2000-2010. See main text for further explanation on the factors

Source: IPEDS 2000-2010

Table 1.3: Imitation at accredited for-profit colleges 2000-2010

Imitation strategy:	Changing academic offerings				External validation	Total Imitation strategy
Organizational change:	Increase the length of longest program	Increase the highest degree offered	Added academic training	Mismatch between predominant degree and level	Accreditation activity	
Year:						
2001	2%	2%	4%	3%	3%	10%
2002	2%	2%	5%	3%	3%	11%
2003	2%	2%	7%	3%	3%	13%
2004	2%	2%	9%	3%	3%	14%
2005	2%	1%	10%	2%	3%	15%
2006	1%	2%	11%	2%	4%	16%
2007	2%	1%	12%	2%	4%	17%
2008	2%	2%	13%	3%	5%	20%
2009	3%	3%	14%	4%	5%	22%
2010	1%	1%	14%	2%	7%	22%

Notes: Imitation on each dimension is only counted once between 2000-2010. See main text for further explanation on the factors

Source: IPEDS 2000-2010

2 and 5 include adjustments for year and the comprehensive list institutional characteristics described above. A comparison between the ICCs in Model 1 and 2, and between the ICCs in Model 4 and 5, indicates that these factors account for about two thirds of the group-level variance in the likelihood of differentiation, and about nine percent of the group-level variance in the likelihoods of imitation.

The observed organizational characteristics are strongly associated with the likelihoods of using differentiation or, alternatively, imitation. Net of other factors, colleges that offered occupational training, nontraditional academic calendars, and other student services at the base year, or that had high share of their expenditures and employees devoted to non-instructional activities, were less likely to use differentiation during the study period (Model 2). Higher enrollments and more branches are both positively associated with differentiation. Colleges that, in 2000, offered associate degrees or lower or offered more student services were more likely to imitate during the study period. Conversely, for-profit colleges that awarded bachelor's degree, bachelor's degree or higher, offer academic programs were less likely to imitate during the study period, likely because they already share many characteristics with traditional colleges. Colleges that offered nontraditional academic calendars, or had many branches, were also less likely to imitate.

Despite differences in organizational characteristics associated with the likelihood to use differentiation and imitation among for-profit colleges, imitation is positively associated with differentiation, and vice versa (Models 3 and 6, respectively). These positive associations likely capture the multi-pronged approach of for-profit colleges, which simultaneously try to legitimize their programs through imitation but distinguish themselves from non-profit colleges through differentiation.

Table 1.4: Coefficients from multilevel logit models predicting the use of differentiation and imitation strategies at accredited for-profit colleges in 2000-2010.

Model #	1	2	3	4	5	6	7	8	9
Strategy:	Differentiation		Imitation				Differentiation only vs. none	Imitation only vs. none	Differentiation & imitation vs. none
Organizational strategy:									
Imitation			0.30**						
			(0.046)						
Differentiation						0.27**			
						(0.058)			
Characteristics in 2001:									
Educational offerings in 2001									
Level of institution in 2001 (< 2 year=0)									
2-year college		-0.20*	-0.20*		0.18	0.19	-0.19+	0.01	0.09
		(0.091)	(0.091)		(0.290)	(0.290)	(0.103)	(0.324)	(0.345)
4-year college		-0.10	-0.16		2.02*	2.04*	-0.55	1.65	2.27*
		(0.331)	(0.328)		(1.021)	(1.021)	(0.435)	(1.136)	(1.081)
Highest degree offered in 2001 (certificate=0)									
AA		0.15+	0.13		0.84**	0.83**	0.03	0.79*	1.02**
		(0.088)	(0.088)		(0.280)	(0.279)	(0.101)	(0.311)	(0.333)
BA		0.07	0.13		-1.70	-1.72+	0.42	-1.57	-1.68
		(0.335)	(0.332)		(1.039)	(1.039)	(0.433)	(1.161)	(1.107)
Above BA		-0.61+	-0.55		-1.97+	-1.94+	-0.28	-1.46	-2.78*
		(0.350)	(0.347)		(1.089)	(1.089)	(0.449)	(1.213)	(1.182)
Offer academic programs		-0.00	0.06		-1.94**	-1.94**	0.07	-2.15**	-2.31**
		(0.054)	(0.055)		(0.184)	(0.184)	(0.060)	(0.207)	(0.236)
Offer occupational training		-0.26**	-0.28**		0.25	0.27	-0.28**	0.41	-0.03
		(0.065)	(0.065)		(0.221)	(0.220)	(0.070)	(0.256)	(0.266)
Mismatch between level of college and predominant degree awarded		0.00	0.00		-0.28	-0.28	-0.00	-0.17	-0.18
		(0.070)	(0.069)		(0.220)	(0.220)	(0.080)	(0.248)	(0.258)
Special educational offerings in 2001:									
Weekend classes		-0.16	-0.16		0.29	0.30	-0.07	0.15	-0.17
		(0.103)	(0.102)		(0.319)	(0.319)	(0.112)	(0.363)	(0.387)
Distance education		0.04	0.03		0.47+	0.47+	0.00	0.45	0.57+
		(0.086)	(0.085)		(0.273)	(0.273)	(0.095)	(0.313)	(0.322)
Number of other student services offered		-0.15**	-0.16**		0.19**	0.20**	-0.15**	0.19**	-0.05
		(0.019)	(0.019)		(0.061)	(0.061)	(0.021)	(0.068)	(0.074)

Non traditional academic calendars	-0.34**	-0.33**	-0.84**	-0.82**	-0.41**	-0.93**	-0.90**
	(0.056)	(0.055)	(0.176)	(0.176)	(0.063)	(0.196)	(0.211)
Finance and management in 2001:							
Share of non-instruction employees (0-25%=0)							
25-50%	-0.10	-0.11+	0.40+	0.41+	-0.05	0.58*	0.05
	(0.063)	(0.062)	(0.219)	(0.219)	(0.067)	(0.251)	(0.256)
51-75%	-0.27**	-0.28**	0.40+	0.41+	-0.26**	0.59*	-0.04
	(0.067)	(0.066)	(0.228)	(0.228)	(0.072)	(0.261)	(0.268)
Over 75%	-0.11+	-0.12+	0.40+	0.41+	-0.08	0.63*	0.09
	(0.067)	(0.067)	(0.232)	(0.232)	(0.072)	(0.266)	(0.274)
Share of expenses on non-instruction activities (0-25%=0):							
25-50%	0.03	0.04	0.09	0.08	0.11	0.25	-0.40
	(0.095)	(0.095)	(0.335)	(0.335)	(0.102)	(0.373)	(0.397)
51-75%	-0.18*	-0.18*	0.51+	0.51+	-0.17+	0.50	-0.01
	(0.083)	(0.083)	(0.293)	(0.293)	(0.089)	(0.327)	(0.339)
over 75%	-0.33**	-0.33**	0.31	0.32	-0.33**	0.28	-0.31
	(0.084)	(0.084)	(0.295)	(0.295)	(0.090)	(0.329)	(0.342)
Number of brunches	0.09**	0.09**	-0.10**	-0.10**	0.10**	-0.07*	-0.00
	(0.006)	(0.006)	(0.024)	(0.024)	(0.007)	(0.028)	(0.027)
Structural characteristics:							
Size of institution (less than 50 students=0)							
51-100 students	-0.08	-0.06	-0.32+	-0.32+	-0.06	-0.41*	-0.47+
	(0.077)	(0.077)	(0.171)	(0.170)	(0.082)	(0.209)	(0.250)
101-500 students	-0.01	-0.01	0.16	0.17	0.00	0.20	0.13
	(0.070)	(0.069)	(0.168)	(0.168)	(0.075)	(0.204)	(0.233)
501-1000 students	0.23**	0.19*	0.80**	0.79**	0.21*	0.98**	1.22**
	(0.081)	(0.081)	(0.189)	(0.189)	(0.090)	(0.230)	(0.262)
1001-2000 students	0.45**	0.41**	0.98**	0.96**	0.36**	1.12**	1.83**
	(0.087)	(0.087)	(0.204)	(0.204)	(0.098)	(0.250)	(0.280)
Over 2k students	0.54**	0.48**	1.37**	1.35**	0.47**	1.60**	2.29**
	(0.101)	(0.101)	(0.236)	(0.235)	(0.114)	(0.291)	(0.318)
Geographic region (New England=0)							
Mid East	-0.19*	-0.18+	-0.68*	-0.67*	-0.17+	-0.66+	-0.93*
	(0.093)	(0.092)	(0.308)	(0.308)	(0.100)	(0.339)	(0.375)
Great Lakes	-0.00	-0.00	-0.13	-0.13	-0.01	-0.15	-0.09
	(0.094)	(0.093)	(0.312)	(0.312)	(0.101)	(0.346)	(0.374)
Plains	0.18+	0.16	0.69*	0.68*	0.18	0.72+	0.73+
	(0.105)	(0.105)	(0.344)	(0.343)	(0.115)	(0.381)	(0.409)
Southeast	0.15+	0.14	0.46	0.45	0.13	0.39	0.47

		(0.089)	(0.089)		(0.294)	(0.294)	(0.097)	(0.326)	(0.352)
Southwest		0.06	0.05		0.49	0.48	0.05	0.46	0.48
		(0.095)	(0.094)		(0.313)	(0.313)	(0.103)	(0.346)	(0.373)
Rocky Mountains		0.09	0.08		0.81*	0.80*	0.08	0.73+	0.66
		(0.119)	(0.119)		(0.388)	(0.388)	(0.130)	(0.432)	(0.458)
Far West		-0.01	0.00		-0.10	-0.10	0.05	-0.09	-0.48
		(0.093)	(0.092)		(0.306)	(0.306)	(0.100)	(0.337)	(0.372)
Outlying Areas		-0.59**	-0.57**		-0.71	-0.68	-0.59**	-0.69	-1.46*
		(0.140)	(0.139)		(0.445)	(0.444)	(0.150)	(0.483)	(0.581)
Competition (# of community colleges in zip code)		0.01	0.01		0.06	0.06	0.02	0.09+	0.05
		(0.017)	(0.017)		(0.038)	(0.038)	(0.019)	(0.046)	(0.055)
Year (2001=0)									
2002		0.13+	0.13+		0.20	0.19	0.11	0.14	0.42*
		(0.067)	(0.067)		(0.123)	(0.123)	(0.071)	(0.159)	(0.188)
2003		0.06	0.06		0.36**	0.36**	0.07	0.46**	0.33+
		(0.068)	(0.068)		(0.123)	(0.123)	(0.073)	(0.155)	(0.192)
2004		0.03	0.02		0.54**	0.53**	-0.01	0.54**	0.56**
		(0.069)	(0.069)		(0.122)	(0.122)	(0.074)	(0.155)	(0.187)
2005		0.08	0.07		0.56**	0.55**	0.11	0.70**	0.59**
		(0.069)	(0.069)		(0.122)	(0.122)	(0.074)	(0.155)	(0.192)
2006		-0.10	-0.11		0.79**	0.79**	-0.03	1.01**	0.39+
		(0.071)	(0.071)		(0.121)	(0.121)	(0.076)	(0.151)	(0.199)
2007		-0.15*	-0.17*		0.87**	0.87**	-0.19*	0.97**	0.63**
		(0.071)	(0.071)		(0.121)	(0.122)	(0.079)	(0.153)	(0.190)
2008		-0.06	-0.09		1.05**	1.05**	-0.12	1.07**	0.93**
		(0.071)	(0.071)		(0.121)	(0.121)	(0.079)	(0.155)	(0.185)
2009		-0.12	-0.15*		1.24**	1.25**	-0.12	1.38**	0.99**
		(0.072)	(0.072)		(0.122)	(0.122)	(0.081)	(0.154)	(0.189)
2010		0.27**	0.24**		1.21**	1.20**	0.31**	1.35**	1.21**
		(0.070)	(0.070)		(0.122)	(0.122)	(0.077)	(0.157)	(0.190)
Constant	-0.90**	-0.90**	0.00	-3.04**	-4.45**	-4.58**	-0.04	-4.99**	-3.65**
	(0.022)	(0.022)	(0.169)	(0.074)	(0.550)	(0.550)	(0.183)	(0.627)	(0.667)
Observations	20,522	20,522	20,522	20,522	20,522	20,522	17296	14,244	13338
Number of institutions	2,330	2,330	2,330	2,330	2,330	2,330	2280	2274	2268
Model chi-square		869.0	914.3		645.9	663.8	800.3	505.4	420.4
Log Likelihood	-12435	-11991	-11970	-6718	-6359	-6348	-9930	-4332	-2992
ICC	0.12	0.04	0.03	0.64	0.57	0.57	0.04	0.60	0.57

Notes: Standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
Source: IPEDS 2000-2010

Models 5 through 8 in Table 1.4 estimate the likelihood of using each specific strategy— differentiation only, imitation only, and imitation and differentiation— compared to no strategy. The results from these models are markedly similar to those obtained from Models 1 through 4, but they also indicate that characteristics associated with the use of imitation are also associated with the simultaneous use of both imitation and differentiation. This pattern reflects the popularity of differentiation strategies among for-profit colleges observed in Table 1.2 and 1.3. It may even represent conformity to emerging norms in the for-profit sector during this time period. Online courses, for example, may have become the new standard for increasing student choice among for-profit colleges.

The overall conclusion from the above analyses is that the diversity in the characteristics of for-profit colleges in the beginning of the decade is associated with differences in the strategies they used throughout the decade in order to attract students. In the next section, I address the payoff (in terms of enrollments) to each of the four strategies.

Differentiation, imitation and growth in the for-profit sector

I proceed by fitting a series of multilevel mixed-effects models predicting yearly organizational growth as a function of the institution' organizational strategy in each year (Table 1.5). The organizational strategy indicator in these models is estimated as a random effect, which allows the effect to vary by institution.

Implementing any strategy, relative to the reference category of no strategy, is associated with higher yearly growth rate (Model 1, Table 1.5). However, the coefficients from this model also suggest variation between the different strategies: differentiation only was associated with an increase of about 3 percentage points in the average growth relative to no differentiation

and/or imitation alone (b=0.03, se=0.011). The average growth rate at colleges that used only imitation was 4 percentage points higher than that of colleges that implemented no differentiation or imitation strategy (b=0.04, se=.014). The largest gains in enrollment were at colleges that used differentiation and imitation simultaneously. Specifically, the average yearly growth at these colleges was 11 percentage points higher than that of for-profit colleges that did not implement differentiation or imitation (b=.11, se=.029). This pattern is similar in Model 2, which adjusts for year. The coefficients maintain their magnitude in Model 2, indicating that overall yearly trends in the for-profit sector do not account for the strategy-enrollment associations.

The next two models in Table 1.5 offer robustness checks on these estimates. Model 3 adds interaction terms between year and strategy, which allow the effect of strategy to vary by year, and Model 4 adds adjustments for the comprehensive set of organizational, academic and structural characteristics of colleges described above. The magnitude and direction of the coefficients in Model 3 and Model 4 are again very similar to those in Model 1. Differences in the organizational and structural characteristics observed at time 1 (i.e., Table 1.1) do not account for the effect of organizational strategy on growth.

It could be, of course, that the patterns of association between strategy and enrollment are driven by unobserved differences between colleges. To minimize the potential impact of omitted variables on the estimations, I re-estimated the effect of organizational strategy on enrollment growth using fixed-effects for colleges, which distinguishes the variance in the outcome associated with organizational characteristics from the variance by strategy and year. The main benefit of these models is that they estimate effects within groups, therefore minimizing the impact of unobserved between-group differences. The assumption of the model is that the effect

of strategy is similar for all colleges adopting that strategy; this is the opposite assumption of mixed-effects models, in which strategy was estimated as a random effect (Allison 2009). The coefficients and estimations of average growth from the fixed-effects models (see Appendix 1.C) are very similar to those obtained from the mixed-effects models, indicating that unobserved characteristics of colleges likely do not account for the differences in the growth associated with organizational strategies.

The impact of the different strategies on organizational expansion is evident in Figure 1.3, which graphs the estimated average yearly growth of for-profit colleges that implemented different strategies and 95% confidence intervals on the estimates, both based on the fully adjusted mixed-effect model (Model 4, Table 1.5). These estimates are standardized to reflect the characteristics of the average for-profit college in the sample. The variation in average yearly growth associated with each strategy is clear: The adjusted average yearly growth of colleges that did not use any differentiation or imitation strategy between 2000 and 2010 was 12%. To compare, the adjusted average yearly growth of for-profit colleges was 15% among colleges that used only differentiation strategies (though this difference is not statistically significant from 12%), 18% among colleges that used only imitation, and 24% among colleges that used imitation and differentiation simultaneously.

Table 1.5: Coefficients from multilevel mixed-effects a models predicting yearly growth in enrollment at for-profit colleges. All for-profit colleges that were operational in 2000

Model #:	1	2	3	4
Organizational strategy (no differentiation/imitation=0):				
Differentiation only	0.03*	0.03**	0.05	0.06
	(0.011)	(0.011)	(0.053)	(0.053)
Imitation only	0.04**	0.06**	0.23*	0.22*
	(0.014)	(0.014)	(0.104)	(0.104)
Differentiation & imitation	0.11**	0.12**	0.39+	0.36+
	(0.029)	(0.029)	(0.209)	(0.209)
Year (2001=0):				
2002		-0.11**	-0.07*	-0.08*
		(0.028)	(0.031)	(0.031)
2003		-0.17**	-0.13**	-0.14**
		(0.025)	(0.028)	(0.027)
2004		-0.17**	-0.15**	-0.17**
		(0.025)	(0.026)	(0.026)
2005		-0.21**	-0.18**	-0.20**
		(0.024)	(0.026)	(0.026)
2006		-0.28**	-0.24**	-0.26**
		(0.023)	(0.024)	(0.025)
2007		-0.25**	-0.21**	-0.23**
		(0.024)	(0.026)	(0.027)
2008		-0.18**	-0.16**	-0.18**
		(0.025)	(0.025)	(0.025)
2009		-0.16**	-0.14**	-0.17**
		(0.025)	(0.027)	(0.027)
2010		-0.29**	-0.25**	-0.28**
		(0.024)	(0.025)	(0.025)
Year*strategy interactions:				
2002*Differentiation only			-0.07	-0.08
			(0.063)	(0.063)
2002*Imitation only			-0.22+	-0.23*
			(0.114)	(0.113)
2002*differentiation & imitation			-0.10	-0.10
			(0.279)	(0.278)
2003*Differentiation only			-0.04	-0.05
			(0.059)	(0.059)
2003*Imitation only			-0.13	-0.14
			(0.125)	(0.124)
2003*Differentiation & imitation			-0.36+	-0.36+
			(0.214)	(0.214)
2004*Differentiation only			0.01	-0.00
			(0.062)	(0.062)
2004*Imitation only			-0.14	-0.14
			(0.111)	(0.111)
2004*Differentiation & imitation			-0.27	-0.26
			(0.229)	(0.228)
2005*Differentiation only			-0.06	-0.06

			(0.058)	(0.058)
2005*Imitation only			-0.15	-0.15
			(0.125)	(0.125)
2005*Differentiation & imitation			-0.28	-0.28
			(0.213)	(0.213)
2006*Differentiation only			-0.05	-0.06
			(0.056)	(0.055)
2006*Imitation only			-0.21*	-0.21*
			(0.107)	(0.107)
2006*Differentiation & imitation			-0.27	-0.27
			(0.211)	(0.210)
2007*Differentiation only			-0.01	-0.01
			(0.061)	(0.060)
2007*Imitation only			-0.26*	-0.27*
			(0.106)	(0.106)
2007*Differentiation & imitation			-0.34	-0.33
			(0.210)	(0.209)
2008*Differentiation only			0.02	0.01
			(0.065)	(0.065)
2008*Imitation only			-0.16	-0.17
			(0.108)	(0.108)
2008*Differentiation & imitation			-0.26	-0.26
			(0.228)	(0.227)
2009*Differentiation only			0.02	-0.00
			(0.062)	(0.061)
2009*Imitation only			-0.15	-0.17
			(0.110)	(0.110)
2009*Differentiation & imitation			-0.31	-0.31
			(0.212)	(0.211)
2010*Differentiation only			-0.04	-0.04
			(0.057)	(0.057)
2010*Imitation only			-0.21+	-0.22*
			(0.108)	(0.108)
2010*Differentiation & imitation			-0.37+	-0.37+
			(0.215)	(0.214)
Organizational and academic characteristics in 2000:	No	No	No	Yes
Structural characteristics	No	No	No	Yes
Constant	0.12**	0.30**	0.27**	0.17**
	(0.005)	(0.021)	(0.023)	(0.048)
Observations	20,522	20,522	20,522	20,522
Number of colleges	2,330	2,330	2,330	2,330
Model chi-square	25.44	361.7	472.2	823.3
df	3	12	39	72
Log Likelihood	-19477	-19293	-19264	-19127

Notes: Standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
Source: IPEDS 2000-2010

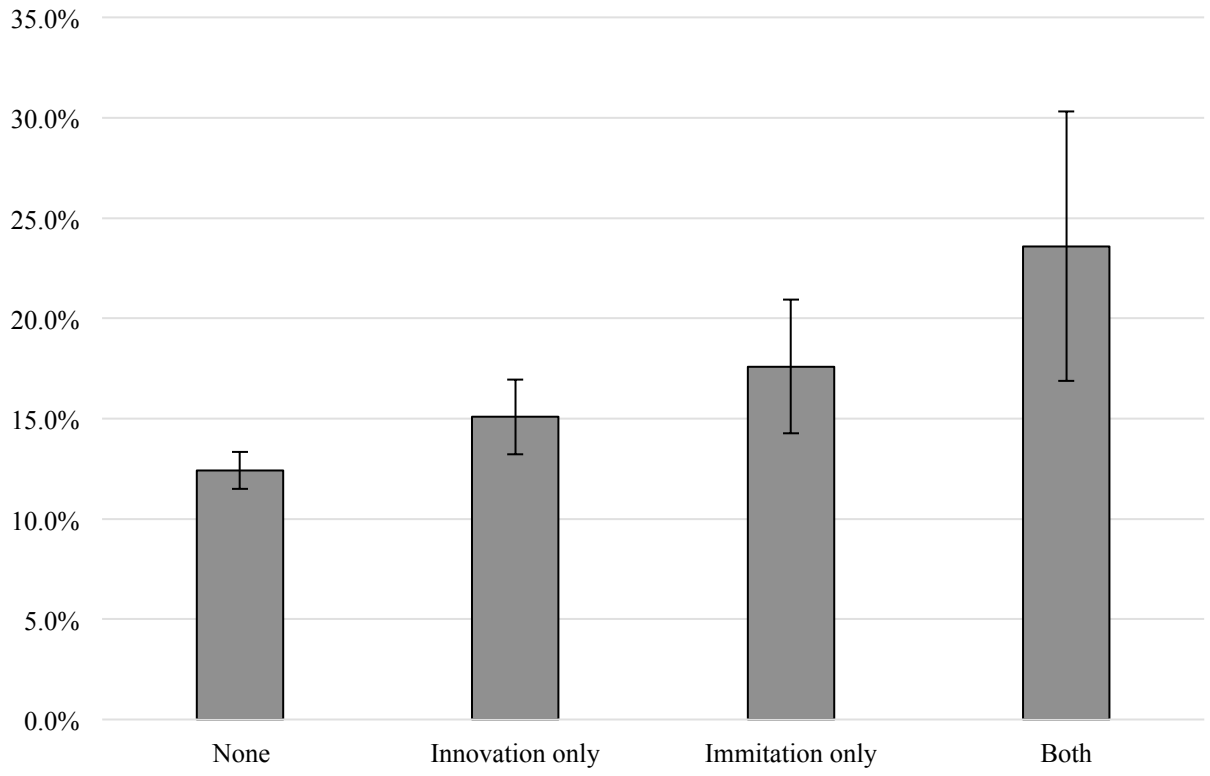

Figure 1.3: Adjusted average yearly growth in enrollment at for-profit colleges 2000-2010, by organizational strategy
Source: IPEDS
Notes: the bars denote the 95% confidence intervals of the adjusted average

The long-term effects of differentiation and imitation on growth

The preceding results pertain to short-term enrollment gains or declines. In this section, I examine the impact of long-term organizational strategies (measured as the occurrences of differentiation, imitation or both over 5- and 10-year periods) on cumulative growth. To ensure consistency, I estimate the effect of 5-year strategy on 5-year growth only for the subset of colleges that were included in the sample between 2000 and 2006 (N=2,054), and 10-year strategy for the subset of colleges that were included in the sample for all the years between 2000-2010 (N=1,827).

