NBER WORKING PAPER SERIES

MAKING THE ONE PERCENT:
THE ROLE OF ELITE UNIVERSITIES AND ELITE PEERS

Seth D. Zimmerman

Working Paper 22900
http://www.nber.org/papers/w22900

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge MA, 02138
December 2016

This paper was previously circulated under the title 'Making Top Managers: The Role of Elite Universities and Elite Peers.' I thank Joseph Altonji, Eduardo Engel, Francisco Gallego, Martin Hackmann, Lisa Kahn, Adam Kapor, Amanda Kowalski, Fabian Lange, Costas Meghir, Craig Palsson, Jamin Speer, Ebonya Washington, and Duncan Watts for valuable comments. I thank Justine Hastings and Christopher Neilson for detailed discussions and for their collaboration in developing the datasets used for this project. I thank Cristobal Huneeus and Federico Huneeus for valuable comments and for support in data access. I also thank seminar participants at Yale, Wharton, the University of Chicago, Brown, Wisconsin, Columbia, UCLA, Dartmouth, UC-Berkeley, the University of Maryland, Duke, Northwestern, the Federal Reserve Banks of New York and Chicago, Purdue, and Microsoft Research. I thank DEMRE Directors Ivan Silva and Eduardo Rodriguez for access to college application data. I thank Pablo Maino, Valeria Maino, and Nadia Vazquez for assistance with archival research. I thank SII staff for their support in access to tax records. I am particularly grateful to Conrado Canales and Boris Gonzalez. I thank Anely Ramirez for her invaluable contributions to data collection and institutional research. I thank Sean Hyland for excellent research assistance. I thank the Yale Program in Applied Economics and Policy and the Cowles Structural Microeconomics Program for financial support. All errors are my own. Required disclosure: Information contained herein comes from taxpayers' records obtained by the Chilean Internal Revenue Service (Servicio de Impuestos Internos), which was collected for tax purposes. Let the record state that the Internal Revenue Service assumes no responsibility or guarantee of any kind for the use or application made of the aforementioned information, especially in regard to the accuracy, currency, or integrity. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

Making the One Percent: The Role of Elite Universities and Elite Peers
Seth D. Zimmerman
NBER Working Paper No. 22900
December 2016
JEL No. I24,I26

ABSTRACT

This paper estimates the effect of elite college admission on students' chances of attaining top positions in the economy, and explores the importance of peer ties as an underlying mechanism. I combine administrative data on income and the census of directors and top managers at publicly traded firms with a regression discontinuity design based on admissions rules at elite business-focused degree programs in Chile. Admission to elite programs raises the number of firm leadership positions students hold by 50% and the share with incomes in the top 0.1% of the distribution by 45%. Effects are larger for students from high-tuition private high school backgrounds and near zero for students from other backgrounds. Consistent with the hypothesis that peer ties play an important role in driving the observed effects, private high school students admitted to top universities become more likely to work in leadership roles with peers from similar backgrounds, but no more likely to work with non-peers from the same program in different cohorts or different programs in the same field.

Seth D. Zimmerman
Booth School of Business
University of Chicago
5807 S. Woodlawn Avenue
Chicago, IL 60637
and NBER
seth.zimmerman@chicagobooth.edu

A online appendix is available at http://www.nber.org/data-appendix/w22900

1 Introduction

Can talented people from humble backgrounds make it to the top of the economic ladder? This question forms a common starting point for discussions of economic opportunity in the US and abroad (Miller 1949, 1950), and is central to a political economy literature emphasizing the importance of innovation and turnover amongst the elite for long run growth (e.g., Acemoglu and Robinson 2006, 2008, 2012; North et al. 2009). On one hand, 'rags to riches' stories of career success provide salient evidence of economic opportunity. On the other, descriptive studies spanning many countries and more than one hundred years of data on business leaders have shown that top managers are disproportionately likely to have come from prominent families and attended a small number of elite high schools and universities.[1] For instance, Useem and Karabel (1986) find that 12 percent of managers from a sample of large US firms attended one of sixteen private high schools, while Cohen et al. (2008) report that 10 percent of all publicly traded firms in the US have at least one senior manager who graduated from Harvard.[2] More broadly, studies of intergenerational income mobility show that mobility rates have remained steady over time as top income shares have risen (Chetty et al. 2014). Understanding the determinants of mobility to the top of the income distribution is of increasing importance as the top percentiles account for larger shares of total income.