The distribution of long-term 5- and 10- year strategies, presented in Table 1.6, reflects the prominence of differentiation in the for-profit sector. Differentiation alone was the dominant long-term 5- and 10-year strategy (51 percent of the 5-year sample, and 46 percent of the 10-year sample), while using imitation alone was the least used strategy (only 6 percent of the 5-year sample, and 3 percent of the 10-year sample). Using both differentiation and imitation over time is frequent in both sub-samples, characterizing 28 percent of the colleges in the 5-year sample, and 47 percent of the colleges in the 10-year sample. Only 16 percent of the colleges in the 5-year and 5 percent of the 10-year sample did not either imitate or innovate. It is possible, of course, that the colleges that failed to adapt also failed as organizations, and dropped out of the 5-year or 10-year samples. At least among for-profit colleges that survive, however, flexibility and adaptation is common.

Table 1.6: Proportion of for-profit colleges using 5- and 10-year different differentiation/imitation strategies.

	5-year strategy	10-year strategy
Organizational strategy:		
None	0.158	0.049
Differentiation only	0.508	0.456
Imitation only	0.056	0.028
Differentiation & imitation	0.278	0.467

Notes: N=2054 for 5-year strategy; N=1827 for 10 year strategy

I fit a series of linear models predicting 5- and 10-year growth based on long-term organizational strategies in each subsample (see Table 1.7). For each sample, I first estimate growth as a function of the long-term strategy alone (Model 1 and Model 3, Table 1.7), and then adjust these estimations for organizational and structural characteristics (see Model 2 and 4, respectively).

Turning first to the 5-year enrollment growth models, I find that colleges that innovated and imitated simultaneously experienced much faster growth than colleges that used no differentiation or imitation, b=.99, se=.164). Imitation only also had a positive effect on long-term growth (b=.66, se=.256), although the coefficient is slightly (and not significantly) smaller than for both differentiation and imitation. The coefficient for differentiation only, which was the most common long-term strategy in the field, is small and not statistically significant. These patterns hold even when the characteristics of the colleges are taken into account.

Table 1.7: Coefficients from a OLS model predicting 5- and 10-year growth between 2000-2005, and 2000-2010. Accredited for-profit colleges that were operational in 2000.

	5-year strategy and growth		10-year strategy and growth	
Model #	1	2	3	4
Organizational strategy (none=0)				
Differentiation only	0.24	0.26+	0.54	0.53
	(0.150)	(0.154)	(0.431)	(0.431)
Imitation only	0.66*	0.80**	0.65	0.72
	(0.256)	(0.259)	(0.680)	(0.681)
Both differentiation and imitation	0.99**	1.15**	1.99**	2.08**
	(0.164)	(0.173)	(0.430)	(0.436)
Organizational and academic characteristics in 2000	No	Yes	No	Yes
Structural characteristics	No	Yes	No	Yes
Constant	0.58**	0.90+	0.71+	1.62+
	(0.131)	(0.507)	(0.409)	(0.924)
Observations	2,054	2,054	1,827	1,827
R-squared	0.024	0.058	0.036	0.077

Notes: Standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
Source: IPEDS 2000-2010

The models for 10-year strategy and growth tell an even clearer story about the effectiveness of long term strategies of synthesis: only colleges that used both imitation and differentiation over the 10-year period experienced growth that was significantly greater than colleges that did not imitate or differentiate. Given the prominence of differentiation only long-term strategies in the 10-year sample, the small magnitude of the differentiation alone coefficient, and its large standard error provides compelling evidence that long-term strategies that focus on differentiation alone were not effective in promoting growth among for-profit colleges.

Table 1.8 reports the estimated 5-year and 10-year growth in enrollment, by long-term strategy. These predictions are estimated based on Model 2 and 4, and are adjusted to reflect the characteristics of the average college in the for-profit sector in 2000. Colleges that used long-

Table 1.8: Adjusted 5- and 10-year growth by long-term differentiation and imitation strategies.

	Adjusted average growth since 2001	SE	95% Confidence intervals	
Panel A: 5-year strategy and growth				
None	52%	0.135	26%	79%
Differentiation only	79%	0.074	64%	93%
Imitation only	132%	0.222	89%	176%
Differentiation & imitation	167%	0.103	147%	187%
Panel B: 10-year strategy and growth				
None	67%	0.410	-14%	147%
Differentiation only	120%	0.140	92%	147%
Imitation only	139%	0.546	31%	246%
Differentiation & imitation	274%	0.138	247%	302%

Notes: Estimations are based on Model 2 & 4 in Table 7. Standardized to reflect the characteristics of the average for-profit college in 2000
Source: IPEDS 2000-2010

term imitation strategies experienced 132 percent growth, on average, in the 5-year sample, and 139 percent growth in the 10-year sample. However, the large confidence intervals reflect the uncertainty associated with these estimations, primarily due to the small share of colleges that used only imitation. The adjusted average growth experienced by colleges that used differentiation only was 79 percent in the 5-year sample and 120 percent in the 10-year sample. Yet, the 95 percent confidence intervals for this estimation overlap with that of the growth experienced by for-profit colleges that did not use imitation or differentiation. In both samples, the adjusted growth of for-profit colleges that imitated and differentiated exceeded that of colleges that used one or neither strategy. More specifically, the dual-strategy organizations experienced 167 percent 5-year growth and 274 percent 10-year growth. The 95 percent confidence intervals of these estimations suggest that there is a significant difference in the growth of for-profit colleges that only used differentiation from those that used differentiation and imitation.

Taken together, these results provide compelling evidence for the effectiveness of using both differentiation and imitation to promote enrollment growth. These results are consistent when applied as short-term or long-term strategy (i.e., Figure 1.2 and Table 1.8). Nonetheless, it is important to consider the possibility of selection. Although the fixed-effect models discussed above suggest that unobserved characteristics of colleges are not driving these results, they do not rule out the possibility entirely. It may be, for example, that variation in the quality of services offered by different schools correlates with organizational strategy. If for-profit colleges that imitate and differentiate are also more likely to provide higher quality services, this variation may account for some of their enrollment growth.

In order for unobserved variation in quality to conflict with the results presented here, quality should not be correlated with other academic, structural and organizational characteristics accounted for in the model. This would suggest that quality of services is not correlated with the organizational expenditures, employees, other academic offerings and so forth. This is empirically possible, but seems unlikely. Nonetheless, the effects of strategy should be interpreted as markers for organizational strategies and activities that are associated with enrollment growth, rather than fully identified causal mechanisms. [6]

DISCUSSION AND CONCLUSIONS

Drawing on insights from the literature on organizational strategy and institutional theory, this paper examined variation in organizational changes among for-profit colleges that resulted from differentiation and imitation strategies, and their association with enrollment growth at for-profit colleges. It shows that for-profit colleges varied substantially in their responses to changes in their environments, including their regulatory environments and the overarching demand for college degrees. Throughout the decade, 95 percent of the for-profit colleges in the sample used at least one of the strategies, reflecting the high degree of organizational change that occurred in the sector.

The linked IPEDs data also show that cross-college variation in strategies is associated with variation in enrollment gains. Differentiation alone was not effective in promoting long-term growth, and was only slightly more effective than no differentiation or imitation strategy in promoting short-term enrollment growth. Imitation alone was more effective than differentiation

[6] As a sensitivity analyses, I estimated all models with adjustments for institutional resources (the total revenues and income of the college in each year, as reported to the Department of Education). Adjusting for resources did not alter the results in any meaningful way due to the correlation between size and resources (results are available from author).

for short-term growth. However, the colleges that used differentiation and imitation together experienced the short- and long-term greatest expansion in enrollments.

As profit-maximizing business, for-profit colleges seek to increase revenues. The massive growth in enrollment in the sector suggests that one prominent method to increase revenues (among others) was through increasing enrollment. To attain this goal, for-profit colleges look at their environments—local demand effects, supply effects, government regulations, etc.—and choose strategies that will enable them to expand. Some colleges distinguish themselves from traditional universities by incorporating innovative practices to their activity, while others draw on the legitimacy of nonprofit colleges by borrowing practices from established colleges. The most strategic ones do both. This variation implies that for-profit colleges strategically engage in forms of "impression management". Some signal to prospective students that they are different than other colleges, others open new markets by appearing similar to non-profit colleges. This variation in strategy can reflect variation in local markets and different methods to increase revenues (e.g., niche vs. mass production models), but it can also reflect the experimental organizational change. That is, rather than following pre-determined scripts for success, organizational actors experiment with different strategies.

Many existing theories of organizations focus on competition within existing markets, but stop short at considering how existing organizations can manipulate their structure in order to compete in entirely new markets. The results of this study suggest for-profit colleges expanded, at least in part, by strategically entering markets that were traditionally occupied by non-profit degree-granting colleges and universities. They did so by adopting a set of "minimum requirements" that established the legitimacy of their academic activity in the eyes of prospective students that seek academic training. In many colleges, the adoption of traditional degree

offerings had only little impact on their academic activity as the majority of students continued to receive shorter degrees. In conjunction with adoption, however, for-profit colleges also made efforts to differentiate themselves from traditional colleges by offering services that highlight student choice and learning flexibility. Together, these results indicate that actors can expand not only by competing in their own markets, but also by strategically manipulating their structure in order to compete in new markets.

The results of this study also provide new insights into to the demand-side processes that enabled the success of for-profit colleges. Perhaps the most interesting, but unanswered, question in this context is why do students, especially low-income students, choose to enroll at for-profit colleges over community colleges given their low prestige and controversial standing. This question is further complicated given the price differences between for-profit colleges and community colleges: The average tuition at for-profit colleges in 2014-15 academic year was $15,230, almost five times higher than the community college average of $3,350 (The College Board 2014; Cellini and Goldin 2012). This study suggests one possible answer, and a testable hypothesis with other data: underserved students with little information about higher education choose for-profit colleges rather than community colleges, because for-profit colleges have successfully "managed impressions" to convince students that they are more similar to traditional four-year colleges, and hence more prestigious than their two-year community colleges. This misperception is likely reinforced by the massive investments for-profit colleges make in sales and marketing, which increase their visibility to low-income students.

This study has important implications for future research and practice. First, it highlights the need to unpack how strategies of differentiation and imitation interact in meaningful ways to support the success of organizations. Teasing apart the effectiveness of differentiation and

imitation in forms, structures, and practices, for example, can promote more accurate understanding of organizational change and success and help practitioners and policymakers to lead successful organizational changes. It is possible that imitation was especially consequential in the case of for-profit colleges due to the normative environment of the higher education field, and the marginal position of for-profit colleges within that field. Using differentiation alone in a different field, or among a less controversial group of organizations, may be more effective than among for-profit colleges. Nonetheless, the results of this study underscore the importance of legitimizing differentiation in promoting the growth of marginal organizational actors in highly institutionalized fields.

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Appendix 1.A: Eligible accredited for-profit colleges that were operational in 2000 in each study year

Year	N	% of institutions that were eligible in 2001
2001	2,330	100%
2002	2,267	97%
2003	2,162	93%
2004	2,113	91%
2005	2,058	88%
2006	2,004	86%
2007	1,959	84%
2008	1,904	82%
2009	1,878	81%
2010	1,847	79%

Note: Include only for-profit colleges that were operational in 2000, and were eligible for inclusion in the sample by 2001.See main text
Source: IPEDS 2000-2010

Appendix 1.B: Organizational characteristics and offerings at for-profit colleges in 2010

	For-profit colleges in the sample	For-profit colleges that became eligible for federal financial aid after 2000
Level of the institution		
Less than 2-year	0.44	0.52
2 year	0.36	0.25
4-year	0.20	0.23
Highest degree offering:		
Certificate	0.57	0.61
AA	0.23	0.16
BA	0.13	0.13
Above BA	0.07	0.10
Mismatch between predominant degree and level of institution	0.39	0.27
Academic offering:		
Academic training	0.44	0.45
Vocational training	0.82	0.75
Student services:		
Weekend classes	0.40	0.55
Distance education	0.23	0.25
Number of student services offered	2.67	2.46
Non-traditional calendars	0.73	0.72
Size (measured in 12-months enrollment)	1376.91 (12098.72)	930.51 (5402.24)

Appendix 1.C: Coefficients from fixed-effects models predicting yearly growth in enrollment at accredited for-profit colleges

Model #	1	2	3	4
Organizational strategy (no differentiation or imitation=0)				
Differentiation only	0.00	0.01	0.03	0.03
	(0.012)	(0.011)	(0.033)	(0.032)
Imitation only	0.01	0.04*	0.17**	0.22**
	(0.019)	(0.019)	(0.058)	(0.057)
Differentiation & imitation	0.05*	0.08**	0.39**	0.40**
	(0.023)	(0.023)	(0.072)	(0.070)
Year (2001=0)				
2002		-0.11**	-0.07**	-0.09**
		(0.018)	(0.024)	(0.023)
2003		-0.17**	-0.13**	-0.18**
		(0.019)	(0.024)	(0.023)
2004		-0.17**	-0.16**	-0.22**
		(0.019)	(0.024)	(0.024)
2005		-0.22**	-0.18**	-0.25**
		(0.019)	(0.025)	(0.024)
2006		-0.28**	-0.24**	-0.31**
		(0.019)	(0.025)	(0.024)
2007		-0.26**	-0.22**	-0.28**
		(0.019)	(0.025)	(0.024)
2008		-0.18**	-0.17**	-0.25**
		(0.019)	(0.025)	(0.025)
2009		-0.17**	-0.15**	-0.25**
		(0.020)	(0.026)	(0.025)
2010		-0.30**	-0.26**	-0.37**
		(0.020)	(0.027)	(0.026)
Year*strategy interactions				
2002*Differentiation only			-0.06	-0.06
			(0.045)	(0.044)
2002*Imitation only			-0.18*	-0.24**
			(0.080)	(0.078)
2002*Differentiation & imitation			-0.17+	-0.16+
			(0.096)	(0.094)
2003*Differentiation only			-0.05	-0.04
			(0.046)	(0.045)
2003*Imitation only			-0.12	-0.14+
			(0.077)	(0.075)
2003*Differentiation & imitation			-0.40**	-0.42**
			(0.098)	(0.096)
2004*Differentiation only			0.03	0.02
			(0.047)	(0.046)
2004*Imitation only			-0.09	-0.13+
			(0.077)	(0.075)
2004*Differentiation & imitation			-0.35**	-0.33**
			(0.094)	(0.092)
2005*Differentiation only			-0.06	-0.06
			(0.047)	(0.046)
2005*Imitation only			-0.10	-0.15*
			(0.076)	(0.074)
2005*Differentiation & imitation			-0.32**	-0.32**
			(0.097)	(0.095)
2006*Differentiation only			-0.06	-0.05

			(0.048)	(0.047)
2006*Imitation only			-0.18*	-0.23**
			(0.073)	(0.072)
2006*Differentiation & imitation			-0.36**	-0.40**
			(0.102)	(0.100)
2007*Differentiation only			-0.00	-0.00
			(0.049)	(0.048)
2007*Imitation only			-0.23**	-0.28**
			(0.074)	(0.073)
2007*Differentiation & imitation			-0.41**	-0.43**
			(0.095)	(0.093)
2008*Differentiation only			0.01	0.00
			(0.050)	(0.048)
2008*Imitation only			-0.10	-0.17*
			(0.074)	(0.073)
2008*Differentiation & imitation			-0.35**	-0.37**
			(0.092)	(0.090)
2009*Differentiation only			-0.00	-0.02
			(0.050)	(0.049)
2009*Imitation only			-0.12+	-0.21**
			(0.072)	(0.071)
2009*Differentiation & imitation			-0.34**	-0.37**
			(0.092)	(0.090)
2010*Differentiation only			-0.04	-0.04
			(0.048)	(0.047)
2010*Imitation only			-0.16*	-0.22**
			(0.074)	(0.072)
2010*Differentiation & imitation			-0.41**	-0.45**
			(0.091)	(0.089)
Organizational and academic characteristics in 2000:	N/A	N/A	N/A	N/A
Structural characteristics	No	No	No	Yes
Constant	0.14***	0.31**	0.28**	-0.41**
	(0.006)	(0.014)	(0.017)	(0.034)
Observations	20,522	20,522	20,522	20,522
Number of colleges	2,330	2,330	2,330	2,330
Model chi-square	.	.	.	.
df	2332	2341	2368	2374
Log Likelihood	-18176	-17968	-17938	-17474

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

STUDY 2:

COLLEFE FOR ALL, DEGREES FOR FEW: FOR-PROFIT COLLEGES AND SOCIOECONOMIC INEQUALITY IN DEGREE ATTAINMENT

ABSTRACT

The recent expansion of for-profit colleges in US higher education has ignited much debate over the potential contributions, and limitations, of profit-maximizing educational businesses to socioeconomic inequality. For-profit colleges may offer innovative services to their students in order to compete with more established institutions, but they may also seek to increase revenues in ways that are not beneficial for student outcomes. Using detailed longitudinal information on a nationally representative sample of recent high school sophomores (ELS 2002), this paper assesses whether and how for-profit colleges impact socioeconomic inequality in student outcomes, measured as the attainment of bachelor's degrees. Results suggest that for-profit colleges are important for socioeconomic disparities in higher education: low-SES students that attend for-profit colleges as their first institution are significantly less likely than observationally similar students who attend non-profit open admission colleges to earn a bachelor's degree. The likelihood of high-SES students to earn a bachelor's degree, by contrast, is not affected by enrollment at for-profit colleges. These findings suggest that for-profit colleges contribute to the maintenance of socioeconomic disadvantage, in that low-SES students with mobility aspirations are paying more for their education and yet are less likely to reap the benefits of their investment.

INTRODUCTION

One of the most dramatic recent changes in higher education has been the expansion of the for-profit sector during the first decade of the 21st century (Deming, Golding and Katz 2012; Tierney and Hentschke 2007; Brenerman, Pusser and Turner 2006). Enrollments in all types of postsecondary institutions increased by about 35 percent from 2000 to 2010, rising from 22 million students to nearly 30 million students. Yet, enrollment at for-profit colleges increased by 400 percent during this time period: from one million students to over four million in 2010. By comparison, enrollment at public and private non-profit colleges increased by only 22 percent during that time.[1] By 2010, 14.7 percent of all students in higher education were enrolled at for-profit colleges, up from only 4 percent in 2000 (NCES 2012: Table 4).

The rapid growth of the for-profit sector in US higher education ignited much debate over the potential contributions and limitations of profit-maximizing educational institutions to social equality. Increased competition for students in higher education, especially among institutions that differ in their organizational structure and incentives (e.g., Tierney and Hentschke 2007), may have positive implications for the educational services offered to students. For-profit colleges offer various services and products that are especially appealing to disadvantaged students, including open admission policies, flexible academic schedules and enrollment modes, a variety of in-class and online academic settings, and academic programs in career-relevant fields that can lead to bachelor's degree attainment (Tierney and Hentschke 2007). These services can improve the academic outcomes of disadvantaged students relative to other non-profit open admission colleges and subsequently reduce inequality (e.g., Ruch 2003).

[1] See Figure 2.1b. Enrollment figures are based on 12-month unduplicated headcount enrollment reports in all accredited U.S. postsecondary institutions collected by the U.S. Department of Education.

But profit-maximizing incentives can also increase socioeconomic inequality. For-profit colleges may seek to increase their revenues in ways that are not necessarily beneficial for student outcomes. For example, recent evidence indicates that for-profit colleges use eligibility for financial aid to artificially increase their tuition rates (e.g., Cellini and Goldin 2012), therefore increasing student costs and potential debt. Other evidence reveals high institutional expenditures on marketing relative to instruction, alongside a wide use of questionable and aggressive marketing methods (e.g., U.S. Senate 2012; U.S. GAO 2010). Since 2010, for-profit colleges have been criticized for their heavy reliance on federal aid money vis-à-vis high loan default rates among their students (e.g., U.S. Senate 2012; NPR 2011). Almost a quarter of federal subsidized loans and Pell Grant dollars today go to the for-profit sector (The College Board 2013: Figure 8b) and estimates suggest that about 75% of the profits of this sector come from taxpayer-funded student aid (Mettler 2014; Deming et al. 2012). Yet, the majority of students at for profit colleges do not earn degrees and many of them end up defaulting on their student loans (U.S. Senate 2012; The College Board 2013: Figure 12c).

Despite the potential impact of for-profit colleges on socioeconomic inequality, and their growing prominence in higher education, their effects on the opportunities available to disadvantaged students for upward mobility are still far from clear. To date, nearly all studies on for-profit colleges focused on comparing the labor market returns to degrees earned at for-profit institutions to those earned at non-profit institutions (e.g., Lang and Weinstein 2012; Chung 2009; Grubb 1993; Denice 2015; Cellini and Chadhary 2014). These studies, valuable though they are, tell us little about the impact of for-profit colleges on inequality since they consider only a highly select group of success stories. The majority of students at open admission

colleges, however, including those at for-profit colleges, do not earn a degree and therefore do not have access to the rewards associated with these degrees. To assess whether and how for-profit colleges impact socioeconomic inequality we need to first consider how for-profit colleges influence the opportunities of students from different social background to earn degrees.

This study provides a systematic and comprehensive assessment of the influence of for-profit colleges on socioeconomic inequality in students' academic outcomes, measured here as bachelor's degree attainment. I focus on bachelor's degree attainment for two main reasons: first, a major recent finding in the stratification literature is that bachelor's degree attainment is key for social mobility among disadvantaged students, while certificates and associate degrees have only marginal impact, if any (e.g., Torche 2011; Pfeffer and Hertel 2015). Second, the majority of growth in enrollment at the for-profit sector occurred among four-year bachelor's degree granting institutions (Kinser 2006). Thus, a focus on bachelor's degree attainment allows a clear assessment of whether for-profit colleges offer an alternative mobility path for disadvantaged students that might otherwise enroll at two-year open admission colleges.

One of the main challenges in examining the impact of for-profit colleges on students' outcomes is the non-random selection of students into institutions, which may confound the effect of the institution with that of students' characteristics. This is especially important when considering open admission institutions, like for-profit colleges, that enroll a high share of disadvantaged students who have, on average, less academic preparation and lower standardized test scores, which are also associated with students' likelihoods of earning a degree (Sirin 2005). To address these issues, this study utilizes longitudinal data on a large, nationally representative sample of students who were in the 10th grade in 2002 (the Educational Longitudinal Study of

2002, hereafter "ELS") to estimate the effect of for-profit colleges on students' outcomes. The main strength of the ELS, in addition to its recency, is that it contains the richest information available today on students' family backgrounds, high school academic preparation and performance, attitudes toward school, coursework and other attributes collected prior to their college enrollment. These data enable me to construct plausible and defensible comparison groups among students, and to tease out (to the greatest extent possible with non-experimental data) the institutional effect of for-profit colleges on students' academic outcome.

To foreshadow my results, I find that among a recent cohort of high school sophomores, (1) low-SES students were more likely than their affluent peers to attend for-profit institutions relative to other types of institutions, including non-profit open admission colleges; and (2) once enrolled, low-SES students that attended for-profit colleges were substantially less likely than their statistical counterparts in other colleges, including non-profit open admission colleges, to attain a bachelor's degree. The likelihood of students from the top-SES quartile to attain a bachelor's degree, in contrast, was not affected by attendance at for-profit colleges relative to other open admission colleges.

THEORETICAL MOTIVATION AND SIGNIFICANCE

The expansion of for-profit colleges and socioeconomic inequality

The recent expansion of for-profit colleges occurred largely in the context of rising demand for higher education across all social strata, but especially among students from the bottom SES quartile, vis-à-vis large budget cuts to community colleges and other state-funded institutions (Turner 2006). The changing landscape of higher education over the first decade of the 21st

century is well captured by Figures 1a, which graphs trends in the number of accredited institutions between 2000 and 2010, and Figure 2.1b, which graphs enrollment figures at accredited postsecondary institutions during the same time period. Enrollment at community colleges and other open admission two-year colleges stayed at the same level until about 2008 and then increased substantially (Figure 2.1b), but the number of these two-year institutions decreased steadily throughout the decade (Figure 2.1a). Declines in the availability of slots at community colleges and other two-year open admission colleges, coupled with stagnation at four year institutions with competitive admission, created high demand for slots at institutions with open admission (e.g., Kirkham 2011). Not surprisingly, for-profit colleges, which offer open admission, flourished during that time, increasing from 2,500 institutions to a peak of about to 3,500 in 2010 (see Figure 2.1a) and enjoying a 400 percent increase in enrollment: from 1.08 million in 2000 to over 4 million students in 2010 (see Figure 2.1b).

The increase in the number of slots in higher education can have important implications for socioeconomic stratification in higher education. Decades of research shows that increasing the number of slots at open admission institutions, which usually have less institutional prestige and poorer student outcomes, can enhance socioeconomic stratification by the type of institution students attend (Alon 2009; Ayalon and Shavit 2004; Arum, Gamoran and Shavit 2007; but see also Breen 2010 for a different conclusion). As more students enter higher education, competition for slots at the top institutions and programs becomes fiercer. High SES students are usually quicker to adapt to these changes, and secure themselves positions at more prestigious institutions and programs. Low-SES students, in contrast, are slower to adapt and consequently

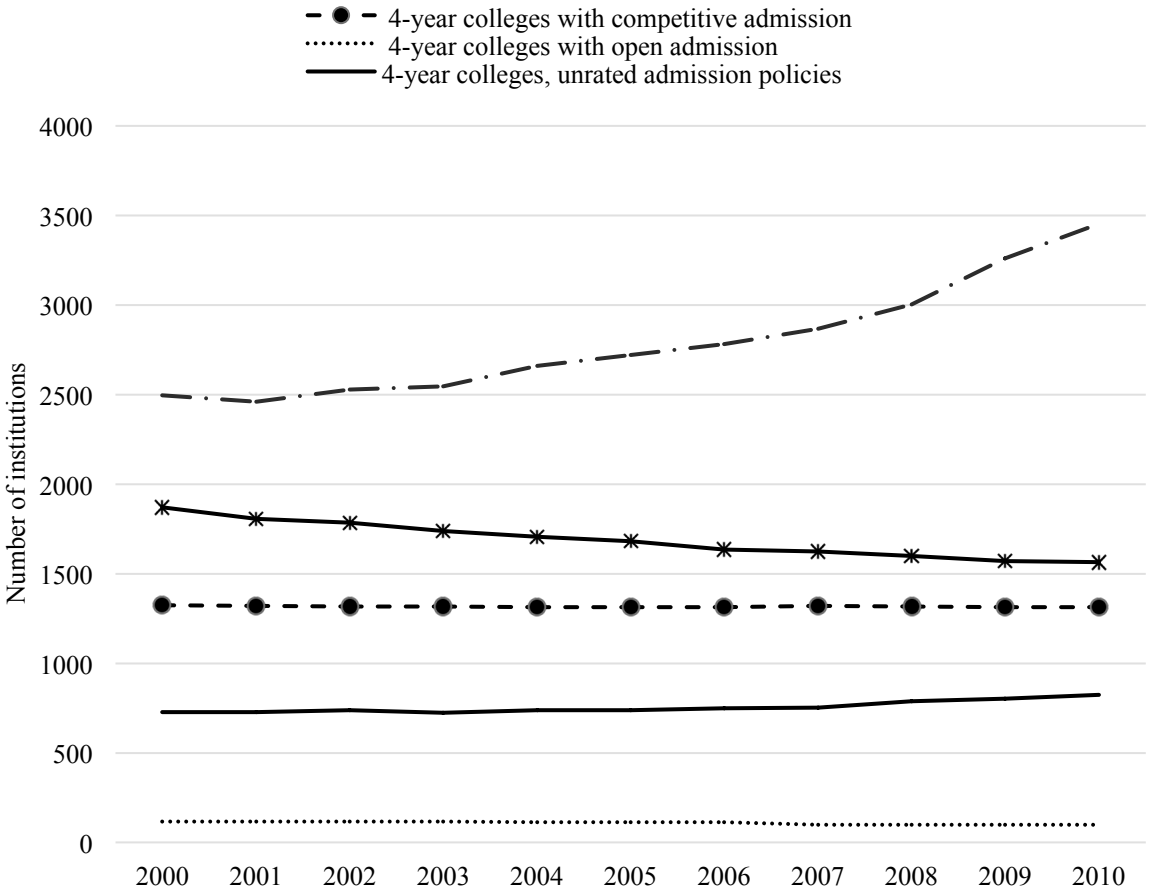

Figure 2.1a: Number of accredited postsecondary institutions 2000-2010, by type of institution
Source: IPEDS

become more concentrated at less-prestigious colleges that offer open admission (Alon 2009). By these accounts, we can expect a growing concentration of low-SES students at for-profit colleges relative to their more affluent counterparts.

The case of for-profit colleges, however, deviates from previous educational expansions in several important respects. The expansion of community colleges since the 1960s increased the diversification of postsecondary institutions by creating another tier of colleges that offered different degrees (two-year rather than four-year). The recent expansion of for-profit colleges, by contrast, diversified institution types among a preexisting category of open admission

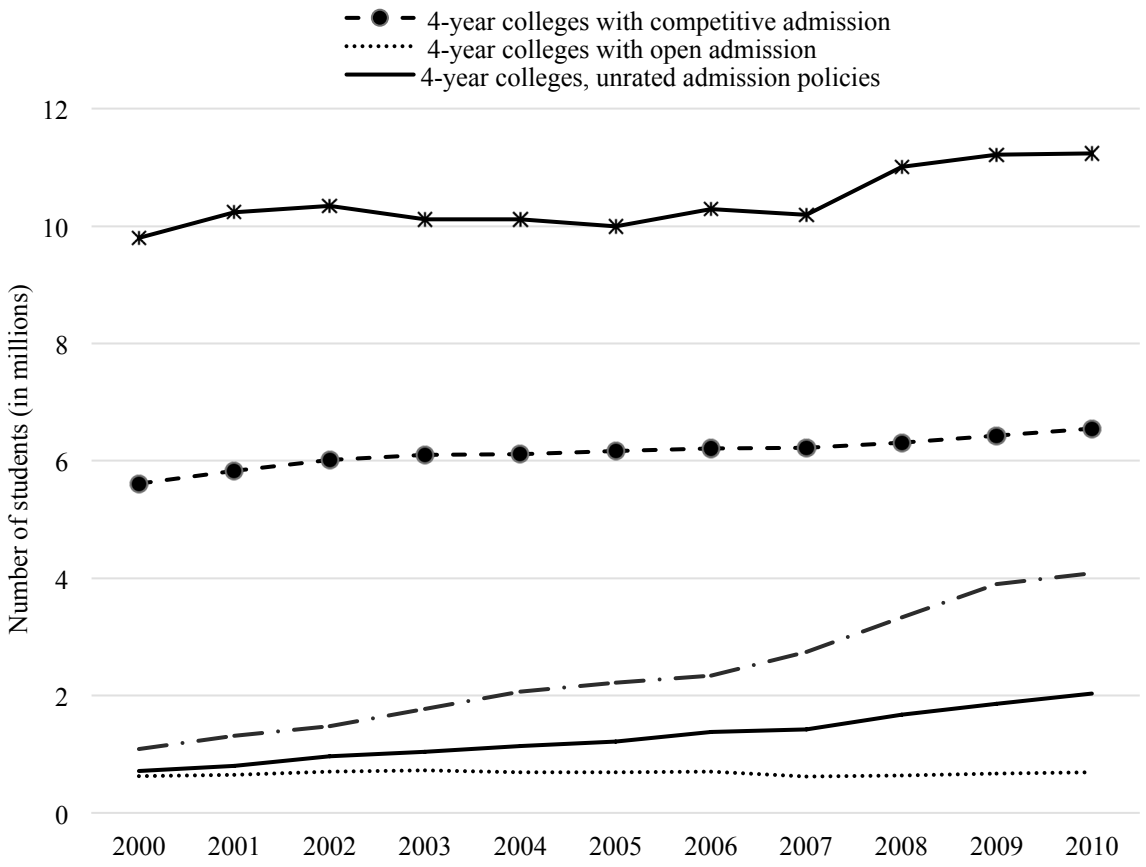

Figure 2.1b: Enrollment in accredited postsecondary institutions 2000-2010, by type of institution
Source: IPEDS
Notes: Based on 12-month unduplicated enrollment count

institutions. This diversification is not only in sector, but also in the cost of education and degrees students can pursue at open admission colleges (Kinser 2006). At $15,230, the average tuition at for-profit colleges is about five times higher than the average tuition at community college ($3,350), which can increase stress and constraints in the lives of students, especially disadvantaged students (The College Board 2014; Cellini and Goldin 2012; Cellini 2010; Goldrick-Rab 2010). Yet, unlike community colleges, which offer certificates or associates

degrees, many for-profit colleges also offer bachelor's degree level programs (Kinser 2006).[2] Between 2000 and 2010, the number of four-year degree granting for-profit institutions offering bachelor's degrees increase by 135 percent while two-year and less than two-year for-profit colleges expanded by less than 20 percent (IPEDS data, author's calculations).

The growth of the for-profit sector can change the distribution of students across different types of institutions in higher education. A concentration of low-SES students at for-profit colleges implies that low-SES students are placed at an academic environment that differs in institutional arrangements, costs and opportunities. They will, inevitably, pay more for their education. But it is yet unclear whether, and how, their educational outcomes will be impacted by these trends. The next section discusses the relationship between institution type and academic outcomes.

Enrollment at for-profit colleges and bachelor's degree attainment

Differences in college destinations can have far-reaching implications for students' degree attainment (e.g., Calcagno et al. 2008; Brand, Pfeffer and Goldrick-Rab 2014). Attending a more selective institution, for example, is positively associated with students' likelihood of earning a bachelor's degree, even when social background and academic preparation are accounted for (Alon and Tienda 2005). Similarly, Clotfelter, Ladd and Muschkin (2013) have found an association between students' graduation rates at different community colleges and the characteristics of the institutions they attend.

[2] Although there are non-profit open admission four-year institutions, they account for only a small fraction of non-profit open admission institutions in U.S higher education.

This literature struggles with the standard problem of selection and the difficulty of identifying a causal effect of the type of college students attended. Selection into institutions is not random, and compositional effects are often hard to disentangle from institutional effects with observational data. These effects are especially hard to identify when considering open admission institutions, like for-profit colleges and non-profit open admission colleges, which attract students with less academic preparation and low standardized test scores who are less likely to attain a bachelor's degree regardless of their chosen institution.

Recent scholarship has attempted to tackle the selection issue with respect to community colleges, where the goal is to estimate the causal effect (and heterogeneity in that effect) of attending a community college on degree attainment.[3] Although the majority of students who enter community colleges aspire to earn a bachelor's degree, attainment rates are quite low, much lower than for students at four-year colleges (Brand et al. 2014). Using a variety of methods to identify the effect of community colleges, scholars have put forth evidence that community colleges influence students' degree attainment rates, though evidence regarding the direction of the effect are mixed. Doyle (2009) and Rouse (1994), for example, report a strong negative effect of community colleges on baccalaureate degree attainment when compared to four-year institutions, suggesting that community colleges shift the distribution of disadvantaged students towards earning lower degrees. Leigh and Gill (2003) and Brand et al. (2014), on the other hand, report a small positive effect of community colleges on students' degree attainment compares to students who didn't go to college immediately after high school, therefore suggesting that they decrease overall inequality in degree attainment.

[3] See Breen et al. 2015 for a through discussion on the limitations of commonly used methods for the identification of heterogeneity in treatment effects.

These studies, though revealing, exemplify the tendency of most research to overlook important variation in the opportunities available to students who enter open admission colleges. For students who aspire to gain postsecondary education, but whose academic credentials are not sufficient to gain access to competitive admission colleges, the main options available to them are community colleges and for-profit colleges.

How consequential is this choice? Is there a difference between these institutions in how they influence the outcomes of their students? Similar to community colleges, the degree attainment rates of students at for-profit colleges are low, which has been the center of many critiques on the sector. Using data from the Beginning Postsecondary Students of 2004, Deming at el. (2012) estimate that only 26 percent of those initially enrolled in BA-level programs at for-profit colleges end up earning a bachelor's degree.[4] However, it is not clear whether these rates are different than those of students who attend other open admission colleges, and whether they reflect institutional effects, or the composition of the students who attend for-profit colleges. It is possible, for example, that by offering programs that lead to a bachelor's degree, for-profit colleges raises students' educational expectations and subsequently their attainment relative to other open admission colleges. On the other hand, it is possible that the organizational structure of for-profit colleges, which highlights student choice and freedom, does not offer enough support and guidance to disadvantaged students, subsequently lowering their likelihoods of earning a bachelor's degree relative to their counterparts at other open admission colleges.

The above review points to two important conclusions: first, estimating the effect of students' postsecondary institution on their outcomes requires a careful consideration of the

[4] Due to significant fluidity in degree programs at for-profit colleges these estimates are likely upwardly biased.

selection process that channel students to different institutions that will allow (to the greatest extent possible with observational data) the identification of institutional effects. Second, in order to evaluate the impact of for-profit colleges on inequality in students' outcomes, it is important to consider the opportunity structure available to students who attend these institutions and compare their impact to that of other open admission institutions.

DATA AND MEASUREMENT

Data and sample

I estimate the association between students' socioeconomic background, institution type, and likelihood of completing a bachelor's degree using the Educational Longitudinal Study (ELS), a nationally representative sample of students who were in the 10th grade in 2002. The 15,400 high school sophomores in the base year of the ELS were re-surveyed three times: in 2004, in 2006 and in 2012, when most students were eight years removed from high school. Most of the ELS respondents graduated high school in 2004 and were entering college between 2004 and 2007, during the rapid expansion of for-profit colleges (see Figures 1a and 1b). The timing of the ELS makes it therefore ideal for estimating the effects of interest.

A second and the most important strength of the ELS dataset relative to other datasets that focus on first-time college students (e.g., the BPS) is that the ELS contains rich information on students' social, economic and academic background collected from students, parents, teachers and schools *prior* to college enrollment. This information is critical for the assessment of the selection processes that channel students into different postsecondary destinations in order to identify (to the extant possible) institutional effects. The ELS also contains detailed information on the timing of entrance to postsecondary education, type of institutions students attend and the

degree they attainment. This information is collected from both students and the institutions they attended, thereby providing high quality and accurate information on students' destinations and outcomes in higher education.

Despite these strengths, it is important to keep in mind that the ELS sample is not representative of the population of students at for-profit colleges, many of whom are older and returning students. To date, there are no available micro-level data that contain a representative sample of students at for-profit colleges. Datasets like the BPS 04/09, which focus only on first-time students, fail to accurately represent the population of for-profit colleges given the high share of returning students at these schools. In this respect, the ELS dataset is preferable to the BPS since it provides a clearly defined population (i.e., a high school cohort) for which the effects of for-profit colleges on socioeconomic inequality can be systematically assessed.

The analyses in this study focus on the subset of 9,579 members of the initial ELS cohort who (1) participated in all ELS waves, (2) have non-missing information on postsecondary enrollment status, timing and type of first postsecondary institution attended, and degree attainment by 2012.[5] To allow projections for the entire population of students who were in the 10th grade in 2002, I weight the data by the 10th grade and last follow-up panel weight developed by the data distributors, multiplied sequentially by two estimated inverse probabilities that account for (a) non-participation in all four waves of the survey and (b) non-response on the two dependent variables (type of first institution and type of degree attained). The estimated probabilities for (a) and (b) are drawn from two separate logit models that predict inclusion in the

[5] To avoid censoring due to timing of transition to higher education, the analytic sample includes only students who graduated high school by 2004. The sample weights adjust for this restriction and allow projections for the entire population of students who were in the 10th grade in 2002. In sensitivity analyses I estimated the models without this exclusion and the results were virtually the same (available from author upon request).

relevant restricted sample with demographic characteristics, family background, and base-year indicators of academic engagement. For the adjustment variables, I use item-specific best-subset linear regression to impute missing information. The standard errors in all analyses are clustered to adjust for the survey design.

Main variables

Bachelor's degree attainment is the main outcome of interest. It is a categorical variable coded 1 if the respondent earned a bachelor's degree or higher by 2012 and 0 if he or she did not.[6]

Postsecondary destination: is measured by the type of the first institution student enrolls in up to three years after high school graduation (i.e., by the end of 2007).[7] I differentiate between for-profit and non-profit institutions, and further differentiate non-profit institutions by their admission policies using the Barron's competitiveness index (NCES 2009). The main destination of interest is that of students who went to for-profit colleges. I compare the academic outcomes of these students to those of students who entered non-profit colleges with open admission policy. This group consists primarily of students who attended community colleges (80 percent) but also includes a small group of students who attended other open admission two-year colleges (1 percent) and open admission four-year colleges (19 percent).[8] For completeness, I include two

[6] Only 4 respondents began their postsecondary education after 2007 and attained a BA by 2012. Since these cases are exceptional they were omitted from the sample.
[7] Although the timing of transition to postsecondary education is important, limiting the sample to students who transition immediately to higher education can underestimates the associations of interest because low-SES students are more likely to travel non-traditional paths to higher education.
[8] These institutions are rated as "inclusive" in the Barron's classification or are listed as having "open admission policies" in the IPEDS data. For further discussion on these broad access institutions, their prominence in contemporary higher education and alternative institutional categorizations see Kirst, Stevens, & Proctor (2010).

additional destinations: students who did not attended any postsecondary institution by 2007, and students who attended four-year colleges with competitive admission policies. The latter group includes four-year institutions rated as "less competitive", "competitive", "most competitive", "highly competitive" or "very competitive" by the Barron's competitiveness index.[9] Schools rated as "special" (N=33) in the Barron's index were classified on a case-by-case basis.[10] This yields four distinct destinations for the high school sophomores in the ELS: (1) *no college;* (2) *for-profit colleges*; (3) *non-profit open admission colleges*; and *(4) competitive admission colleges*.

Because this classification focus on the first institution student attends, it does not capture students who transitioned from one institutional category to another. Although a more detailed study of multiple transition types would be useful, it exceeds the capabilities of the ELS sample size. Nonetheless, this focus is not likely to meaningfully alter the results reported here. About 60 percent of ELS respondents that attended for-profit colleges as their first institutions did not attend any other institution during the study period (with a similar rate across different SES quartiles). Moreover, among the respondents who attended a second (and third) institution, 30 percent attended a different for-profit college, 24 percent attended a competitive admission college, and 46 percent attended non-profit open admission colleges.

Students' Socioeconomic status: is measured by a composite score constructed by the National Center for Educational Statistics (NCES), divided into quartiles. The NCES measure is based on

[9] Two sensitivity analyses for this classification yielded very similar results: In the first, I use a more detailed classification that distinguishes between "competitive colleges" and "more competitive schools". In the second, I included only students that attended open admission institutions.

[10] 246 ELS respondents who attended four-year institutions that are not rated in Barron's Index or by the NCES were omitted from the sample. The sample weights adjust for this omission.

students' family income, parents' education and SEI scores.[11] I measure the breadth of socioeconomic inequality by focusing on the comparison between the bottom SES quartile and the top SES quartile, although the middle quartiles are included in all analyses. In additional analyses not shown here, I use separate measurements of parental education and family income to account for students' socioeconomic status and obtain very similar results.

Pre-college variables

The ELS contain measures on students' ability, achievements, attitudes towards education and educational aspirations that are known to be associated with family socioeconomic background and educational outcomes (see discussion of models, below). These measures are more comprehensive than used in most studies on educational attainment and include:

- *Prior academic achievements and ability*: measured by students' cumulative GPA in 12th grade as reported by the school, as well as by students' math scores in the 10th and 12th grade and reading scores in the 10th grade in a series of standardized tests administrated by the data collectors.
- *High school coursework-* measured by three categorical variables indicating the highest level of coursework student attained in three subjects: math, science and foreign language courses by 12th grade. See Appendix 2.B for a full list of all categories.
- *Composite college entrance exam*: is measured by the percentile ranking of students' scores in the SAT or ACT test.