This paper considers the role of elite higher education in determining who makes it to top positions in the economy. The goals are a) to disentangle the causal role of elite college degree programs in the production of top economic performers from selection effects; b) to understand what kinds of students– those from elite family backgrounds versus those from non-elite backgrounds– benefit from attendance; and c) to explore the importance of ties formed between college peers as a mechanism driving the overall admissions effect. I focus on two measures of top attainment: working in a leadership position at a publicly traded firm, and having an income in the top 0.1% of the distribution of high school graduates applying to college. Understanding how elite college attendance affects these outcomes is challenging because students select into elite colleges on the basis of skills and tastes, and because elite colleges offer students a package of benefits that include but are not limited to high quality peers.

I address these challenges using data from Chile, a middle-income OECD country. College admissions and data collection procedures in Chile facilitate credible measurement of top outcomes and estimation of causal effects. To estimate the effect of elite admission on the probability stu-

[1]For studies of business leaders, see, e.g., Sorokin 1924; Taussig and Joslyn 1932; Miller 1949, 1950; Mills 1956; Warner and Abegglen 1979; Useem and Karabel 1986; Temin 1997, 1999; Capelli and Hamori 2004; Gallego and Larrain 2012; Nguyen 2012.

[2]Harvard was the most commonly represented institution, followed by Stanford University, the University of Pennsylvania, and Columbia University.

dents rise to top positions, I use a regression discontinuity design based on cutoff scores for admission to elite degree programs. I explore the value of peer ties using a difference-in-differences approach that compares the rates at which pairs of college peers who attend the same degree program at the same time serve on management teams at the same firm to rates for pairs of students who attend the same degree program at different times or different degree programs at the same time. I conduct this analysis using a dataset that links college applications with administrative tax records and records of leadership outcomes at all publicly traded Chilean companies. My analysis focuses on six highly selective, business-oriented degree programs: the law, business, and civil engineering programs at the two most selective universities in Chile.

I begin by documenting the educational backgrounds of people with very high incomes. I show that within the population of individuals who took the national college admissions exam in 1980 or later, the 1.8% of students admitted to the six elite business-focused programs make up 41% of all directors and top managers, 38% of the top 0.1% of the income distribution between 2005 and 2013, and 45.9% of the top 0.01%. Students in the six business-focused programs are much more likely to attain leadership positions and to have incomes within the top half percent of the population distribution than students in other highly selective degrees with similar average income, such as medical degrees. For students admitted to the six elite degree programs, the probability of attaining top positions differs by high school type, which I interpret as a proxy for student socioeconomic background. 2.3% percent of students from private high schools have incomes in the top 0.1% of the distribution and 3.3% hold either a C-suite or directorship position, compared to rates of 0.6% and 1.0% (respectively) for students not from private high schools.

I next consider the causal effects of admission to an elite degree program on the rate at which students reach top positions. I find that admission to an elite degree program raises the average number of leadership positions students hold by 50%, from 0.040 to 0.060. Admission raises the probability applicants will have incomes in the top 0.1% of the distribution by 0.008, a 45% gain from a base of 0.018. Students admitted to elite degrees would in most cases otherwise attend less selective programs in similar fields, so gains are relative to this baseline.

Splitting by high school background, I find that gains accrue only to applicants from private high schools. For these students, threshold-crossing raises mean leadership positions held by 0.033 (from a base of 0.061), and the rate of top income attainment by 0.018 (from a base of 0.032). Effects for students not from private high schools are small and statistically indistinguishable from zero. An analysis of changes in other parts of the income distribution shows that, for students from private high schools, the biggest effects are those at the top of the distribution. There is little evidence that income increases at all for students from other high schools. Heterogeneous effects by high school type cannot easily be explained by differences in below-threshold admissions outcomes or the sectors where students go on to work.