[11] The quartiles are calculated for the entire sample of 15,400 tenth graders. Due to unequal attrition patterns the size of the quartiles is not equal in the analytic sample. The sample weights discussed above adjust for that.

- *Commitment to school:* although many educational theories highlight the importance of students' behavior and commitment to school in channeling students to different college destinations and subsequent attainment, a direct measurement of commitment is often absent from empirical models (Morgan et al. 2013). I account for students' commitment to school using a composite standardized measurement based on 31 different items that reflect parents', students' and teachers' assessment of the respondent' behavioral commitment to school when they were in the 10th grade. (A full list of questions used to assess commitment is available in Appendix 2.A).
- *Educational expectations:* many educational attainment models attribute a central role to students' educational aspirations and plans (e.g., Sewell, Haller and Portes 1969). Here, I measure students' planned educational attainment using two variables: (1) *Students' declared educational plans*, which is a categorical variable indicating whether or not the student expect to earn a bachelor's degree by the time they are 30 (measured in 12th grade). Since this measurement is upwardly biased by the "college for all" culture, I'm also measuring students' educational plans as a function of (2) *the educational requirements of students' expected occupation*. This variable is based on students' detailed verbatim occupational plans in the 12th grade, matched with O*Net information regarding the required education for the occupation.
- *Demographic and geographic factors:* including student' gender, race, high school type and geographic region at 10th grade. Descriptive statistics for all pre-college variables are available in Appendix 2.B.

Analytic strategy

I examine the effect of for-profit colleges on students' degree attainment in several stages: First, I assess the selection process that channels students from different socioeconomic background into different postsecondary destinations. To this end, I fit a series of logit and multinomial logit models predicting students postsecondary destinations as a function of their socioeconomic status, adjusting for the entire comprehensive list of pre-college variables discussed above. Next, I fit a series of logit models that estimate the association between institution type and the likelihood of bachelor's degree attainment, adjusting for all pre-college factors. I also estimate socioeconomic differences in the association between college type and students' outcomes by fitting these models separately for the top and bottom SES quartile students, as well as by fitting a model (to pooled data) that includes SES quartile by institution type interactions.

Last, I examine the association between students' institution and their outcomes among low-SES students in light of possible unobserved selection into for-profit colleges (relative to non-profit open admission colleges) and assess possible heterogeneity in this effect. I do so by estimating a weighted regression, a method developed from the counterfactual literature on causal inference, which balances the data based on students' propensity to attend for-profit colleges and help detect heterogeneity in the treatment effect that can be related to unobserved characteristics (see Morgan and Winship 2014). I discuss the construction of the models and the method in greater detail in the results section.

RESULTS

Socioeconomic differences in access to for-profit colleges

Low-SES students are less likely than high SES students to enter higher education: Only 71 percent of students from the bottom of the SES quartile attended any postsecondary institution compared to 96 percent of students from the top SES quartile (Panel A in Table 2.1 , "Observed proportion" columns). But socioeconomic differences remain even among students who attended postsecondary institution, in the type of institutions they attend (see Panel B in Table 2.1): low SES students are more concentrated than high SES students at non-profit open admission colleges (62 v. 27 percent, respectively), while high SES students are more concentrated than low SES students at four-year competitive admission colleges (71 percent vs. 28 percent, respectively). The largest socioeconomic differences are found in the likelihood to attend for-profit colleges: students from the bottom SES quartile who entered higher education are about 5 times more likely than students from the top SES quartile to attend for-profit college (10 vs. 2 percent). This suggests that for-profit colleges can be consequential for socioeconomic inequality, even though a relatively small share of all ELS respondents attended these institutions.

The socioeconomic differences in the observed distributions of students across different postsecondary destinations likely reflect, in part, socioeconomic differences in academic preparation, attitudes and educational plans. To account for these differences, I estimated a series of logit models predicting students' likelihood to enter any college by 2007, and a series of multinomial models predicting students' institution type in higher education (conditional on enrollment in higher education). For each outcome of interest, I first estimated an unadjusted

Table 2.1: Observed and adjusted proportions of students who attended any college, and college destinations among students that entered higher education by 2007. High school sophomores of 2002.

	Distribution						Socioeconomic Differences		
	Bottom SESQ		Middle SESQ		Top SESQ				
	Observed proportion	Adjusted proportion	Observed proportion	Adjusted proportion	Observed proportion	Adjusted proportion	Observed gap (T-B)	Adjusted gap (T-B)	Share of the observed gap that is explained by pre-college factors
Panel A: Observed and adjusted proportion of students who attended postsecondary education by 2007									
Any college	0.71	0.80	0.84	0.84	0.96	0.91	0.25	0.11	56%
Panel B: Observed and adjusted proportion of students at different college destinations among high school sophomores who attended any postsecondary education by 2007									
For-profit colleges	0.10	0.07	0.07	0.07	0.02	0.05	-0.08	-0.02	75%
Non-profit open admission colleges	0.62	0.49	0.49	0.47	0.27	0.41	-0.35	-0.08	77%
Competitive admission colleges	0.28	0.45	0.44	0.46	0.71	0.54	0.43	0.09	79%

Source: ELS 2002

Notes: Data are weighted. Adjusted rates for Panel A are based on a logit model predicting college attendance (Model 1, Table 2). Adjusted rates for college for Panel B are based on a multinomial logit model predicting college destinations (Model 2, Table 2). Unweighted sample sizes are: for bottom SESQ n=1799 in Panel A, and n=1355 in Panel B. For middle SESQ n=4573 for Panel A and n=3970 in Panel B. For Top SESQ, n=3207 in Panel A and n=3132.

model that includes only students' socioeconomic status, and then an adjusted model that includes students' socioeconomic status as well as the comprehensive set of pre-college variables discussed above. The coefficients from these models are presented in Table 2.2. To gauge the share of socioeconomic differences in students postsecondary destination that is related to socioeconomic differences in students' characteristics, I use Model 2 and 4 in Table 2.2 to calculated the predicted proportions of students from different socioeconomic quartiles that would have (a) transition to higher education; and (b) attend different institutions types in higher education if everyone had similar distributions of prior academic achievements, attitudes and educational expectations as that of the average 10^{th} grader in 2002. These predicted proportion of students at each destination are presented in Table 2.1 (see the "Adjusted proportion" columns).

The results in Table 2.1 and 2.2 suggest that a large share of the socioeconomic differences in the likelihood to enter higher education (see Model 1 and 2 in Table 2.2 and Panel A in Table 2.1), and to attend different institution type in higher education (see Model 3 and 4 in Table 2.2 and Panel B in Table 2.1) are accounted for by socioeconomic differences in students characteristics. The magnitude of the coefficient for the bottom SES quartile (relative to the top SES quartile) decreases from -2.33 in Model 1 to -1.22 in Model 2, although it remains negative and significant in Model 2. Similarly, the observed difference in the likelihood of students from the top and bottom SES quartile to enter higher education is 25 percentage points. Yet, this gap decrease by more than half once socioeconomic differences in academic preparation, attitudes and educational expectations are taken into account (compare the "observed gap" column and the "adjusted gap" column in Table 2.1)

Table 2.2: Coefficients from logit and multinomial logit models predicting postsecondary destinations. High school sophomores of 2002

Population:	All high school sophomores of 2002		High school sophomores of 2002 that attended any postsecondary institution by 2007			
Postsecondary education destination:	Any college vs. no postsecondary education		Non-profit open admission college vs. For-profit college	Competitive admission college vs. for-profit college	Non-profit open admission college vs. For-profit college	Competitive admission college vs. for-profit college
Model #	(1)	(2)	(3)		(4)	
SES quartile (top SESQ=0)						
Bottom SESQ	-2.33**	-1.22**	-0.60**	-2.37**	-0.23	-0.85**
	(0.148)	(0.162)	(0.206)	(0.214)	(0.226)	(0.238)
Middle SESQ	-1.62**	-0.90**	-0.48*	-1.55**	-0.23	-0.72**
	(0.141)	(0.148)	(0.190)	(0.186)	(0.197)	(0.200)
Adjustment variables:						
Female		0.16+			0.00	-0.04
		(0.086)			(0.131)	(0.149)
Race (white=0)						
Hispanic		0.46**			-0.11	-0.40+
		(0.150)			(0.222)	(0.235)
black		0.66**			-0.08	0.67**
		(0.149)			(0.217)	(0.235)
Asian		0.52*			-0.16	0.11
		(0.210)			(0.263)	(0.271)
Other race		-0.42+			0.18	0.57
		(0.249)			(0.424)	(0.511)
Region (Midwest=0)						
North east		0.23			-0.55**	0.03
		(0.155)			(0.198)	(0.208)
South		-0.42**			0.09	-0.05
		(0.111)			(0.182)	(0.212)
West		-0.02			-0.15	-0.47+
		(0.150)			(0.211)	(0.241)
Urbanicity (suburban=0)						
Urban		0.06			-0.21	0.00

	(0.117)	(0.170)	(0.182)
Rural	0.23+	0.08	0.11
	(0.119)	(0.173)	(0.200)
HS type (public=0):			
Catholic	1.12**	0.54*	1.12**
	(0.285)	(0.250)	(0.244)
Private	0.77**	0.43	0.13
	(0.296)	(0.325)	(0.321)
SAT score (pct)	0.00	-0.00	0.03**
	(0.004)	(0.007)	(0.007)
Math (10th grade)	-0.00	0.01	0.00
	(0.008)	(0.010)	(0.011)
Math (12th grade)	0.01+	0.01	0.01
	(0.007)	(0.010)	(0.010)
Reading (10th grade)	0.00	-0.00	-0.00
	(0.007)	(0.011)	(0.012)
GPA (12th grade)	0.44**	0.30*	0.75**
	(0.092)	(0.142)	(0.162)
Science pipeline (low level science=0)			
Chemistry 1 or physics 1	-0.01	-0.07	0.36+
	(0.114)	(0.176)	(0.206)
Chemistry 1 and physics 1	0.22	0.15	0.65*
	(0.207)	(0.301)	(0.322)
Chemistry 2 or physics 2 or advanced bio	0.37	0.22	0.58+
	(0.236)	(0.258)	(0.305)
Chemistry and physics and level 7	0.33	0.16	0.74
	(0.342)	(0.536)	(0.549)
Missing transcripts	0.46*	-0.61*	0.50+
	(0.215)	(0.280)	(0.300)
Math pipeline (None/Low/Middle Academic=0)			
Middle academic ii	0.26*	0.18	0.62**
	(0.120)	(0.197)	(0.222)
Advanced i	0.44**	-0.11	0.50+
	(0.164)	(0.245)	(0.271)
Advanced ii/Pre-calculus	0.84**	-0.24	0.66*
	(0.222)	(0.291)	(0.305)
Advanced iii/Calculus	0.60	-0.55	0.45

		(0.365)			(0.461)	(0.462)
Language pipeline (no credit=0)						
0.5- 1 Carnegie unit 9th grade instruction		0.23+			-0.34+	-0.52*
		(0.135)			(0.203)	(0.266)
0.5-1 Carnegie unit 10th grade instruction		0.70**			-0.31	-0.14
		(0.117)			(0.191)	(0.233)
0.5-1 Carnegie unit 11th grade instruction		0.59**			0.07	0.34
		(0.182)			(0.256)	(0.288)
0.5-1 Carnegie unit 12th grade instruction		0.38			-0.22	0.34
		(0.369)			(0.404)	(0.422)
.5- 1 Carnegie unit AP/IB instruction		0.87**			0.20	0.83+
		(0.337)			(0.447)	(0.478)
12th grade educational expectations: bachelor's degree		1.14**			0.55**	2.13**
		(0.099)			(0.143)	(0.172)
12th grade occupational plans (missing=0)						
College or more		0.50*			0.30	-0.10
		(0.205)			(0.327)	(0.410)
HS or less		0.06			-0.40	-0.95*
		(0.202)			(0.324)	(0.419)
HS/college		0.04			0.17	-0.14
		(0.358)			(0.469)	(0.560)
Don't know		-0.03			0.71*	0.28
		(0.200)			(0.345)	(0.427)
10th grade commitment (factor score)		0.10+			0.07	0.16
		(0.060)			(0.089)	(0.108)
Constant	3.24**	-0.38	2.40**	3.37**	1.56*	-3.09**
	(0.138)	(0.366)	(0.173)	(0.171)	(0.660)	(0.751)
Observations	9,579	9,579	8,457	8,457	8,457	8,457
Model chi-square	255.6	1101	396.6	396.6	1524	1524
df	2	39	4	4	78	78
Pseudo R-squared	0.0708	0.297	0.0572	0.0572	0.298	0.298

Source: ELS 2002

Notes: Robust standard errors in parentheses. The dependent variable for Model 1 is postsecondary attendance by 2007 (logit model). The dependent variable for model 2 is college destinations: for-profit colleges, non-profit open admission colleges, and competitive admission colleges (multinomial logit model). For-profit colleges are the reference category for Model 3 and 4. ** p<0.01, * p<0.05, + p<0.1

Socioeconomic differences in academic preparation, attitudes and expectations are even more consequential in sorting the ELS respondents who entered higher education to different institution types. The magnitude of the coefficient for the bottom socioeconomic status (relative to the top SES quartile) in the equation comparing the odds of attending non-profit open admission colleges v. for-profit colleges decreases from -0.60 in Model 3 to -0.23 in Model 4 and is no longer statistically significant. Similarly, the coefficient for the bottom socioeconomic status in the second equation comparing the odds of attending competitive admission colleges v. for-profit colleges decreases from -2.37 in Model 3 to -0.85 in Model 4, although it is still statistically significant.

The effectiveness of socioeconomic differences in preparation, attitudes and expectation to account for differences in the type of institutions students attend is clear when examining the predicted proportions of students at each destination obtained from Model 4 (see columns under "Socioeconomic differences" in Table 2.1). Socioeconomic differences in pre-college factors account for about 75 percent of the observed socioeconomic gap in the likelihood to attend for-profit colleges (decreasing from 8 percentage points to about 2 percentage points), 77 percent of the gap in the likelihood to enter non-profit open admission colleges (decreasing from 35 percentage points to 8 percentage points), and 79 percent of the observed gap in the likelihood to enter competitive admission colleges (decreasing from 43 percentage points to 9 percentage points).

Taken together, these results show important socioeconomic stratification in the type of institutions students attend in higher education. Students from the bottom SES quartile are more likely to attend for-profit colleges than high SES students. The majority of these differences are

accounted for by socioeconomic differences in students' characteristics—their academic preparation, attitudes and educational expectations—which generate differences in the opportunities available to students when they enter higher education. In the next section, I build on these models and assess the consequences of these choices to student outcomes. Specifically, I examine whether attending for-profit colleges has a measurable impact on the odds of completing a bachelor's degree relative to non-profit open admission institutions.

For-profit colleges and bachelor's degree attainment

Estimating the effect of for-profit colleges on bachelor's degree attainment is complicated by class-linked selection processes that push students with low academic preparation and test scores, and especially students who are also from low-SES families, into for-profit colleges. Many of these low-achieving students would, presumably, have lower odds of completing a bachelor's degree than higher-achieving students, regardless of the type of institution they attend.

The results in Table 2.1 and 2.2 indicate that a substantial share of the selection to different institutions is accounted for by the set of pre-college predictors included in Model 2 and 4 in Table 2. Thus, I account for this selection by estimating a series of logit models that predict students' likelihood of attaining a bachelor's degree by 2012 as a function of the first institution they attended while adjusting for the same comprehensive list of pre-college factors. For-profit colleges are set as the reference category in these models, which allows for a direct comparison between the effect of for-profit colleges and other college types. The coefficients for college type represent the estimated difference in the likelihood of students who attend the alternative type of institution (e.g., non-profit open admission college, competitive admission college) of attaining a

bachelor's degree relative to students who attend a for-profit college. A positive coefficient (presented in log odds) indicates that, adjusting for other factors, students at the alternative postsecondary destination are more likely than their peers at for-profit college to obtain a bachelor's degree. I further account for socioeconomic-based variation in the effect of for-profit colleges on degree attainment by, first, fitting the models separately for students from the bottom and top SES quartiles, and, second, fitting to the pooled sample a model that includes interactions of SES quartile by institution type.[12] The results from this analysis are reported in Table 2.3.

Model 1 in Table 2.3 shows the unadjusted estimates of the association between the type of college that students from the bottom SES quartile attended and their likelihood of attaining a bachelor's degree. The positive and significant coefficients of non-profit open admission colleges and competitive admission colleges imply that students from the bottom of the SES quartile attending for-profit colleges are significantly less likely than their peers at other college types to earn a bachelor's degree eight years after high school. This negative effect of for-profit colleges on low-SES students' likelihoods of attaining a bachelor's degree holds even after the comprehensive set of pre-college factors are included in the model (compare Model 2 and Model 1). The magnitudes of the relevant coefficients decrease only slightly from Model 1 to Model 2, and the coefficients for the two institution types remain statistically significant. While the positive effect of attending a competitive admission college relative to a for-profit college on bachelor's degree attainment is consistent with prior research (e.g., Alon and Tienda 2005), it is

[12] The pooled models restrict the effect of pre-college factors to be equal for students from different socioeconomic background. That the results from the separate models and the pooled models are similar suggests that this restriction does not mask underlying patterns in the data.

Table 3: Coefficients from a logit model predicting bachelor's degree attainment by 2012. High school sophomores in 2002 who entered higher education by 2007.

Population:	Bottom SES quartile		Top SES quartile		All	
Mode specification:	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Model #:	1	2	3	4	5	6
College type (for-profit college=0)						
Non-profit open admission colleges	1.62**	1.32**	-0.34	-0.51	-0.34	-0.40
	(0.501)	(0.512)	(0.373)	(0.409)	(0.373)	(0.395)
Competitive admission colleges	3.63**	2.36**	1.55**	0.43	1.55**	0.49
	(0.488)	(0.500)	(0.376)	(0.417)	(0.376)	(0.393)
SES quartile (Top SESQ =0)						
Bottom SES quartile					-3.13**	-2.46**
					(0.607)	(0.631)
Middle SES quartiles					-1.93**	-1.37**
					(0.433)	(0.453)
College type*SESQ interactions:						
Non-profit open admission colleges *bottom SESQ					1.97**	1.67*
					(0.627)	(0.654)
Non-profit open admission colleges *middle SESQ					1.35**	0.93*
					(0.439)	(0.463)
Competitive admission colleges *bottom SESQ					2.08**	1.91**
					(0.628)	(0.646)
Competitive admission colleges *middle SESQ					1.15**	0.86+
					(0.447)	(0.466)
Constant	-3.34**	-5.28**	-0.51	-3.84**	-0.37	-3.90**
	-0.502	-0.97	-0.38	-0.729	(0.368)	(0.545)
Observations	1,355	1,355	3,132	3,132	8,457	8,457
Model chi-square	202.7	352.8	247.9	460.7	1113	1679
df	3	28	3	28	9	34
Log Likelihood2	-247582	-211356	-405879	-357717	-1.389e+06	-1.214e+06
Pseudo R-squared	0.176	0.296	0.128	0.232	0.199	0.300

Source: ELS 2002

Notes: Data are weighted. Robust standard errors in parentheses. The "adjusted" models control for prior academic achievements and ability, composite college entrance exam, commitment to school at 12th grade, educational expectations and occupational plans, and demographic and geographic factors. These variables are described in the method section. All models adjust for students' gender.

notable that low-SES students at non-profit open admission colleges are more likely to obtain a bachelor's degree than observationally similar students who attend for-profit colleges.

The story is quite different for top-SES high school sophomores (Model 2, Table 2.3). For these students, the coefficient for non-profit open admission colleges is negative with a large standard error, suggesting that the likelihoods of attaining a bachelor's degree among high SES students is not negatively influenced by attendance at for-profit colleges (and they may even benefit from it). This implies that the educational outcomes of top SES students are not as sensitive to the type of institution they attend, as are those of low-SES students. The results from Models 5 and 6 are consistent with this interpretation: in these models, the interactions of "bottom SES" and institution type are large, and large relative to their standard errors. Moreover, these interaction terms remain large and significant even after socioeconomic differences in all pre-college factors are accounted for (see Model 6).

The asymmetrical effects of institution type by SES quartile are easy to see in Figure 2.2a and 2.2b, which graphs the adjusted predicted degree attainment rates for students from each SES quartile by the type of institution they attend, using the estimates from Model 6 in Table 2.4. In Figure 2.2a, the predicted bachelor's degree attainment rates are standardized to the high school academic achievements, test scores, attitudes and expectations of the average 2002 10^{th} grader. In figure 2.2b, the predictions are standardized to the pre-college characteristics of the average high school sophomore who attended a for-profit college. Under both standardizations, the negative effect of for-profit colleges on the degree attainment of low-SES student is evident. The adjusted degree attainment rate of low-SES students who attended non-profit open admission college, and have the pre-college characteristics of the average 10^{th} grader in 2002, is

more than twice that of *observationally similar* low-SES students that attended a for-profit college: 19 vs. 7 percent (Figure 2.2a).

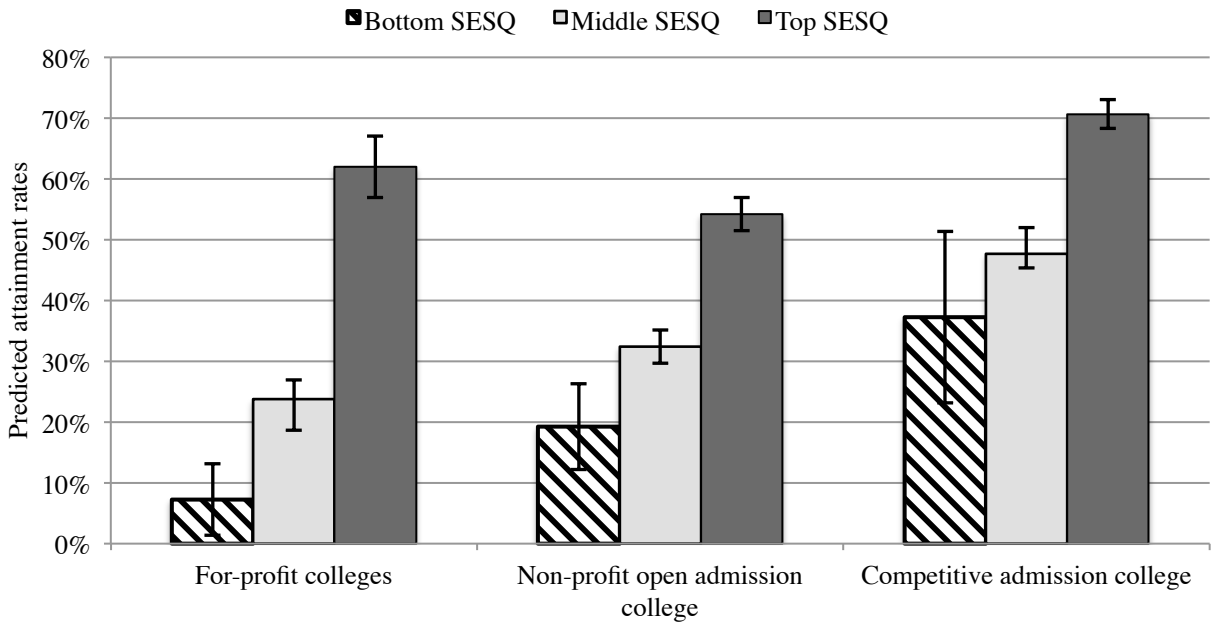

Figure 2.2a: Predicted bachelor's degree attainment rates (adjusted the for pre-college characteristics of the average high school sophomore in 2002), by students' first postsecondary institution and SES quartile
Source: ELS 2002
Notes: The bars denotes th

These differences are even stronger when the predictions are adjusted to reflect the attainment rates of students with the academic preparation, attitudes and expectations of the average high school sophomore who attended for-profit colleges (Figure 2.2b). The bachelor's degree attainment rates of low-SES students who attend a non-profit open admission college are about three times higher than those of observationally similar low-SES students who attended a for-profit college. This is taking into account their educational aspirations, preparations and attitudes. Given that non-profit open admission colleges are primarily two-year colleges and for-profit colleges are primarily four-year colleges, these low attainment rates are alarming. The

degree attainment rates of high SES students, in contrast, are quite similar at for-profit colleges and non-profit open admission colleges under both standardizations.

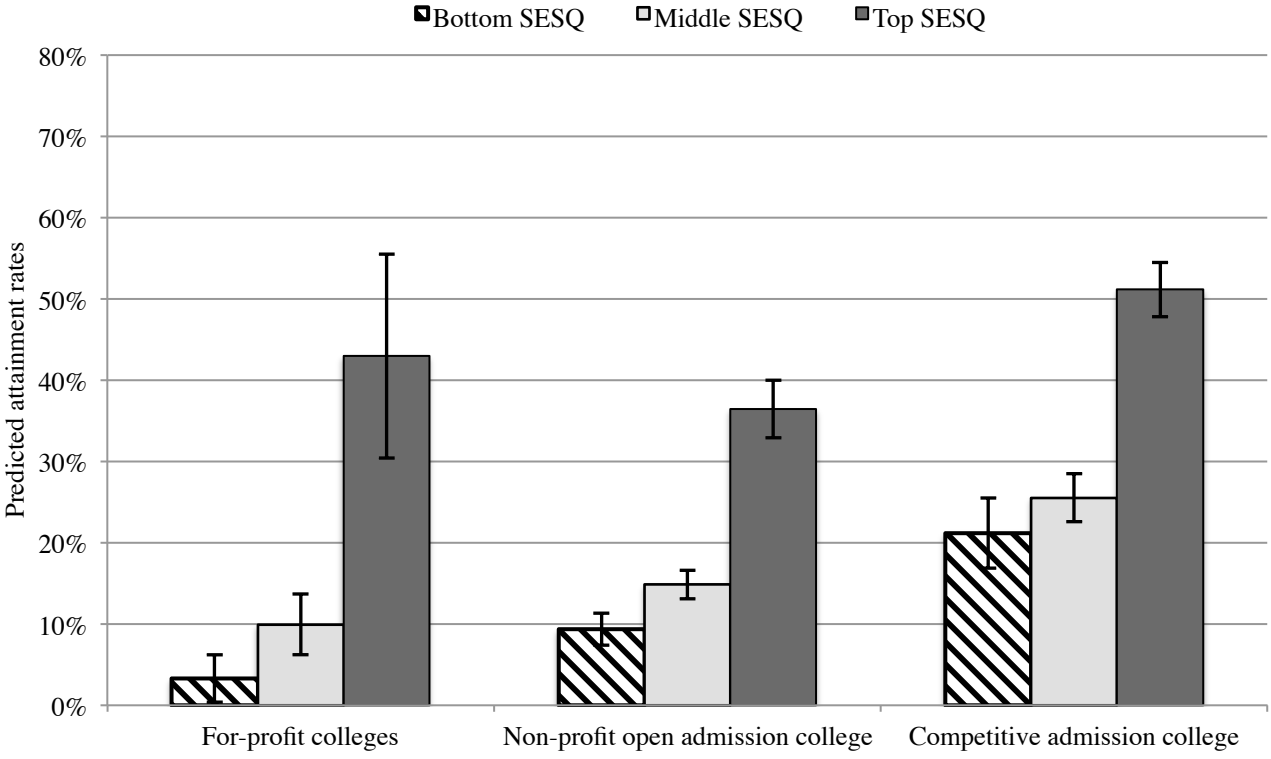

Figure 2.2b: Predicted bachelor's degree attainment rates (adjusted for pre-college characteristics of the average for-profit student), by students' first postsecondary institution and SES quartile
Source: ELS 2002
Notes: The bars denotes the 95 percent co

Sensitivity analyses suggest that these findings are robust across model specifications and measurements of socioeconomic status. The results are virtually identical when the sample is limited only to students who attended institutions with open admission (i.e., for-profit colleges and. non-profit open admission colleges), as well as when family income and parents education are used instead of the composite measurement of socioeconomic status (results available from the author).

These results point to two important conclusions: first, the educational outcomes of low-SES students are much more susceptible to the influence of the academic environment of their first institution than of more advantaged students. Second, even among institutions with open admission polices, there are important differences in how institutions influence students' educational outcomes. Low SES students at for-profit colleges are significantly less likely than their counterparts at non-profit open admission colleges to obtain a bachelor's degree. The degree attainment rates of high-SES students, on the other hand, are not negatively influenced by attendance at for-profit colleges.

Unobserved selection and heterogeneity in the effect of for-profit colleges

The low degree attainment rates of low-SES students at for-profit college relative to non-profit open admission institutions reported in Figure 2.2a and 2.2b may capture the impact of the unique academic and social environment at for-profit colleges that is especially unfavorable to bottom SES students (see Xie, Brand, and Jann 2012). However, the negative effect of for-profit colleges could also result from unobserved selection patterns, where low-SES students enter for-profit colleges based on unobserved factors that are related to their outcomes. In this section, I examine the evidence for such patterns within the subpopulation of low-SES students, considering both the possibilities for positive and negative selection. In this context, positive selection among low-SES students would be present if those students most likely to enter for-profit colleges are those who would benefit the most from doing so. Negative selection among low-SES students would be the opposite pattern, where those low-SES students most likely to enter for-profit institutions are also those most likely to suffer a greater penalty for attending for-

profit colleges. If evidence of negative selection exists among low-SES students who enter for-profit colleges, then it can be responsible for apparent, but not necessarily real, lower degree attainment of low-SES students at for-profit institutions in comparison to low-SES students at other institutions, especially non-profit open admission colleges.

I assess this possibility by estimating a weighted regression, which examines heterogeneity in the "treatment" effect of attending a for-profit college on the likelihood of attaining a bachelor's degree among low-SES students (see Morgan and Winship 2014, Chapter 7, for an introduction).[13] This technique offers a robust and straightforward way to estimate the average treatment effect for the treated across the full sample or, in this case, within the subpopulation of low-SES students. The logic is to compare the average effect among low-SES students whose measured characteristics match those who enter for-profit institutions (the "ATT" for average treatment effect for the treated) and the average effect among low-SES students whose measured characteristics match those who do enter for-profit institutions (the "ATC" for average treatment effect for the controls). Differences between estimates of the ATT and ATC may then indicate heterogeneity in the treatment effect that is related to students' unobserved propensity to enter the treatment. I focus here only on the comparison between for-profit colleges and non-profit open admission colleges since they are the main alternative for low-SES students who attend for-profit colleges. Negative selection would be present if the estimate of the ATT is more negative than the estimate of the ATC, since it will suggest that those who are most likely to attend for-profit colleges are those who are most likely to be harmed by having done so. The

[13] In analyses not shown here, I use other parametric and non-parametric methods suggested by Xie et al (2012), with very similar results.

differences emerge because, net of the variables we observe, low-SES students who attend for-profit colleges differ in their unobservable characteristics.

There are important differences in the composition of the sample of low-SES students who attend for-profit colleges and those who attend non-profit open admission colleges, which render this method especially useful in assessing heterogeneity in the effect of for-profit colleges among low-SES students. Low-SES high school sophomores who attended for-profit colleges score, on average, lower on their college entrance exam than those who attend non-profit open admission colleges (24^{th} vs. 30^{th} percentile), and in their 10^{th} and 12^{th} grade math and reading tests (-11 vs. -9 for math in 10^{th} grade, -13 vs. -10 for 12^{th} grade math, and -8 vs. -6 in reading scores in 10^{th} grade). The commitment scores of low-SES students who attend for-profit colleges are also lower, on average, than those of students who attend non-profit open admission colleges (-0.32 vs. -0.02, respectively). The ATT and ATC weights balance these observed differences and allow differences in unobservable characteristics that are associated with bachelor's degree attainment at for-profit colleges to emerge. [14]

The estimation of a weighted regression is carried out in several steps. First, I estimate a comprehensive logit model predicting the likelihoods of bottom SES students to receive the treatment, in this case—attend a for-profit college.[15] Next, I use the propensity scores from this model to construct the ATT and ATC weights. The ATT weight creates a representative sample of low-SES students at non-profit open admission colleges who are observationally similar to

[14] I use a diagnostic routine developed by Morgan and Todd (2008) to evaluate the balance in the samples achieved by the ATT and ATC weights. The samples of for-profit colleges and community colleges students were highly unbalanced with average of standardized mean difference (ASMD) of 0.1496. The ATT and ATC weights significantly improve the balance of the samples: the ASMD decrease to 0.0108 for the ATT weights and to 0.0416 for the ATC weights

[15] This model is estimated only for bottom SES quartile students and includes all pre-college variables as well as several interaction terms between the different covariates to increase the balance of the samples.

low-SES students at for-profit colleges by giving cases with high propensity to enroll at for-profit colleges more weight. The ATC weights do the opposite: they create a representative sample of low-SES students at for-profit colleges that are observationally similar to low-SES students who attend community colleges. Last, I estimate the average treatment effect of for-profit colleges for the treatment and the control groups by fitting logit models predicting low-SES students' likelihoods to obtain a bachelor's degree as a function of their institution types using the ATT and the ATC weights. These models also include all the pre-college adjustment variables to account for remaining imbalance in the samples. Table 2.4 reports the coefficients for the for-profit colleges from these models.

The results from the weighted regression imply that the negative effect of for-profit colleges on the likelihood of low-SES students to earn a bachelor's degree is not driven by negative selection. Under both the ATT and ATC weights, for-profit colleges have a negative effect on the likelihood of low-SES students to earn a bachelor's degree (relative to non-profit open admission colleges) and the effect is similar in magnitude, and even slightly larger when the ATC weight is used (-1.46 for the ATT vs. -1.55 for the ATC), indicating the possibility of positive selection. A corollary is that negative selection, whether it is based on observables or unobservable characteristics, is not likely to account for the negative effect of attending for-profit colleges on low-SES students' likelihood of earning a BA relative to other non-selective institutions. If anything, the negative effect of for-profit colleges reported in Figure 2.2a and 2.2b may be slightly attenuated by patterns of positive selection to for-profit colleges among students from the bottom SES quartile.

Table 2.4: Coefficients for for-profit colleges v. non-profit open admission colleges from a weighted regression predicting bachelor's degree attainment. High school sophomores in 2002 from the bottom SES quartile that attended open admission colleges.

	Coefficient for for-profit colleges	(se)
Average treatment effect of for-profit colleges for the treated (ATT)		
Estimated on students who are observationally similar to students who attend for-profit colleges		
Model 1: College type only	-1.12*	(0.512)
Model 2: Model 1+ pre-college factors	-1.46**	(0.485)
Average treatment effect of for-profit colleges for the control (ATC)		
Estimated on students who are observationally similar to students who attend non-profit open admission colleges		
Model 1: College type only	-1.47**	(0.517)
Model 2: Model 1+ pre-college factors	-1.55**	(0.422)

Source: ELS 2002

Notes: See main text for further explanation on the weights. The reference category is non-profit open admission colleges. Robust standard errors in parentheses.

** p<0.01, * p<0.05, + p<0.1

Together, the results provide compelling evidence that for-profit colleges have a negative effect on the likelihoods of students from the bottom SES quartile to earn a bachelor's degree relative to non-profit open admission colleges. Although the possibility of negative selection based on unobserved characteristics cannot be ruled out using non-experimental data, it seems unlikely given the comprehensiveness and richness of the models and measurements (e.g., the commitment measurement based on 31 different indicators), and the results from the weighted regression. Moreover, unobserved characteristics like motivation or intelligence, which are not included in the model, are likely correlated with students' attitudes toward high school, measured ability, coursework, educational plans and other social or academic factors and therefore are unlikely to meaningfully conflict with the results reported here. Nonetheless, cautious

interpretation of the results is warranted. Although the set of pre-college factors in the models accounts for a substantial share of socioeconomic differences in the type of institutions students attend, the treatment assignment process was not perfectly modeled, and therefore the ATT and ATC effects should be interpreted as only indicative of underlying patterns in the data rather than fully identified causal effects.

DISCUSSION AND CONCLUSIONS

This study assessed socioeconomic differences in the likelihood of entering for-profit colleges as well as in the effect for-profit colleges have on their students' likelihood of earning a bachelor's degree relative to other non-profit open admission institutions. Results from a large longitudinal data on a representative sample of a recent cohort of high school sophomores confirm that for-profit colleges are consequential for socioeconomic disparities in higher education: low-SES students are more likely than their affluent counterparts to enter for-profit colleges relative to any other type of institution. Once enrolled, low-SES students at for-profit colleges are significantly less likely than observationally similar students that attend non-profit colleges to earn a bachelor's degree eight years after high school. Students from the top SES quartile, in contrast, suffer no penalty in their likelihood of attaining a degree at for-profit colleges. These results are robust across different model specifications, and different measures of family background. These results suggest that at least in the case of US higher education, for-profit educational institutions contribute to growing type of inequality—one in which the students with the least amount of resources are paying more for their education, but are increasingly less likely to reap the benefits of their investment. Since the attainment of a bachelor's degree is key for the social mobility of

low-SES students (e.g., Torche 2011), for-profit colleges are contributing to the intergenerational transmission of disadvantage.

This study has identified an important and, I argue, extremely consequential source of socioeconomic inequality in higher education. While previous studies on open admission institutions focused primarily on the comparison between community colleges and competitive colleges or no college (e.g., Leigh and Gill 2003; Brand et al. 2014), this study shows that there is important variation in the outcomes associated with the postsecondary destinations available to students who wish to go to college, but are unable to secure a position at competitive admission colleges. This variation is important also for evaluating the returns to degrees earned at different postsecondary destinations: the negative effect of for-profit colleges on students' outcomes implies that the selection into degrees is not equal across institution types, which will upwardly bias the estimations for degrees earned by students that attended for-profit colleges. Future research should take note of this variation and estimate the returns to degrees alongside the likelihood of observationally similar students to graduate at different intuition types.

For-profit colleges are highly successful in attracting low-SES students despite their high tuition rates. Part of their attraction likely stems from their institutional characteristics that allow students greater flexibility than traditional institutions and from the decreasing number of slots at community colleges. Yet, some of the success of these institutions is likely related also to their marketing strategies and the ways students perceive them relative to other opportunities available to them. Since low-SES students usually have little information about higher education, they may be under the impression that for-profit colleges, which are by and large four-year institutions, are more prestigious than community college that offer only certificate and associate

degrees. This assumption may be strengthened by the growing presence of ads for for-profit colleges on TV and the Internet. The direct, active and sometimes questionable marketing methods of for-profit colleges may further enhance this perception among students (e.g., US GAO 2010). Without addressing these issues, there is no reason to think that the concentration of low-SES students at for-profit colleges will decrease.

The next step for future research will be to determine how and why for-profit institutions have their deleterious effects on the likelihood of earning a college degree for low-SES students, in particular. One possible source of these effects is the organizational structure of for-profit institutions compared to community colleges, other non-selective institutions, and selective four-year colleges. It is possible that the easy-to-replicate flexible curriculum of for-profit colleges (Ruch 2003), which is appealing to low-SES students, is a double edge sword because it does not provide the individualized guidance and support that are especially beneficial for the academic success of low-SES students (Roksa et al. 2007; Plank and Jordan 2001; Calcagno et al. 2008). It is also possible that students at for-profit colleges are discouraged by the cost of their education from pursuing a bachelor's degree, and instead opt out to shorter programs that provide associate degrees or certificates (Heller 1997). In contrast, many community colleges and non-selective two-year institutions embrace a role of "stepping stone" and structure their programs to ease the transition to a baccalaureate programs. Four-year institutions may be more likely to accept credits from community colleges, or perhaps even reserve spots for graduates of the local community colleges (conditional on meeting academic requirements).

Profit-maximizing incentives, along with regulatory pressures, may also account for some of the negative effects of for-profit colleges on students' attainment. Over the past decade,

pressures to increase regulatory oversight on the sector have been rising, as evident by gainful employment regulations and President Obama's call to reform college funding. To avoid scrutiny, for-profit colleges may capitalize on the rising aspirations of low-SES students to earn a bachelor's degree (e.g., Goyette 2008) in order to attract students. Yet, once enrolled, they may attempt to increase retention by shifting students to shorter-length programs that lead to associates and certificate degrees. Indeed, many students at for-profit colleges begin their education in four-year programs, but later obtain associate or certificate degrees (Cellini and Chaudhary 2014). Unpacking these, and possibly many other, sources of institutional effects on degree attainment is critical to designing effective higher education policy and "leveling the playing field" for high school students from low-SES families.

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Appendix 2.A: Indicators of commitment to school in 10th grade

Teacher reports of commitment (inter-item scale reliability of 0.77)

Does this student usually work hard for good grades in your class? (English Teacher)

Does this student usually work hard for good grades in your class? (Math Teacher)
How often does this student complete homework assignments for your class? (English Teacher)
How often does this student complete homework assignments for your class? (Math Teacher)
How often is this student attentive in class? (English Teacher)
How often is this student attentive in class? (Math Teacher)
Has this student fallen behind in school work? (English Teacher)
Has this student fallen behind in school work? (Math Teacher)
How often is this student absent from your class? (English Teacher)
How often is this student absent from your class? (Math Teacher)
How often is this student tardy to your class? (English Teacher)
How often is this student tardy to your class? (Math Teacher)

Student reports of commitment (inter-item scale reliability .70)

How many times did the following things happen to you in the first semester or term of this school year?
- I was late for school.
- I cut or skipped class.
- I got in trouble for not following school rules.
- I was transferred to another school for disciplinary reasons.

How often do you spend time on the following activities outside of school?
- Visiting friends at a hangout
- Driving or riding around

How much do you like school?
How often do you come to class without these things?
- Pencil/pen or paper
- Books
- Homework done

How many times did the following things happen to you in the first semester or term of this school year?
- I was absent from school.
- I was put on in-school suspension.
- I was suspended or put on probation.

Parent reports of commitment (inter-item scale reliability .79)

Has your tenth grader ever been considered to have a behavior problem at school?
Since your tenth grader's school opened last fall, how many times have you or your spouse/partner contacted the school about the following?
- Your tenth grader's problem behavior in school
- Your tenth grader's poor attendance record at school
- Your tenth grader's poor performance in school

Since your tenth grader's school opened last fall, how many times have you or your spouse/partner: been contacted by the school about the following?
- Your tenth grader's problem behavior in school
- Your tenth grader's poor attendance record at school
- Your tenth grader's poor performance in school

Source: ELS 2002

Appendix 2.B: Descriptive statistics and definitions of adjustment variables

Variable Name	Description	Mean	St. Deviation
Prior academic achievements and ability			
Math score at 10th grade (standardized)	Based on standardized test administrated by the ELS	0.097	0.983
Math score in 12th grade (standardized)	Based on standardized test administrated by the ELS	0.093	0.994
Reading score in 10th grade (standardized)	Based on standardized test administrated by the ELS	0.094	0.977
GPA at 12th grade	Cumulative GPA score reported by the school	2.789	0.787
High school coursework	Based on the NCES coding schema developed by Burkham and Lee (2003)		
Science pipeline:	The highest courses student took in science		
Low Level Science		0.257	
Chemistry 1 or physics 1		0.304	
Chemistry 1 and physics 1		0.181	
Chemistry 2 or physics 2 or advanced biology		0.101	
Chemistry and physics and level 7		0.099	
Missing transcripts	If student did not participate in the HS transcript study	0.058	
Math pipeline:	The highest courses student took in math		
None/Low/Middle Academic		0.187	
Middle academic ii		0.224	
Advanced i		0.175	
Advanced ii/Pre-calculus		0.190	
Advanced iii/Calculus		0.167	
Missing transcripts	If student did not participate in the HS transcript study	0.058	
Foreign language pipeline:	The highest courses student took in foreign language		
no credit		0.156	
0.5- 1 Carnegie unit 9th grade instruction		0.102	
0.5-1 Carnegie unit 10th grade instruction		0.318	
0.5-1 Carnegie unit 11th grade instruction		0.188	
0.5-1 Carnegie unit 12th grade instruction		0.105	
.5- 1 Carnegie unit AP/IB instruction		0.073	
Missing transcript	If student did not participate in the HS transcript study	0.058	
Composite college entrance exam			
Standardized test scores (in percentiles)	SAT and ACT scores converted to percentile scales	45.554	28.847

Commitment to school at 12th grade			
Commitment factor	A factor score based on 32 questions reported by students, teachers and parents regarding students' behavioral commitment to school	0.153	0.871
Educational expectations and occupational plans			
Expect to earn a bachelor's degree or more	Based on the response to the prompt "as things stand now, how far in school do you think you will get"	0.77	
Educational requirements of expected occupations	Based on students' verbatim responses to the question "write the name of the job or occupation that you expect or plan to have at the age of 30" that were matched with ONET information regarding the educational requirements of the expected occupation		
College or More	Expected occupation requires a college degree or more	0.524	
High school or Less	Expected occupation requires high school diploma or less	0.143	
High school/College	Expected occupation may require either high school or college degree	0.021	
Don't Know	If respondent didn't know what occupation they plan to have at the age of 30.	0.280	
Missing	If respondent did not answer the question	0.031	
Demographic and geographic factors:			
Gender:			
Women		0.524	
Race			
Hispanic		0.134	
Black	Non-Hispanic black	0.144	
White	Non-Hispanic white	0.641	
Asian	Non-Hispanic Asian	0.054	
Other race	Non-Hispanic native American and other races	0.027	
Geographic region in 10th grade	Geographic region of school in 10th grade		
West		0.219	
South		0.343	
North east		0.186	
Midwest		0.253	
High school type (private=0)	If student attended a public high school	0.915	

Source: ELS 2002

Study 3

Unintended Consequences:

Open Admission Colleges and Changes in the Relationship Between Social Background and the Average Family Income on College Campuses

ABSTRACT

Higher education has responded to the growing demand for postsecondary education with a dramatic expansion of open admission institutions. These changes in the ecology of higher education alter the characteristics of the population of students entering higher education, but they also impact the distribution of students across college types, and, in turn, the social environment that students encounter while in college. Using data from two nationally representative cohorts of high school students in the 1990s and the 2000s (NELS and ELS), and information on college campuses compiled by the US Department of Education, this study documents an increase in the strength of the relationship between students' social backgrounds and the average family income on the campus they attend. Low-income students in the later cohort were more likely to access higher education, especially two-year colleges. However, they were also more likely than their counterparts in the 1990s to enroll in colleges characterized by significantly lower average family income. These results imply that students in younger cohorts have fewer opportunities to engage with students from different social backgrounds while in college.