Finally, I show that peer ties play an important role in attaining top positions for students from private high schools. When admitted to an elite degree program, students from private high schools become much more likely to serve on the same leadership teams as other private high school students from the same cohort in that program. They do not become more likely to lead the same firms as private high school students from the same program in other cohorts or other programs in the same field in the same cohort. Two students from private high schools who are college peers are 126% more likely to have leadership roles in the same firm than two students from private high schools who attend the same program but at different times. Effects are larger for students from the most prestigious private high schools, for whom admissions effects on leadership attainment are also larger. In contrast, pairs of students from different backgrounds are no more likely to lead the same firms if they are college peers than if they are not. These findings are consistent with a story where ties formed with peers from similar backgrounds at top schools drive much of the effect of elite admission on leadership attainment.

These findings have implications for how we understand the role of education in promoting intergenerational economic mobility. Much research on intergenerational mobility focuses on education as a key driver of upward mobility (Solon 1999, Solon 2002, Black and Devereux 2011, Núñez and Miranda 2010). This argument is consistent with a body of evidence indicating that access to higher education in general and more selective higher education in particular can raise average earnings, with some evidence that these gains are particularly large for students from poorer backgrounds (Hastings et al. 2016, Dale and Krueger 2014, Zimmerman 2014). That elite education raises the chance of attaining top positions only for students from elite backgrounds and appears to operate through peer ties suggests that mechanisms determining mobility to the very top may differ from those that raise mean earnings through shifts elsewhere in the distribution. Because top income shares are increasing in many countries (Alvaredo et al. 2013), the role of educational institutions in providing access to top positions is of growing importance for the allocation of income overall. My findings provide the first causal evidence on this topic.

The paper proceeds as follows. In section 2, I describe how this paper contributes to existing research. In section 3, I describe corporate and educational institutions in Chile, and how these facilitate data collection. In Section 4, I present descriptive results on the educational backgrounds of business leaders and individuals with very high incomes. Section 5 presents the regression discontinuity analysis of the effect of admission on the attainment of top positions. Section 6 discusses the changes in career paths that lead to the observed effects. Section 7 examines the role of peer ties. Section 8 concludes.

2 Related Literature

This paper contributes to five distinct strands of literature. First, I build on descriptive studies of business leaders. Studies such as Sorokin (1924), Taussig and Joslyn (1932) , Miller (1949, 1950), Mills (1956), Warner and Abegglen (1979), Useem and Karabel (1986), Temin (1997, 1999), and Capelli and Hamori (2004) describe the population of business leaders in qualitative and quantitative terms and discuss pathways to business success. Though these authors often note that many business leaders have elite educational backgrounds, they do not provide causal evidence on the role of elite universities in making business leaders. This paper fills that gap in the literature. My findings on the importance of the peer interactions at elite colleges are consistent with qualitative explanations advanced in these studies.[3]

Second, I contribute to a growing literature using administrative records to document income and wealth inequality (e.g. Kopczuk et al. 2010; Atkinson et al. 2011; Piketty 2014; Saez and Zucman 2016). This paper provides insight into the role of educational institutions in determining who the people at the top of the income distribution are, in a context where inequality is very high: income inequality in Chile in the 2000s was among the highest measured in any country, with top 0.01% income shares comparable to the US, Colombia, South Africa, or Argentina, depending on measurement (Fairfield and Jorratt de Luis 2015). My findings suggest that elite education does not help students from non-wealthy backgrounds achieve top positions.