INTRODUCTION

The first decade of the 21st century was marked by record demand for postsecondary education. Enrollment in all types of postsecondary institutions increased by 35 percent during this time, from 22 million students in 2000 to nearly 30 million students in 2010. However, not all types of postsecondary institutions expanded equally. Open admission colleges, especially community colleges and for-profit colleges, experienced the largest gains in enrollment, continuing longstanding trends that began in the late 1960s (Alon 2009; NCES 2008; Deming et al 2012; Stevens 2015; Kirst, Stevens and Proctor 2010). Between 2000 and 2010, enrollment at for-profit colleges increased from 1 million students to over 4 million students, and enrollment at two-year colleges increased from 9.8 million students to 11.2 million students. Enrollment at four-year competitive admission colleges, in comparison, increased by only 1 million students during this time period: from about 5.6 million students in 2000 to 6.6 million students in 2010 (Integrated Postsecondary Education Data System, Author's calculation).[1]

Because socioeconomic differences in high school academic achievements and standardized test scores are ubiquitous, the expansion of open admission colleges is especially beneficial for the college attendance of low-income students (e.g., Sirin 2005; Reardon 2011; Alon 2009). Low-income students today have more opportunities to attend college, and may consequently be more likely than low-income students in the past to earn degrees.

The expansion of open admission colleges, which absorbed much of the growing demand for education among disadvantaged students, may also have affected the social environment that students encounter at their college campuses. The number of slots in highly selective colleges did not grow as fast as demand for them, thereby raising competition at these colleges. As I will

[1] Based on unduplicated 12 months head count enrollment files. Enrollment at open admission four-year colleges increased from roughly 620,000 students to 700,000 students.

argue here, this shifted the distribution of low-performing students, many of whom are from low-income families, toward open admission colleges. These trends, coupled with the growing share of non-traditional students at open admission colleges, are expected to increase segregation in higher education and alter the social environment at many open admission colleges. Given the well-known benefits of social diversity to the outcomes and wellbeing of students, especially disadvantaged students (Bowen and Bok 1998; Alon 2016), these changes may offset some of the benefits associated with postsecondary education for disadvantaged students.

This paper examines whether and how the social environments students from different social background encounter on their first college campuses changed, measured here as by changes in the average family income on students' college campus. I assess these changes using detailed information on two nationally representative cohorts of students who were in high school in the 1990s (NELS 1988) and in the 2000s (ELS 2002). I match these data to information on the average family income of all students in the colleges the NELS and ELS students attended, using the College Scorecard data from the US Department of Education.

I also assess whether changes in the academic environment students encounter are associated with changes in the characteristics of the students who enter higher education, especially their academic preparation and educational aspirations, or changes in the type of colleges that students with different attributes attend. Last, I consider whether changes in the social environment in college campuses are the result of compositional shifts in the population of students who enter higher education, or in the overall increase in income inequality during the 21st century.

The results show that low-income students in the more recent cohort are more likely to access higher education, especially two-year colleges and other open admission colleges like for-

profit colleges. However, the social environment students encounter on college campus has changed as well: low-income students who attend colleges in the later cohort attended campuses that were characterized by lower average family income than their statistical counterparts attended in the 1990s. High-income students in the 2000s, by contrast, are less likely than their statistical counterparts in the 1990s to enroll at institutions characterized by low average family income.

FAMILY BACKGROUND AND COLLEGE ATTENDANCE

Differences in access to education on the basis of social background have long been a central concern for educational scholars and policymakers. Low-income students are less likely than high-income students to attend college (Walpole 2003; Raftery and Hout 1993; Alon 2009; Alexander et al. 1987). These differences are due, in part, to socioeconomic inequality in high school academic achievement and standardized test scores, which are a major basis for admission decisions in higher education (Alon and Tienda 2007; Sirin 2003; Camara and Schmidt 1999). Although substantial debates surrounds the mechanisms that generate the association between social background and academic achievements (e.g., Breen and Goldthrope 1997; Coleman 1966; Card and Krueger 1996; Betts, Kim, and Danenberg 2000; Farkas 2003; Lareau 2003), the association between social background and academic achievement is one of the most robust and consistent findings in sociology.

Analyzing trends in students' achievements by family income, Reardon (2011) finds that the relationship between family income and academic achievements has strengthened over time, especially in the upper part of the income distribution. He attributes some of these changes to the growing investment in cognitive development among mid- and high- income families. In a

similar vein, Alon (2009) argues that there is a growing class polarization in the strategies parents use to help their kids secure a position in higher education. As college attendance becomes more universal, competition for position at selective colleges, which have greater returns, is fiercer. Affluent parents are quicker to adapt to the admission changes by investing in various mechanisms that boost the competitiveness of their kids to college admission officers. Low-income parents, on the other hand, usually have fewer resources to invest and less information to guide their efforts, and therefore are lagging behind.

Although socioeconomic differences in academic preparation have widened over time, differences in educational expectations, at least those measured by students' explicit educational plans, have narrowed. The "college-for-all" culture, promoted by popular media, politicians and other social leaders has impacted the (measurable) college expectations of students of different social background (Rosenbaum 2001; Reynolds and Pemberton 2001; Raynolds et al. 2006). Analyzing trends in the educational expectations of three cohorts of high school students in the 1980s, 1990s, and 2000s, Goyette (2008) finds that students' educational expectations have been rising steadily over time, and also less closely tied to their social background or the educational requirements of their expected occupations. For students in the 2000s cohort, a bachelor's degree became the modal aspiration. Rising expectations likely contributed to rising college enrollment among low-income students, even if their academic achievements held steady.

Widening socioeconomic gaps in high school academic achievements, on the one hand, and rising educational aspirations, on the other implies that more low-income students may aspire to enter higher education, but they are also less likely to be able to compete with more affluent students for slots at competitive admission colleges. In the next section, I discuss how higher education as an institutional field responded to changes in student demand, and the

implications of this response for the social experience of students from different social backgrounds in higher education.

EDUCATIONAL EXPANSION AND THE SOCIAL ENVIRONMENT ON COLLEGE CAMPUSES

Far from constant, higher education has a long history of responding to changes in student demand, technical, normative and legal environments (e.g., Kraatz and Zajac 1996; Stevens and Kirst 2015). One of the responses to the rising demand for slots in postsecondary institutions was a massive expansion of open admission colleges, especially community colleges and, more recently, for-profit colleges (Roksa et al 2007; Bailey 2002). Studies examined the implications of the expansion of open admission colleges, and especially community colleges, for inequality in students' outcomes, and reported mixed results: while some studies found a positive effect of community colleges on educational attainment (relative to no college), others have found a negative effect on the likelihood of earning degrees (e.g., Brand et al. 2014; Long and Kurlaender 2009; Alba and Lavin 1981; Alfonso 2006; Brint and Karabel 1989; Doyle 2009; Dougherty 1994; Leigh and Gill 2003; Long and Kurlaender 2009; Rouse 1995).

But college campuses are not only sites to obtain college degrees. They are also important sites for the formation of social, professional, and romantic ties. Students interact with their peers, compare expectations and experiences, and establish connections that can be beneficial for the later on in the labor market. Opportunities to meet students from different social background on college campuses can facilitate more diverse social networks among students who can help students get better and more rewarding jobs, improve their social and cognitive skills, achieve better health, and increase life satisfaction (Granovetter 1973; Fischer

1982; Erickson 1996; Coser 1975; Lin 1999; Son and Lin 2012). This may be especially important for disadvantaged students, who are already disadvantaged in the resources they can access through their social networks (e.g., Campbell, Marsden, and Hurlbert 1986; Marsden and Hurlbert 1988; Lin 2000).

The core claim of this paper is that educational expansion altered the social environment that students from different socioeconomic backgrounds encounter in colleges. This claims is based on the consistent observation in the educational expansion literature that expansion often leads to greater stratification within the system (e.g., Shavit and Blossfeld 1993; Alon 2009; Ayalon and Shavit 2004). This is especially true when educational expansion occurs unevenly at lower-tier institutions. Such expansion increases reliance on standardized test scores and other observed measurements academic preparation at competitive admission colleges (e.g., Alon and Tienda 2007), which, in turn, increase homogeneity in academic preparation among entering students at competitive admission college. This process implies that expansion leads to greater sorting in prior academic achievements into college types, even independent of changes in student academic preparation. Because of the differences in academic achievements by socioeconomic background, the distribution of low-income students shifts more towards less prestigious colleges. High-income students, by contrast, are more concentrated at competitive admission colleges (e.g., Ayalon and Shavit 2004; Alon 2009).

While previous accounts of educational expansion focused on changes in student destinations, they do not consider the implications of these processes for the social environments students encounter on their college campuses. If the surplus of higher preforming students does not attend open admission colleges, these colleges are becoming hubs of low-income students in higher education as more low-income students enter open admission colleges. In this case, we

would expect that (1) net of other characteristics, low-income students will be more likely today to enroll at open admission colleges; and (2) students at open admission colleges today will be more likely than their counterparts in earlier cohorts to study at campuses characterized by a high share of low-income students. It also follows that selective institutions are likely to see a decline in their share of low-income students, unless there are direct efforts to recruit disadvantaged students through affirmative action or other policy interventions (see Alon 2016). Together, these well-known trends in higher education suggest a new and growing form of inequality: the growing segregation of students from different socioeconomic backgrounds, and the consequence inequity in the social environments they encounter. In the following sections, I empirically examine this emerging disparity by exploring changes in the average family income on campuses students from different social backgrounds attend.

DATA, VARIABLES AND METHOD

Datasets and sample

The empirical investigation in this study is based on data from two large surveys conducted by U.S. Department of Education: the National Education Longitudinal Study of 1988 (hereafter "NELS") and the Educational Longitudinal Study of 2002 (hereafter "ELS"). Both surveys follow a nationally representative cohort of high school students throughout their transition to adulthood and have a similar sampling frame—stratified two-stage multilevel samples of high school sophomores—that allows for meaningful comparisons across the cohorts. The NELS began with a survey of about 25,000 students who were 8th graders in 1988 that were re-surveyed again in 1990, 1992, 1994 and 2000. The sample of students in 1990 was "freshened" to generate a nationally representative sample of the cohort of 10th graders in 1990 (NCES 2002), which is

used as the baseline NELS cohort in the current analyses. The ELS began with a sample of about 15,400 high school students who were in 10th grade in 2002 (NCES 2007) and were re-surveyed in 2004, 2006 and in 2012.

The NELS and the ELS contain detailed and comparable information about students' destinations in higher education, including the US Department of Education identifier of the institution and the year during which they began their post-secondary schooling. I use year and institution to merge information from the College Scorecard Data into the data. The College Scorecard, which is compiled by the US Department of Education, contains college-level information on the average family income on each campus of a given college.[2] The main advantage of using the NELS and ELS to study changes in social integration on college campuses is the wealth of information on students collected prior to entering higher education, which allows for a careful assessment of changes in the relationship between students' background and markers of the socioeconomic environment of the campuses they attend.

The analytic sample consists of 9,109 NELS[3] respondents and 9,295 ELS respondents who (1) participated in all relevant waves, and (2) have valid non-missing information on the average family income of their first college.[4] I also limited the sample to students who graduated high school on time to avoid potential biases in the timing of students' transition to college, but I constructed appropriate sample weights that allow projections to the entire population of tenth graders in 1990 and 2002.[5] I use item-specific best subset linear regression to impute missing information on the adjustment variables.

[2] The data are available at https://collegescorecard.ed.gov/data.
[3] The smaller sample of NELS respondent reflects differences in retention across waves.
[4] As I explain later, I focus only on student first institution. I discuss the reasons and limitations for this focus when I discuss the measurement for campus environment.
[5] I weight the data by the 10th grade and last follow-up panel weight developed by the data distributors in each study, multiplied sequentially by two estimated inverse probabilities that account for non-participation in all relevant data

In addition to the full sample, I present results on two subsets of the ELS and NELS respondents: (1) tenth graders who attended any type of postsecondary institution up to three year after high school graduation (N=7,385 for the NELS respondents and N=8,173 for ELS), and (2) tenth graders who attended a four-year college as their first institution up to three years after high school graduation (N=4,495 for NELS respondents and N=5,375 for ELS). A comparison between these two subsets of students provides insight into how the expansion of two-year colleges impacted the social integration in US campuses.

Variables

Campus average family income: the main outcome of interest is measured as the weighted average family income (expressed in 1999 dollars) of all students enrolled in the first college students attended.[6] The College Score data reports the average family income of all dependent students and independent students, and the share of independent students in the institution in each year. I used this information to calculate the weighted average family income of all students enrolled in the institutions at each year. Note, however, that due to data availability, the estimates for the NELS cohort are based on data reported in 1996.

The main benefit of this measurement is that it is exogenous to the characteristics of the ELS and NELS respondents, since it reflects the average income of all students, including older students, non-traditional students and returning students. Moreover, unlike other commonly used

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collection waves and non-response on the dependent variable (college destination and campus composition). These estimated probabilities are drawn two from separate logit models that predict inclusion in the relevant restricted sample with demographic characteristics, family background, and base-year indicators of academic engagement.

[6] I am only looking at institutions students attended up to three years after high school, on the assumption that these years are especially formative for students' social, academic and professional ties. Information on the average family income on campus for the ELS respondents is based on the exact year students entered the institution. Information on the average family income on campus for NELS respondents is based on the 1996 information from the College Scorecard, where 1996 is the first year these data were available. Because the proportion of low-income students at institutions increased over time, the average income on campus in 1996 was likely higher than it was in 1992-1995. Thus, this is a conservative test for the changes in campus composition.

measurements of social environment, like the share of students who are eligible for financial aid, this measurement is independent of tuition rates at specific colleges. I use both continuous measurement of the average family income on campus and a categorical one in which I distinguish low-income campuses (defined here as colleges in which the average family income is lower than $30,000) from other colleges.

This measurement of college socioeconomic environment has two limitations. First, the average family income on campuses cannot tell us much about the distribution of family income, and to my knowledge, there are no available data on the latter. The average family income measure is thus the best available proxy for socioeconomic environment. Second, the focus on students' first institution may fail to capture how students navigate the academic landscape and improve their relative location over time by transitioning between institutions, especially from two- year to four-year colleges. Indeed, forty percent of NELS respondents and 47 percent of ELS respondents who entered higher education have attended more than one institution (see also Goldrick-Rab 2006). If a large share of these transitions between institutions among low-income students is from open admission to competitive admission colleges, this measurement will underestimate the level of social integration in higher education encountered by low-income students. This is important limitation to the results. Nevertheless, students' first institution is their initial encounter with higher education, and, I assume, especially important in shaping their perceptions of the opportunities available to them in higher education, adjusting their expectations and plans, and forming important social and professional connections. An analysis of whether and how students navigate different social environments as they move across different institutions is beyond the capabilities of the pooled NELS and ELS samples.

Main predictors

Student family income: ELS and NELS respondents report family income in the base year (8th grade for NELS respondents and 10th grade for ELS respondents)**.** Students' family income is expressed in 1999 dollars, and divided into three income groups: (1) *low-income students* are students with yearly family income lower than $30,000, which roughly corresponds with the bottom 25 percent of the family income distribution; (2) *medium-income students*, who have yearly family income of $30,000-85,000 and represents roughly the middle 50 percent of the family income distribution in each cohort; and (3) *high-income students*, which consist of students with yearly family income higher than $85,000 and who represents roughly the top 25 percent of the family income distribution.

Cohort: a dummy variable coded 0 if the student was in the 10th grade in 1990 and 1 if the student was in the 10th grade in 2002.

Changes in students' academic preparation: The ELS and the NELS administrated math tests to respondents in the 10th and 12th grade, and reading tests in the 10th grade. I use the score of students at each cohort, standardized to the entire sample of student in each cohort, to capture the location of students on the distribution of math and reading relative to other students. I also include measures for college entrance exam (SAT and ACT exams), which I converted to cohort-specific percentile scores to enable comparisons over time.

Changes in students' attitudes and expectations—I use two indicators that are comparable across cohorts to measure attitudes and expectations. (1) *Students' educational expectations* is measured using a dummy variable coded 1 if students indicated that they expect to earn a bachelor's degree when they were in the 12th grade and 0 otherwise. (2) *Students' commitment to school* is a composite measurement containing information reported from 32 different indicators about students' behavior in school reported in the 10th grader by parents, teachers and students at each cohort.[7] The commitment factor scores are standardized in each cohort. A list of all survey items used to create the commitment scores is provided in the Supplementary Appendix.

Changes in the type of postsecondary college students attend: I classify students' first postsecondary institution based on the level, sector, and competitiveness in admission. Information on sector and level is obtained from the IPEDS, and information on competitiveness is obtained from the Barron's Competitive Admission Index Data (NCES 2009). I distinguish between four different types of postsecondary destinations in higher education: (1) *for-profit colleges*, which include four-year for-profit colleges, two-year for-profit colleges, and less than two-year for-profit colleges. Virtually all for-profit colleges in U.S. higher education have open admission policies. (2) *Community colleges and other open admission two year colleges*, which include open admission two-year community colleges and a small number of open admission, private two-year colleges; 95 percent of the students in each cohort who attended a not-for-profit, open admissions college attended a two-year publicly funded community college. (3) *Inclusive non-profit four-year colleges,* which include students who attended four-year colleges that are rated by the Barron's classification as inclusive or are listed in the IPEDS as having open

[7] The parent items for NELS respondents are reported in the 12th grade rather than the 10th grade.

admission policies. (4) *Competitive admission four-year colleges* include all four-year colleges rated by the Barron's as "most competitive", "highly competitive", "very competitive", "competitive" and "less competitive". Colleges rated as "special" (N=25 for the NELS and N=33 for the ELS) were classified on a case-by-case basis using information from the school website about admission requirements.

Additional adjustment variables: the models also adjust for social and demographic factors known to be associated with both family income and college composition, including race (Hispanic, black, white, Asian or other), geographic regions (Midwest, northeast, south, west), type of locality (urban, rural, suburban), and high school type (private, public, catholic).[8] I also adjust for gender due to differential participation patterns by socioeconomic origins (i.e., Buchman and DiPrete 2006).

Analytic Strategy

I assess changes over time in the average family income on campus by fitting a series of OLS and logit models for the pooled sample predicting the average income on the NELS and ELS students' campuses. I specify the dependent variable in two ways: as a continuous measure of average family income, and as a dichotomous outcome indicating whether or not students attend a low-income campus (defined as an average income on campus that is lower than 30k). These models include indicators for students' family income, their cohort, and an interaction term between cohort and family income. The interaction term between students' family income and

[8] I do not include measurements for parental education since it is highly correlated with students' family income and therefore adjusting for it will underestimate the relationship of interest.

cohort is key in these models because it estimates how the relationship between social background and the average income on college campuses has changed over time.[9]

Because there is no clear causal model that can dictate the order in which factors are introduced into the model, I gauge the range of possible contributions of each factor using two different model assumptions: first, I estimate the impact each set of factors under the assumption that it is completely exogenous to the other explanations tested. Specifically, I compare the estimated change of the gap obtained from the baseline model (which includes family income, cohort, interaction between family income and cohort) to the gap estimated from a nested model that adds, separately, each set of factors associated with each explanation. The difference between these estimates of the change over time yields the "maximum" contribution of the set of factors to the change in the share of students at low-income campuses. To gauge the "minimum" impact of each factor on changes over time, I instead assume that the focal factor is endogenous to all other measured factors (see also Morgan et. al 2013 for a related approach). I compare the change over time estimated from a model that includes the factors associated with all the explanations (i.e., family income, cohort, interaction between family income and cohort and all three explanations) to that obtained from a nested model that excludes only the set of factors associated with the explanation of interest.

Changes in the average family income on college campuses can also result from macro-level processes, like compositional shifts in the population of students who enter higher education in the two cohorts, or from overall growing income inequality. To assess the contribution of compositional shifts to changes in environment, I calculate a counterfactual scenario in which I estimate the anticipated change if the NELS students' characteristics had also

[9] See Alon 2009 and Alon and Tienda 2007 for similar analytic strategy for analyzing changes in socioeconomic stratification over time.

characterized the later, ELS students. Comparing the actual change to the anticipated counterfactual change estimates the extent to which changes in the average income on campuses are driven by compositional shifts.

To examine whether growing income inequality is responsible for the observed changes in campus social environment, I model the average family income as a percentile distribution rather than an absolute dollar value. Changes in the association between student family income and the position of the college on the distribution of colleges will allow me to estimate growing inequality in campus environments that is unaffected by the well-known rise in income inequality across families: a college that is in the 90th percentile in average family income in 1990 may have experienced a sharp rise in average family income by 2002, as family income inequality grew, but no change in its p-tile rank in the distribution of colleges.

RESULTS

Educational expansion and average income on college campuses

A greater share of tenth graders in 2002 attended any type of postsecondary institution than tenth graders in 1990: 84 vs. 79 percent (Table 3.1). Low-income students experienced the largest increase in enrollment: from 62% in 1990 cohort to 75% in the 2002 cohort, or 13 percentage points. The increase in enrollment among middle-income and high-income students, in comparison, was much smaller: from 79% to 86% for middle-income students, and from 94% to 96% for high-income students. These patterns are reversed when we look at changes in the share of students who enter four-year colleges as their first institution: though 47% of low-income students entered four-year colleges as their first institution in both cohorts, the percentage of middle-income students increased from 52% to 61%, and the percentage of high-income students

increased from 74% to 82% for high-income students. The overall percentages of students who enter four-year colleges as their first institution have changed relatively little over time—from 57% in the 1990 cohort to 60% in the 2002 cohort.

Have the social environment that students in 2002 cohort encountered in college differ from those encountered by students in the 1990 cohort? Table 3.2 presents the average family income in students' campuses and the share of students from each cohort that attended low-income campuses. In both cohorts, low-income students enroll in colleges with lower average family income than middle and high-income students. However, the average family income at the institutions that low-income students attend decreased from $41,000 in the 1990 cohort to $36,600 in the 2002 cohort, while the average income in colleges that mid- and high-income students attend changed only little. These results are partly consistent with the argument that income segregation in higher education increased, although we would expect the average family income at colleges that high-income students attend would increase.

The same patterns are evident in the share of students from different social backgrounds that attend low-income campuses. The share of low-income students who attended low-income campuses increased by 10 percentage points, from 38% of the 1990 cohort to 48% of the 2002 cohort. The share of mid-income students who attend low- income campuses decreased by 3 percentage points across the cohorts, from 32% in the 1990 cohort to 29% in the 2002 cohort. The decline in the share of high-income students at low-income campuses was even more pronounced, dropping 5 percentage points, from 18% in the 1990 cohort to only 13% in the 2002 cohort.

Table 3.1: Proportions of 10th graders in 1990 and 2002 who entered higher education institution

	10th graders that attended any type of postsecondary institution		10th graders that attended four-year colleges		N	
	1990	2002	1990	2002	1990	2002
All 10th graders	79%	84%	57%	60%	9,109	9,295
Low-income students	62%	75%	47%	47%	1,800	2,560
Mid-income students	79%	86%	52%	61%	5,034	5,126
High-income students	94%	96%	74%	82%	2,275	1,609

Notes: Data are weighted. See main text for further explanation on family income groups.
Source: NELS 1988 & ELS 2002

Students who attended four-year colleges as their first institutions follow a similar pattern. The average family income on all campuses decreased over time, but the greatest decline was in the family income on campuses that low-income students attended (decreasing from $56,147 in the 1990 cohort to $49,641 in the 2002 cohort). The share of low-income students who attended low-income four-year colleges as their first institution increased from 9 to 15 percent. On top of the already low share of low-income students who enter four-year colleges (see Table 3.1), these patterns imply that low-income 10th graders in 2002 who entered higher education were also more likely than low-income students attended in the prior cohort to attend college in which the average family income that is lower than $30k. Interestingly, the shares of mid-income and high-income students who attended a low-income four-year college as their first institutions also increased, and in proportionate terms quite substantially: the share of high-income students attending low-income four-year colleges doubled from 1 percent to 2 percent for high-income students, and the share of middle-income students attending low-income four-year colleges doubled from 3 to 6 percent. These small but interesting groups of students could be students whose grades and prior academic achievements were insufficient to allow them to secure a

position in increasingly competitive selective colleges, although of course with such small sample sizes the increase could also simply be noise.

Table 3.2: Average family income on campus. Tenth graders in 1990 and 2002 that entered higher education

Population:	10th graders that attended any type of postsecondary institution		10th graders that attended four-year colleges as their first institution	
Cohort:	1990	2002	1990	2002
Average family income of students on campus:				
All students	$49,698	$46,020	$65,464	$58,468
Low-income students	$41,010	$36,630	$56,147	$49,641
Mid-income students	$46,442	$46,543	$62,887	$58,442
High-income students	$60,893	$60,195	$72,261	$67,237
Proportion of 10th graders enrolled in a low-income campuses:				
All students	29%	31%	3%	7%
Low-income students	38%	48%	9%	15%
Mid-income students	32%	29%	3%	6%
High-income students	18%	13%	1%	2%

Notes: Data is weighted. All dollar amounts are presented in set 1999 dollars.
Source: College Scorecard Data, NELS 1988 & ELS 2002

Changes in student characteristics and college destinations patterns

As I argued above, these changes in the average income at students' colleges could be related to changes in student characteristics, changes in the sorting mechanisms by which students are matched to (and choose) institutions, and macro-level processes such as rising growing income inequality and compositional changes in the overall population of students attending higher education. In his section I examine evidence for changes in student characteristics and choice of institutions that may help account for the changes in college average income observed in Table 3.2.

Changes in students' characteristics

Table 3.3 presents the average math and reading scores of tenth graders in 1990 and 2002 that attended higher education. In both cohorts, low-income students have weaker academic preparation than their more affluent peers. The average academic preparation of low-income tenth graders who entered any type of postsecondary institution also decreased over time, from -.15 to -.31 for 10^{th} and 12^{th} grade math scores, and from -.13 to -.29 for 10^{th} grade reading scores. The average academic achievements of mid- and high-income students, by contrast, did not changed across the two cohorts. These patterns are consistent with previous findings (e.g., Reardon 2011), and suggest that low-income students arrive to college with even larger disadvantage in academic preparation than their counterparts in earlier cohorts. This interpretation is also consistent with the changes in the ACT/SAT scores of students from different social background that entered higher education (see Table 3.3). The relative percentile of low-income students remain the same-39^{th} percentile, while that of mid- and high-income students increased from 51^{st} to 55^{th} for mid-income students and from 63^{rd} to 69^{th} for high income

students. Given admission to selective colleges is based primarily on SAT/ACT scores (e.g., Alon and Tienda 2007), these trends suggest that low-income students face a greater disadvantage in admission to selective colleges.

The increased disadvantage of low-income students may not reflect a decline in the preparation of these students, but a shift in the share and characteristics of low-income students who enter higher education (see Table 3.1). The last column in Table 3.3 shows the indicators for all students in the NELS and ELS samples, including those who did not attend any type of postsecondary institution. It indicates that socioeconomic gaps in academic math and reading test scores were larger in the 2002 cohort than in the 1990 cohort, due to both a decline in the average scores of low-income students, and an increase in the average scores of high-income students. SAT/ACT percentile scores also show divergence, driven not by a decline in the average SAT/ACT percentiles of low-income students (which held steady across the cohorts at about the 34th percentile), but by an increase in the SAT/ACT scores of middle- and, in particular, high-income students. Specifically, middle-income students' average SAT/ACT percentile scores increased from 47 to 51, while high-income students' average percentile scores increased from 6^{1} to 67. The similarity in patterns of change across the different samples implies that the changes in the population of students attending higher education reflects overall changes over time, rather than localized changes in the population of students who enter higher education.

Table 3.3: Academic preparation of 10th graders in 1990 and 2002, by students' family income and attendance status

Population:	10th graders who attended any type of postsecondary institution		10th graders who attended four-year colleges as their first institution		All 10th graders	
Cohort:	1990	2002	1990	2002	1990	2002
10th grade Math scores (standardized)						
Family income in 10th grade:						
Low-income	-0.15	-0.31	0.22	0.02	-0.36	-0.45
Mid-income	0.21	0.20	0.56	0.48	0.07	0.09
High-income	0.61	0.65	0.79	0.79	0.55	0.61
12th grade math scores (standardized)						
Low-income	-0.15	-0.31	0.23	0.03	-0.37	-0.46
Mid-income	0.22	0.21	0.60	0.51	0.07	0.09
High-income	0.63	0.69	0.81	0.84	0.56	0.65
10th grade reading scores (standardized)						
Low-income	-0.13	-0.29	0.16	0.03	-0.34	-0.44
Mid-income	0.20	0.21	0.51	0.48	0.07	0.11
High-income	0.54	0.53	0.70	0.64	0.48	0.50
SAT/ACT percentile						
Low-income	39.07	39.03	47.55	49.66	33.64	34.78
Mid-income	50.79	54.79	61.47	64.46	46.92	51.36
High-income	63.29	68.56	68.38	73.53	61.34	67.34

Notes: Data are weighted.
Source: NELS 1988 & ELS 2002

Even as socioeconomic gaps in students' academic preparation widened, gaps in students' educational expectations declined. These changes may have downstream effects, too, in that expectations impact students' attitudes towards school and their behaviors in class (Morgan, Leenman, Todd, Weeden 2013). Table 3.4 presents the share of 10th graders in each cohort who entered higher education and aspires to get a bachelor's degree, and their commitment scores (standardized to the entire population of 10th graders in each cohort). The majority of students in both cohorts indicated that they plan to earn a bachelor's degree. However, despite the pervasiveness of the college-for-all culture, there has been very little change in the educational expectations of low-income students who entered any type of postsecondary institution, or entered four-year colleges. Specifically, college expectations increased from 67% to 70% among low-income students who attended any type of postsecondary institution, and from 85% to 87% among low-income students who attended four-year colleges as their first institution. In the total ELS and NELS samples, including those who did not attend a postsecondary institution, the share of low-income students who indicated they expect to earn a bachelor's degree increased from 49 percent in the 1990 cohort to 59 percent.

A greater change in college expectations is evident among mid- and high-income students who enter higher education: the share of students expecting to earn a bachelor's degree among students who attended any type of postsecondary institutions increased from 72% to 80% for mid-income students and from 86% to 90% for high income students. Similarly, the share of students expecting to earn a bachelor's degree among students who attend four-year colleges increased from 88% to 93% among mid-income students and from 91% to 96% for high-income students. And, in the entire sample, the share of mid-income students expecting to earn a

bachelor's degree increased from 62% to 73% and from 82% to 88% among high-income students.

However, Table 3.4 also shows that rising educational expectations among college going students had little bearing on their attitudes and behaviors in schools. In both cohorts, the commitment scores of students who entered higher education, or who entered four-year colleges, are higher than the average commitment scores in their cohort (i.e., zero). Differences by social background are evident, even among the select group of students who attend four-year colleges: low-income students have the lowest commitment scores while high-income students have the highest. Over time, differences in commitment are growing: the average commitment scores of low-income students in the 1990 cohort is 0.01 for all 10th graders, .20 for those who entered any type of postsecondary institution, and .40 for those who entered four-year colleges. The commitment scores of their counterparts in the 2002 cohort are –0.01 for all low-income 10th graders is, .12 for those that attended any type of postsecondary institution, and .34 for those who entered four-year colleges. Among mid- and high-income students, in contrast, commitment scores either rose, or stayed relatively stable.

The prior results thus show that gaps in academic preparation have been rising, gaps in educational expectations have been growing (largely because of stagnant expectations among low-income students relative to more advantaged students), and differences in behaviors and attitudes have been widening. The stability in the average commitment scores of all low-income 10th graders, and their decline in the select group of students who attend higher education suggest changes in the sorting of low-income students into higher education.

Table 3.4: College expectations and commitment to school among 10th graders in 1990 and 2002

Population:	10th graders that attended any type of postsecondary institution		10th graders that attended four-year colleges		All 10th graders	
10th grader cohort:	1990	2002	1990	2002	1990	2002
Commitment factor score (standardized)						
Family income in 10th grade:						
Low-income	0.20	0.12	0.40	0.34	0.01	-0.01
Mid-income	0.22	0.28	0.43	0.46	0.12	0.20
High-income	0.35	0.41	0.52	0.50	0.31	0.39
Proportion of students who expect to earn a bachelor's degree						
Low-income	0.67	0.70	0.85	0.87	0.49	0.59
Mid-income	0.72	0.80	0.88	0.93	0.62	0.73
High-income	0.86	0.90	0.91	0.96	0.82	0.88

Notes: Data are weighted.
Source: NELS 1988 & ELS 2002

Changes in the type of first college students attend

Changes in student characteristics and attitudes may impact the initial sorting of students into different types of institutions. But, as noted above, changes in the availability of slots at different colleges, and changes in admission practices due to increased competition, can influence the distribution of students across institutions independent of students' characteristics. Table 3.5 presents the distribution of students in each cohort across different destinations in higher education. Low-income students who entered any type of postsecondary institution (Panel A) were more concentrated at for-profit colleges and inclusive four-year non-profit colleges in the later cohort than in the earlier cohort (increasing from 6% to 8% and from 6% to 9%, respectively). Given that the overall share of low-income students who entered higher education increased from 62% in 1990 to 75% in 2002 (i.e., Table 3.1), the absolute number of low-income students who attend open admission colleges increased substantially. The share of low-income students who entered higher education and attended two-year community colleges over time stayed the same, from 49% in the 1990 cohort to 48% in the 2002 cohort. However, because a greater number of low-income students entered higher education in the 2002 cohort, the absolute number of low-income students attending also increased. This is reflected in Panel C, which shows the share of students who attended each college destination from the entire NELS and ELS sample. The overall share of low-income students who attended for-profit colleges doubled: from 3 percent in 1990 to 6 percent in 2002. The overall share of low-income students attending two-year colleges as their first institution increased from 30% to 36%, and the share of students attending open admission four-year colleges increased from 4% to 7%. By contrast, the share of low-income students who attended four-year colleges with competitive admission as their first

institution decreased from 40% to 35% among students who entered higher education, and stayed relatively stable for the entire sample of students, increasing from 25% in 1990 to 27% in 2002.

Table 3.5: Distribution of 10th graders in 1990 and 2002 across college destinations

College destination:	For-profit colleges	Two-year open admission colleges	Four-year open admission non-profit	Four year competitive admission colleges
Panel A: 10th graders that attended any type of postsecondary institution				
1990				
Low-income	0.06	0.49	0.06	0.40
Mid-income	0.03	0.45	0.04	0.47
High-income	0.01	0.26	0.05	0.68
2002				
Low-income	0.08	0.48	0.09	0.35
Mid-income	0.06	0.36	0.08	0.51
High-income	0.01	0.18	0.05	0.76
Panel B: 10th graders that attended four-year colleges as their first institution				
1990				
Low-income	0.02	-	0.13	0.85
Mid-income	0.01	-	0.08	0.90
High-income	0.01	-	0.06	0.92
2002				
Low-income	0.05	-	0.19	0.75
Mid-income	0.04	-	0.12	0.84
High-income	0.01	-	0.06	0.93
Panel C: All 10th graders				
1990				
Low-income	0.03	0.30	0.04	0.25
Mid-income	0.03	0.36	0.03	0.37
High-income	0.01	0.24	0.04	0.64
2002				
Low-income	0.06	0.36	0.07	0.27
Mid-income	0.05	0.31	0.07	0.44
High-income	0.01	0.17	0.05	0.73

Notes: Data are weighted. N=7385 for 1990 cohort and N=8173 for the 2002 cohort in Panel A. N=4494 for the 1990 cohort & N=5375 for the 2002 cohort in Panel B. N=9109 for the 1990 cohort and N=9295 for the 2002 cohort in Panel C.
Source: NELS 1988 & ELS 2002

Among students who attended four-year colleges as their first institutions, the decline in access of low-income students to competitive admission colleges is even clearer. The share of low-income students attending for-profit colleges and non-profit open admission four-year colleges increased over time: from less than 2 to over 5 percent at for-profit colleges, and from 12 to 19 percent at non-profit inclusive colleges.

These patterns are reversed for mid- and high-income students. Among students who entered any type of postsecondary institution, the share of mid-income students who attended for-profit colleges increased from 3% to 6%, and so did their representation at four-year open admission colleges. Unlike low-income students, the share of mid-income students at community colleges decreased from 45% to 36%, and their representation at competitive admission four-year colleges increased from 47% to 51%. These patterns are also evident when we look at the entire sample of 10th graders at each cohort. The representation of mid-income students at two-year colleges decreased from 36% to 31%, but increased from 37% to 44% at four-year competitive admission four-year colleges.

These relative changes, coupled with overall higher share of enrollment among mid-income students, indicate that there are substantially fewer middle-income students at community colleges in the more recent cohort. The share of high-income students attending for-profit colleges and inclusive four-year colleges stayed relatively stable over time in all samples, but the share of high-income students who attend two-year colleges decreased from 26% to 18% among students who entered any type of postsecondary education, and from 24% to 17% among all 10th graders. Their representation at competitive admission four-year colleges increased from 68% to 76% among students who attended any type of postsecondary institution, and from 64% to 73% among all 10th graders.

Changes in average family income on college campuses over time: multivariate models

To what extent did class-specific changes in students' academic preparation, expectations and attitudes, or the type of institutions they attend, is associated with the changes in the average family income on students' campuses? To examine this question, I estimate a series of OLS models predicting the average family income on respondents' campuses (Models 1-6, Table 3.6), using the students in the NELS and ELS samples who attended any type of institution. These models include an indicator of students' family incomes (measured in high school), their cohort (i.e., 1990 and 2002), and an interaction between the cohort and family income. High-income students and the 1990 cohort are set as the reference category in these models.

Model 1 estimates changes over time in the average family income on college campus as a function of students' cohort and family income. The interaction term between low-income and cohort in this model is negative, large, and statistically significant. Specifically, the coefficients in Model 1 suggest that that low-income students in the later cohort attend colleges in which the average family income was about $3,700 lower than the campuses their counterparts in 1990 attended. The change in the average family income of campuses attended by mid-income students and high-income students (reflected in the cohort main effect) is small in magnitude and not statistically significant.

Model 2, which I consider the baseline model, adds adjustment for other social and demographic factors, including gender, race, region, locality and high school type. Adjusting for these factors has little impact on the magnitude and standard error of the interaction between low-income and cohort which remain large and significant (See Table 3.6). The magnitude of the

interactions between mid-income and cohort, and the main effect of cohort, however, shrank in size, from $798 in Model 1 to -$53 in Model 2.

Models 3 through 5 examine how adjusting for academic preparation, expectations, and college destinations (entered separately) alters the estimated association between students' family income and their campuses family income. Adjusting for changes in students' academic preparation and test scores in Model 3 reduces the impact of low academic preparation from (-$3,304) in Model 2 to (-$972) in Model 3, and the effect is no longer statistically significant. Adjusting for changes in students' attitudes and expectations had only a small effect on the interaction term, decreasing in magnitude from (-$3,304) in Model 2 to (-$2560) in Model 4, and is only marginally significant. Adjusting for changes in the type of college students attend yielded the largest impact on the magnitude of the interaction term: the effect decreased from (-$3,304) to $321.65 and is no longer statistically significant. This is similar to Model 6, which includes all factors. The negative interaction term has changed direction, and the standard error is large, implying that the fully specified model explains away the decrease in the average family income in the campuses low-income students attend reported in Model 3-5.

Models 7 through 12 in Table 3.6 use logit models to estimate the likelihood of students to enroll in low-income campuses, defined here as campuses with average family income lower than $30,000 per year. The patterns described above are the same: the likelihood that low-income students in the 2002 cohort will enroll at low-income campuses is significantly higher than that of low-income students in the 1990 cohort. This is the case even when changes in academic preparation, attitudes and expectations, and the type of colleges students attend are fit in the models.

Table 3.6: Coefficients from OLS and logit models predicting the average family income in students' campus, 10th graders in 1990 and 2002 that attended any type of postsecondary institution

Outcome:	Average family income on campus					
Estimation method:	OLS Models					
Model #:	1	2	3	4	5	6
Family income (high income students=0)						
Low-income	-19,883.21**	-14,347.83**	-7,880.25**	-12,233.51**	-7,285.18**	-5,972.66**
	(1,468.175)	(1,410.651)	(1,238.021)	(1,312.412)	(914.712)	(886.209)
Mid-income	-14,450.72**	-12,000.02**	-8,163.69**	-9,899.47**	-6,043.68**	-5,372.53**
	(1,239.875)	(1,164.715)	(993.252)	(1,100.668)	(779.537)	(769.318)
Cohort: 2002	-698.13	203.44	-1,753.65	-800.87	-2,859.20**	-3,366.22**
	(1,453.193)	(1,299.625)	(1,096.492)	(1,206.248)	(852.459)	(829.863)
Family income*cohort interactions:						
Low-income*2002	-3,682.10*	-3,303.70*	-972.74	-2,559.66+	321.65	746.47
	(1,799.574)	(1,646.919)	(1,414.930)	(1,501.262)	(1,071.067)	(1,025.124)
Mid-income*2002	798.98	-53.02	690.32	-553.62	1,019.10	1,116.56
	(1,545.601)	(1,416.224)	(1,183.794)	(1,315.936)	(916.410)	(894.226)
Adjustments:						
Social/Demographic factors		Yes	Yes	Yes	Yes	Yes
Academic preparation and SAT/ACT scores			Yes			Yes
Educational expectations and commitment				Yes		Yes
Type of college					Yes	Yes
Constant	60,892.97**	63,356.16**	43,576.28**	51,019.53**	48,338.05**	43,737.21**
	(1,111.688)	(1,171.699)	(1,398.837)	(1,195.463)	(1,047.581)	(1,248.770)
Observations	15,558	15,558	15,558	15,558	15,558	15,558
Model chi-square						
df						
R-squared	0.106	0.228	0.405	0.335	0.671	0.689

Notes: Data are weighted. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Table 3.6 (continued): Coefficients from OLS and logit models predicting the income diversity in students' campus, 10th graders that attended any type of postsecondary institution

Outcome:	Enrollment in a low-income serving campus					
Estimation method:	Logit models					
Model #:	7	8	9	10	11	12
Family income (high income students=0)						
Low-income	1.08**	0.75**	0.30+	0.64**	0.22	0.16
	(0.157)	(0.165)	(0.180)	(0.174)	(0.211)	(0.211)
Mid-income	0.79**	0.70**	0.47**	0.58**	0.24	0.21
	(0.134)	(0.140)	(0.146)	(0.151)	(0.185)	(0.188)
Cohort: 2002	-0.38*	-0.49**	-0.35+	-0.40*	-0.10	-0.10
	(0.172)	(0.176)	(0.181)	(0.182)	(0.229)	(0.231)
Family income*cohort interactions:						
Low-income*2002	0.76**	0.77**	0.64**	0.73**	0.55*	0.54*
	(0.204)	(0.208)	(0.219)	(0.214)	(0.269)	(0.270)
Mid-income*2002	0.23	0.30+	0.25	0.33+	0.21	0.22
	(0.177)	(0.184)	(0.188)	(0.193)	(0.238)	(0.242)
Adjustments:						
Social/Demographic factors		Yes	Yes	Yes	Yes	Yes
Academic preparation and SAT/ACT scores			Yes			Yes
Educational expectations and commitment				Yes		Yes
Type of college					Yes	Yes
Constant	-1.55**	-2.06**	-0.71**	-1.28**	-1.99**	-1.62**
	(0.123)	(0.165)	(0.195)	(0.179)	(0.262)	(0.304)
Observations	15,558	15,558	15,558	15,558	15,558	15,558
Model chi-square	282.7	613.0	1026	652.3	889.3	936.2
df	5	16	20	18	19	25
R-squared	0.0388	0.122	0.206	0.170	0.500	0.503

Notes: Data are weighted. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Source: NELS 1988 & ELS 2002, College Scorecard data

The likelihood that high-income students entered low-income campuses, by contrast, decreased over time. There has been no significant change in the likelihood of mid-income students to enroll in low-income campuses. Similar to the OLS models, adjusting for changes in the type of institutions students attend yield the largest decrease in the magnitude of the interaction term between low-income and cohort (although it remains statistically significant).