Third, my work extends a line of research studying the ways that students form peer ties in college and how these ties affect labor market outcomes. Marmaros and Sacerdote (2002, 2006) and Mayer and Puller (2008) provide evidence that peer connections are strongest between students of the same race and that these connections can help students obtain their first jobs after college. Arcidiacono and Nicholson (2005), de Giorgi et al. (2010), and Sacerdote (2001) also explore the role of peers in career choices. This paper provides empirical evidence that the ties formed at college continue to influence hiring outcomes over the long run and at the highest levels of occupational attainment. The empirical analysis of co-hiring is similar in spirit to Oyer and Schaefer (2012), who study the agglomeration of law graduates in law firms, and my empirical approach using data on co-leadership for pairs of students most closely resembles Bayer, Ross, and Topa

[3]For instance, Mills (1956) describes how

> Harvard or Yale or Princeton is not enough. It is the really exclusive prep school that counts, for that determines which of the 'two Harvards' one attends. The clubs and cliques of college are usually composed of carry-overs of association and name made in the lower levels at the proper schools; one's friends at Harvard are friends made at prep school.

More recently, Kantor (2013) describes a student at Harvard Business School who 'was told by her classmates that she needed to spend more money to fully participate, and that 'the difference between a good experience and a great experience is only $20,000."

(2008), who examine co-hiring probabilities for neighbors.

Fourth, I contribute to a set of empirical corporate finance findings on the role of school peers in firm performance, executive hiring, and corporate strategy. Papers such as Shue (2013), Fracassi and Tate (2012), and Fracassi (2012) show how compensation and firm policy can depend on peer ties formed in school between managers. These papers describe the intensive margin effects of school peers on management practices conditional on holding management positions. This paper addresses the extensive margin: how much do school ties raise the probability that students at elite programs will rise to leadership positions within firms?

Fifth, and finally, I build on a large body of research estimating the labor market effects of college admission. Previous papers using admissions discontinuities to study earnings outcomes include Zimmerman (2014), Hoekstra (2009), Saavedra (2009), and Öckert (2010). Kaufmann et al. (2013) use a similar strategy to study returns in the marriage market. Oyer and Schaefer (2009) and Arcidiacono et al. (2008) use non-RD methods to study applicants to law and business graduate programs, respectively. These papers find relatively large earnings returns to attending top programs. In contrast, Dale and Krueger (2002, 2014) find limited evidence of returns to increased selectivity. Reyes et al. (2013) model selection into college for Chilean students and find evidence of positive but heterogeneous returns.

The most closely related paper in the literature on returns to education is Hastings, Neilson and Zimmerman (2016; henceforth HNZ), which uses discontinuous admissions rules at the population of Chilean degree programs to study the effects of admission to different kinds of degrees on mean earnings. HNZ develops a model of earnings determination and selection into degree programs, and identifies the model using variation generated by admissions discontinuities. The authors find returns to selectivity within some fields, including business, and also show that transitions from low- to high-earning fields lead to earnings gains on average. The contribution of the present paper is to describe the special role of a small number of degree programs in producing a large share of corporate leaders and top incomes, and to present evidence that peer ties are a key mechanism in producing these top outcomes.

3 Institutional background and data collection

This section describes economic and educational institutions in Chile. The goal is to provide background information for a discussion of external validity and to outline the institutional features that allow for data collection and generate identifying variation.

3.1 Corporate institutions and inequality in international context

Chile is a middle-income OECD member country, with per capita GDP equal to about $11,800 (values reported in constant 2014 USD except as noted). Adjusted for purchasing power parity, per capita income in Chile in 2015 was about $22,000. This is the highest in Latin America and roughly comparable to Eastern European EU member states such as Poland (World Bank 2016). As is true elsewhere in Latin America, inequality in Chile is high. In household survey data, the top ten percent of the income distribution accounts for 41.5% of all income, compared to 30.2% in the US and approximately 25.6% in Poland (World Bank 2016). Administrative records that better capture income for the very rich suggest the top ten percent share in Chile may be closer to 55% after accounting for capital income, with 23% and 11% going to the top 1% and 0.1%, respectively. These shares are among the highest in the world (Fairfield and Jorratt De Luis 2015).