Student characteristics or college type?

Academic preparation, educational expectations, and institution type are highly correlated, and their impact on changes in the average family income in the campuses students attend may overlap. It is possible that in the 2002 cohort, lower performing students were pushed more toward for-profit colleges and two-year colleges than students in the earlier cohort. Stronger achievement-based sorting in higher education will increase the representation of low-income students at open admission colleges, especially given the widening socioeconomic gaps in academic preparation. Under this scenario, we would not expect differences in college type to account for much of the change in campus family income once student characteristics such as preparation, expectations, and commitment are taken into account.

However, socioeconomic differences in college destinations can also be independent of students' characteristics, reflecting the increased competition for slots in selective admission colleges. These changes, along with growing share of enrollment of non-traditional students at open admission colleges, may change the relationship between the type of college and its social environment independently of students' characteristics. Thus, even among students with similar characteristics who enter similar institution types in the two cohorts, we would expect to find

changes in the average family income on their campus. Under this scenario, adjusting for college type will be associated with campus environment even once students' characteristics are included in the models.

To gain insight into these alternative explanations for the relationship between college type, student characteristics, and the social environment students encounter on campus, I estimate the range of explanatory power of each set of factors (academic preparation, educational expectations and commitment, and college type) using two guiding assumptions: First, I gauge the explanatory power of each factor under the assumption they are completely exogenous to the others. To this end, I compare the estimated share of low-income students attending low-income colleges obtained from the baseline model (Model 8) to that obtained from a nested model adjusting for the factor (i.e., Model 9 to 11). These comparisons yield the "maximum" contribution of each factor to changes over time in the share of students at low-income campuses.

Next, I gauge the contribution of each set under the assumption they are completely endogenous to other factors. In this scenario, I compare the estimated share of low-income students attending low-income colleges obtained from the full model which includes all factors (i.e., Model 12) to that obtained from a nested model that exclude only the factor of interest (models available from author). These comparisons yield the "minimum" possible contribution of these factors to changes over time in the share of students enrolled at low-income campuses. The estimations from each model and their minimum and maximum estimated contributions to changes [[in what]] over time are presented in Table 3.7.

Panel A in Table 3.7 lists the predicted change in the share of low-income students attending low-income campuses under the different model specifications. Panel B in Table 3.7

summarizes the share of the change between the 1990 and the 2002 cohort that can be attributed to each set of factors: Between 1 to 15 percent of the rise in the concentration of low-income students at low-income-serving colleges can be attributed to changes in academic preparation and test scores. Between 0 and 13 percent of these changes over time can be attributed to changes in students' expectations and commitment to school. The largest contribution is the type of colleges students attended, which account for 26% to 43% of the increase in the concentration of low-income students at low-income colleges. In other words, most of the change in the relationship between students socioeconomic backgrounds and the average income in the campus they attend was not due to changes in students characteristics, but rather to the growing stratification in the type of institution students attend and to growing inequality in average family income across institution type.[10]

Slightly different results emerge when I fit these models to the subsample of students who attended four-year colleges as their first institutions (see Appendix 3.A and Appendix 3.B). The minimum and maximum ranges for the academic preparation, educational expectations and college type indicate that these factors are less effective at accounting for changes over time in the social environments low-income students encounter in four-year colleges. The increasing concentration of low-income students at two-year colleges, however, suggest that focusing only on students who enter four-year colleges underestimates the changes in the average income at campuses low-income students attend. Moreover, it underestimates the importance of the growing supply of open admission institutions to these trends, the majority of which are two-year.

[10] The results are the same when the effects of each set of factors are allowed to vary by cohort (see Appendix 3.C).

Table 3.7: Adjusted share of low income 10th graders in 1990 and 2002 who attend low-income campus. Students that attended any type of postsecondary institution

Panel A: Observed and predicted share of low income students that enroll in low-income colleges

	1990	2002	Change 1990-2002
M1: student family income*cohort	0.385	0.478	0.093
M2: M1+social/demographic factors (baseline)	0.329	0.411	0.082
M3: M2+ Academic preparation	0.284	0.354	0.070
M4: M2+Educational expectations and commitment	0.322	0.393	0.071
M5: M2+Type of college	0.292	0.339	0.047
M6: Full model	0.289	0.336	0.047
M7: M6-academic preparation	0.292	0.34	0.048
M8: M6-expectations/commitment	0.289	0.336	0.047
M9: M6-type of college	0.287	0.355	0.068

Panel B: Minimum and Maximum estimations of the contributions of each set of factors to the change over time

	Minimum	Maximum
Academic preparation and SAT/ACT scores	-1%	-15%
Educational expectations and commitment	0%	-13%
Type of college	-26%	-43%

Notes: Data are weighted. Coefficients for Model 1-6 are in presented in Table 6. Maximum estimations assume the predictors are exogenous to the effect of other factors, therefore comparing the difference in the gap between the baseline model (i.e., Model 2), and a nested model that adds each factor. Minimum estimations assume factors may be endogenous, and reflect the difference in the gap between the full model (M6) and a model that excludes the factor in question. See main text for further explanation.
Source: College Scorecard data, NELS 1988 & ELS 2002

Taken together, these results suggest that the social environments students encounter on their college campuses, proxied here by the average family income on campus, have changed over time, especially for low-income students. Although changes in students characteristics, including academic preparations, test scores, educational expectations and commitment, account for some of these changes, the growing segregation of students by college type appears more consequential for explaining these trends.

Rising income inequality, or compositional shifts?

In the preceding sections, I examined how micro-level factors are associated with changes in the social environment students encounter on college campuses, assuming that these changes reflect a real social change in the organization and stratification in higher education. In this section I assess this assumption by examining two alternative explanations—growing income inequality and compositional shifts—that may generate similar patterns of change in the average income on college campuses, without representing changes in the organization or stratification in higher education.

Growing income inequality

Growing income inequality (e.g., Kruger 2012) may pull down the average income at low-income colleges even if the share of low-income students who enroll in the college have stayed the same over time. In this case, the decrease in average family on college campuses that low-income students attend may be a by-product of the declining family incomes of low-income students, rather than a mark of changes in sorting processes.

To assess this possibility, I re-estimate models from Table 3.6 but with a relative, rather than absolute, measure of college average income, specifically, the percentile rank of each campus in the distribution of "campus" incomes (i.e., the campus-specific average family income). I standardize the distribution within cohorts to account for the fact that there were many more colleges and universities at the time students from the ELS cohort enter higher education than at the time the NELS students entered higher education. Colleges ranked lower on the distribution have lower absolute average family income.

The results from these models, presented in Table 3.8, indicate shifts in the association between students' social background and college *relative* income, complementing the earlier results on *absolute* campus income. The interaction term between low-income and cohort is negative and statistically significant in Model 1, indicating that low-income students in the later cohort enrolled in campuses that were ranked about 6 percentiles lower than low-income students in the earlier cohort. The interaction term between mid-income and cohort, and the main effect for cohort (which reflect the change in the association between the reference category, high income students, and the percentile rank of the average family income on campus) support this interpretation: the percentile ranks of campus income did not for middle-income students, and rose for high-income students.

Model 2 and 3 in Table 3.8 add adjustments for individual-level characteristics (Model 2) and college type (Model 3). The patterns of association are very similar to those reported in Table 3.6. The main effect for cohort is positive and significant, while the interaction term between low-income background and cohort is negative (although not significant). In models that adjust for college type as well, the magnitude of the relevant coefficients decrease substantially, and the main effect is no longer significant. I conclude that although rising income inequality account for some of the trends in the average family income on college campuses, it is the growing stratification of students by college type that is more strongly associated with changes in the association between student socioeconomic background and the average family income at their respective institution.

Table 3.8: Coefficients from OLS models predicting the percentile rank of the family income on college campuses.

Model #:	(1)	(2)	(3)
Family income:			
Low-income	-20.26**	-6.67**	-4.18**
	(1.711)	(1.471)	(0.947)
Mid-income	-13.83**	-6.53**	-3.42**
	(1.272)	(1.075)	(0.707)
Cohort: 2002	4.20**	2.89*	1.11
	(1.399)	(1.122)	(0.727)
Family income*cohort interactions:			
Low income*2002	-5.91**	-2.73	-0.56
	(2.104)	(1.667)	(1.126)
Mid-income*2002	0.23	-0.37	0.52
	(1.604)	(1.280)	(0.835)
Social/demographic factors	No	Yes	Yes
Academic preparation & SAT scores	No	Yes	Yes
Educational expectations and commitment	No	Yes	Yes
Type of college	No	No	Yes
Constant	75.67**	54.00**	62.05**
	(1.053)	(1.653)	(1.670)
Observations	15,558	15,558	15,558
R-squared	0.083	0.402	0.728

Notes: Data are weighted. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1

Source: NELS 1988 & ELS 2002

Changes in the sorting of students to higher education

The expansion of higher education brought into higher education a population of students who in previous cohorts had not enrolled in higher education, especially among low-income students (i.e., Table 3.1). These changes suggest a compositional shift in the population of students in higher education, as indeed was evident in Table 3, 4 and 5. They could generate a change in the association between student' family income and college environment if low-income students who previously did not enter higher education at all began entering low-income campuses, thereby pulling down the average family income on college campuses for all low-income students. An empirical implication is that we would see no meaningful cohort interaction on the association between campus environment and students' social background for students with similar characteristics.

To assess this possibility, I ask a counterfactual question: if the 1990 cohort of high school sophomores had instead gone to college in 2004 or thereafter, what would the association between student social background and the average family income at their respective campus look like? The intuition here is that if students' characteristics remain the same across cohorts, any changes in the association between students' characteristics and college average family income must be due to structural changes in higher education, namely, the expansion of open admission colleges. Using a logit model that predicts the likelihood of students to attend a low-income campus, I calculated the share of students from each family income group that would be expected to enroll in low-income campus under the counterfactual scenario of constant student characteristics. The logit model includes students' family income, cohort, interaction between cohort and family income, and personal attributes (social and demographic factors, academic preparation, educational expectations and commitment). I do not include adjustments for college

type in this model because the changing relationship between students' characteristics and college types does not represent compositional shifts in the sample of students (although it could be a byproduct of it). The actual and estimated share of students attending low-income campuses is presented in Table 3.9.

The results from this analytic exercise indicate that compositional shifts account for some, but a relatively trivial share, of the change in the association between student social background and campus social environment. The share of low-income students who attended a low-income campus increased between 38% for the 1990 cohort to 48% in the 2002 cohort. Among 10th graders in 2002 with similar characteristics as those of 10th graders in 1990 that attended any type of postsecondary, the share of low-income students at low-income campuses increased by 6 percentage points to 44%. In other words, only about one third of the change in the concentration of low-income students at low-income institutions is associated with compositional shifts in the sample of students.

Compositional shifts account for a slightly larger share of the change in concentration of mid-income and high-income students at low-income campuses. The share of mid-income students who attended low-income campuses decreased by three percentage points between 1990 and 2002 (i.e., actual change), and by one percentage points among students with similar characteristics (i.e., counterfactual change). Similarly, compositional shifts account for about a third of the change in the concentration of high income students at low-income campuses (an actual decline of 5 percentage points in comparison to an expected decline of 3 percentage points).

Table 3.9: Actual and predicted share of students attending low-income campuses, 10th graders in 1990 and 2002

Estimated distribution:	Actual distribution			Counterfactual distribution	
	10th graders in 1990 that attended any type of postsecondary institution	10th graders in 2002 that attended any type of postsecondary institution	Change 2002-1990	10th graders in 2002 with the similar characteristics as 10th graders in 1990 that attended any type of postsecondary institution	Expected change 2002-1990
Low income	0.38	0.48	0.09	0.44	0.06
Mid income	0.32	0.29	-0.03	0.31	-0.01
High income	0.18	0.13	-0.05	0.14	-0.03

Source: College Scorecard, NELS 1988 & ELS 2002

These results provide compelling evidence for a social change in higher education, above and beyond either compositional shifts or rising (absolute) income inequality. Students who enter higher education today are encountering a social environment that is significantly different than that encountered by observationally similar students in the 1990s. Income segregation in higher education appears to be increasing because the relationship between students' social background, the type of college they choose, and the social environment that they are likely to encounter there, is strengthening.

DISCUSSION AND CONCLUSIONS

Scholarship on the expansion of higher education focuses primarily on changes in the educational opportunities available to low-income students to earn degrees (e.g., Brand at al 2014; Goldrick-Rab 2010; Alon 2009). In this chapter, I have instead shifted focus to the resources available to students through their college campuses, under the assumption that (a)

college campus are a major site of interaction, learning, socialization, and network formation, and (b) college campuses where the average family income is comparatively high offer their students a comparatively advantaged social environment vis a vis these resources. Furthermore, I have argued that changes in the environment of college campuses can increase or decrease disparities among students from different social backgrounds in the quality of the resources they encounter through their college experience.

Using longitudinal information on two cohorts of high school students in the 1990s and in the 2000s, I document changes in the social environment students encounter on college campuses, measured by changes in the average family income of all students on campus. I find that although access to higher education system is becoming more universal, as evident in the growing share of enrollment among low-income students, income segregation on college campuses is also becoming more extreme. Low-income students in the 2000s were more likely to attend colleges characterized by lower campus family income than observationally similar students attended in the 1990s. Conversely, high-income students in the 2000s were less likely to attend low-income campuses than their 1990s counterparts.

To be sure, these shifts take place in the context of many intertwined changes in student attributes, campus attributes, and overall levels of inequality. However, these changes had little bearing on the changes in the association between family background and campus composition. Instead, I find that the expansion of open admission colleges—two-year community colleges, for-profit colleges and open admission non-profit four-year colleges—shifted the distribution of low-income students towards these colleges, conditional on academic preparation and educational plans. High-income students, by contrast, became more competitive, and are increasingly more concentrated at competitive admission colleges. At the same time, for-profit

and community colleges have attracted a high share of non-traditional students, the majority of which are from disadvantaged backgrounds. These two processes together contribute to the increase in income segregation in higher education. However, it is important to keep in mind that students can, and do, move between institutions. It is possible that low-income students move up in the rank of the average family income on campus in their second intuition.

How should we evaluate these findings in light of recent efforts to increase the number of slots at open admission colleges and make them more affordable (and even free) to low-income students (e.g., Smith 2015)? Open admission colleges have opened the door to college education to many low-income students who may otherwise not enter higher education altogether. Many of these colleges may enable low-income students to "get their foot in the door" of higher education and later transition to four-year colleges. Nevertheless, researchers and policymakers should take not of the unintended consequences of the recent expansion of open admission colleges on income segregation in higher education, and consider how it may have shaped the academic experience of students in higher education. The shape of educational expansion is not pre-determined; it is the results of various policy decisions, negotiations and interventions (Mettler 2014). More efforts to close socioeconomic gaps in high school academic performance, for example, or increase the representation of low-income students at competitive admission colleges, can offset some of these trends in income segregation.

This study identifies an important and novel implication of the recent expansion of open admission colleges. The next step for future research is to further examine the relationship between the social environment on college campuses and the life chances of students from different social background. Comparing the labor market and other life outcomes of low-income students who attended similar types of institutions, but with different average family income, for

example, can shed new light on the mechanisms by which campus social environment is associated with students' outcomes in higher education.

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Appendix 3.A: Coefficients from OLS and logit models predicting the average family income in students' campus, 10th graders that attended four-year colleges

Outcome:	Average family income on campus					
Estimation method:	OLS Models					
Model #:	1	2	3	4	5	6
Family income (Above 85k=0)						
Low-income	-16,113.75**	-10,409.17**	-6,941.23**	-10,064.18**	-9,878.15**	-7,362.73**
	(1,530.916)	(1,311.180)	(1,218.525)	(1,218.863)	(1,214.159)	(1,150.736)
Mid-income	-9,374.38**	-7,423.67**	-6,186.91**	-6,958.25**	-7,383.62**	-6,287.93**
	(1,152.072)	(1,036.100)	(971.118)	(996.165)	(1,031.249)	(976.190)
Cohort: 2002	-5,024.14**	-3,927.99**	-5,174.56**	-4,320.92**	-4,088.33**	-5,184.82**
	(1,200.134)	(1,075.964)	(969.304)	(1,011.727)	(1,013.941)	(943.499)
Family income*cohort interactions:						
Low-income*2002	-1,482.25	-1,955.52	-568.97	-1,610.00	53.58	605.97
	(1,866.512)	(1,566.194)	(1,438.253)	(1,447.827)	(1,371.522)	(1,272.549)
Mid-income*2002	579.12	-149.62	728.07	-393.87	1,351.29	1,455.50
	(1,430.707)	(1,248.518)	(1,141.385)	(1,183.350)	(1,187.723)	(1,099.226)
Adjustments:						
Social/Demographic factors		Yes	Yes	Yes	Yes	Yes
Academic preparation and SAT/ACT scores			Yes			Yes
Educational expectations and commitment				Yes		Yes
Type of college					Yes	Yes
Constant	72,261.10**	74,932.43**	59,025.35**	65,550.93**	56,838.04**	48,114.48**
	(892.111)	(922.129)	(1,328.644)	(1,264.795)	(1,581.526)	(1,673.140)
Observations	9,870	9,870	9,870	9,870	9,870	9,870
Model chi-square						
df						
R-squared	0.116	0.254	0.355	0.306	0.356	0.427

Notes: Data are weighted. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
Source: NELS 1988 & ELS 2002

Appendix 3.A (continued): Coefficients from OLS and logit models predicting the average family income in students' campus, 10th graders that attended four-year colleges

Outcome:	Enrollment in low-income students serving campus					
Estimation method:	Logit models					
Model #:	7	8	9	10	11	12
Family income (Above 85k=0)						
Low-income	2.53**	1.92**	1.52**	1.92**	1.85**	1.67**
	(0.460)	(0.447)	(0.457)	(0.451)	(0.476)	(0.495)
Mid-income	1.36**	1.21**	1.12**	1.14*	1.37**	1.31**
	(0.404)	(0.424)	(0.425)	(0.457)	(0.485)	(0.495)
Cohort: 2002	1.04*	0.98*	1.32**	1.13*	1.09*	1.27*
	(0.426)	(0.432)	(0.448)	(0.443)	(0.503)	(0.526)
Family income*cohort interactions:						
Low-income*2002	-0.47	-0.45	-0.66	-0.53	-0.74	-0.77
	(0.540)	(0.524)	(0.543)	(0.531)	(0.568)	(0.586)
Mid-income*2002	-0.24	-0.19	-0.44	-0.17	-0.67	-0.71
	(0.491)	(0.499)	(0.498)	(0.525)	(0.554)	(0.562)
Adjustments:						
Social/Demographic factors		Yes	Yes	Yes	Yes	Yes
Academic preparation and SAT/ACT scores			Yes			Yes
Educational expectations and commitment				Yes		Yes
Type of college					Yes	Yes
Constant	-4.84**	-5.92**	-4.31**	-5.36**	-4.90**	-4.17**
	(0.331)	(0.436)	(0.454)	(0.441)	(0.603)	(0.634)
Observations	9,870	9,870	9,870	9,870	9,870	9,870
Model chi-square	126.9	267.2	332.2	370.1	461.1	515.9
df	5	16	20	18	18	24
R-squared	0.0785	0.194	0.253	0.234	0.352	0.385

Notes: Data are weighted. Robust standard errors in parentheses. ** p<0.01, * p<0.05, + p<0.1
Source: NELS 1988 & ELS 2002

Appendix 3.B: Adjusted share of low income 10th graders in 1990 and 2002 who attend low income serving campus, students that attended four-year colleges as their first institution

Panel A: Observed and predicted share of low income students that enroll in colleges

	1990	2002	Change 1990-2002
M1: student family income*cohort	0.091	0.150	0.059
M2: M1+social/demographic factors (baseline)	0.058	0.104	0.046
M3: M2+ Academic preparation	0.045	0.085	0.040
M4: M2+Educational expectations and commitment	0.058	0.100	0.042
M5: M2+Type of college	0.048	0.092	0.044
M6: Full model	0.043	0.086	0.043
M7: M6-academic preparation	0.049	0.092	0.043
M8: M6-expectations/commitment	0.042	0.084	0.042
M9: M6-type of college	0.046	0.086	0.040

Panel B: Minimum and Maximum estimations of the contributions of each set of factors to the change over time

	Minimum	Maximum
Academic preparation and SAT/ACT scores	-2%	-13%
Educational expectations and commitment	3%	-9%
Type of college	5%	-4%

Notes: Data are weighted. Coefficients for Model 1-6 are in presented in Table SA1. Maximum estimations assume the predictors are exogenous to the effect of other factors, therefore comparing the difference in the gap between the baseline model (i.e., Model 2), and a nested model that adds each factor. Minimum estimations assume factors may be endogenous, and reflect the difference in the gap between the full model (M6) and a model that excludes the factor in question. See main text for further explanation.
Source: College Scorecard Data, NELS 1988 & ELS 2002

Appendix 3.C: Adjusted share of low income 10th graders in 1990 and 2002 who attended low income serving college, based on fully interactive models.

Panel A: Observed and predicted share of low income students that enroll in colleges

	Low-income students that attended any type of postsecondary institution			Low-income students that attended four-year colleges		
	1990	2002	Change 1990-2002	1990	2002	Change 1990-2002
M1: student family income*cohort	0.385	0.478	0.093	0.091	0.150	0.059
M2: M1+social/demographic factors (baseline)	0.329	0.411	0.082	0.058	0.104	0.046
M3: M2+ Academic preparation	0.289	0.350	0.061	0.047	0.084	0.037
M4: M2+Educational expectations and commitment	0.323	0.391	0.068	0.059	0.099	0.040
M5: M2+Type of college	0.292	0.339	0.047	0.050	0.091	0.041
M6: Full model	0.290	0.335	0.045	0.045	0.085	0.040
M7: M6-academic preparation	0.293	0.339	0.046	0.051	0.091	0.040
M8: M6-expectations/commitment	0.290	0.335	0.045	0.043	0.084	0.041
M9: M6-type of college	0.293	0.350	0.057	0.048	0.085	0.037

Panel B: Minimum and Maximum estimations of the contributions of each set of factors to the change over time

	Minimum	Maximum	Minimum	Maximum
Academic preparation and SAT/ACT scores	-1%	-26%	1%	-20%
Educational expectations and commitment	0%	-17%	-1%	-13%
Type of college	-15%	-43%	8%	-10%

Notes: Data are weighted. Maximum estimations assume factors are completely exogenous to the effect of other factors, therefore comparing the difference in the gap between the baseline model (i.e., Model 2), and a nested model that adds each factor (M3-M5). Minimum estimations assume factors may be endogenous, and reflect the difference in the gap between the full model (M6) and a model that excludes the factor in question. All models include interactions between each set of predictors and cohort, to allow the effect to vary by cohort.

Source: College Scorecard data, NELS 1988 & ELS 2002