Compared to other states at similar income levels, Chile is a fairly good place to do business. Its World Bank Ease of Doing Business Ranking, which captures the regulatory hurdles associated with starting and operating a firm, is 48 (out of 189, with 1 being the best ranking). Only 0.7% of businesses report 'informal payments' to government officials, compared to 18.1% in Argentina, 11.7% in Mexico, or 14.7% in Poland. Still, Chile is similar to other Latin American countries in that many firms are controlled by a small number of large shareholders (see Gallego and Larrain 2012 and Lefort and Walker 2000 for further discussion). 38% of adults between 25 and 34 years old in 2010 had obtained a tertiary degree, compared to 42% in the US, 22% in Mexico, and 12% in Brazil (OECD 2012). See Table A-1 for a comparison of economic and business indicators in Chile to those for several other countries.

The last year for which I observe leadership and labor market outcomes is 2013. The youngest applicants to reach their peak labor market years (beginning at roughly age 40) by 2013 applied to college in the early 1990s, while the oldest applied in the early 1970s. These students grew up during a time of lower economic and political development than prevails in Chile today. Per capita GDP in Chile in 1980 was about $4,000, compared to $31,100 in the US. 19% of Chilean adults between 55 and 64 years old in 2010 (25 to 34 years old in 1980) had obtained a tertiary degree, compared to 41% in the US.

3.2 Higher education institutions and applications

Until the late 1990s, almost all college students in Chile attended one of 25 'traditional' universities (Rolando et al. 2010). These are known as CRUCH universities (an acronym for 'Council of Rectors of Universities of Chile') and include a mix of public and private institutions. The two most selective are the Universidad de Chile (UC) and Pontificia Universidad Católica de Chile (PUC). Both are world class institutions, ranking 13th and 7th, respectively, in the 2016 U.S. News Latin American university rankings (US News and World Report 2016). Within these institutions, some fields are more selective and/or more business-oriented than others. I focus much of my analysis on three highly selective, business-oriented fields of study: law, business, and engineering.[4] These programs have a reputation within Chile for producing many graduates with very high incomes. For example, a 2003 study conducted by an executive search firm using a sample of business owners and business executives found that 58.1 percent had degrees from one of these six institution-field combinations (Seminarium Penrhyn International, 2003; henceforth SPI). Section 4 presents evidence confirming that students admitted to these programs account for large shares of leadership positions and top incomes.

CRUCH applicants commit to specific fields of study prior to undergraduate matriculation. The application process works as follows. Following their final year of high school, students take a standardized admissions exam.[5] After receiving the results from this test, students apply to up to eight degree programs by sending a ranked list to a centralized application authority (the Departamento de Evaluación, Medición, y Registro Educacional, or DEMRE). These degree programs consist of institution-degree pairs; e.g., law at UC or engineering at PUC. Degree programs then rank students using an index of admissions test outcomes and grades, and students are allocated to degrees based on a deferred acceptance algorithm. Students are admitted to only the most preferred degree program for which they have qualifying rank. For instance, a student who is rejected from his first choice but admitted to his second choice will not be considered for admission at his third choice if he lists one. Students near the cutoff for admission to an institution-degree are placed on a waitlist, and both admissions and waitlist outcomes are published in the newspaper.[6] This process is similar to the medical residency match in the US (see Roth and Peranson 1999), but with public disclosure of evaluation criteria and outcomes. The regression discontinuity analysis amounts to a comparison of the students near the bottom of the published lists of admitted students to students near the top of the published waitlists.

Three features of this process are worth highlighting. First, students do not have access to ex post choice between multiple accepted outcomes. If they wish to change institution-degree enrollment, they must wait a year, retake the admissions test, and reapply. Second, the scores required for admission vary from year to year depending on aggregate demand for institutions and ca-

[4]Chilean universities offer degrees in many types of engineering. My focus here is on a program titled 'Civil Engineering, Common Plan' ('Ingenieria Civil, Plan Comun'). This engineering program is the one identified on surveys as the source of many business leaders, and it is best thought of as a business-oriented applied math degree.

[5]Prior to 2003, this test was known as the Prueba de Aptitud Académica, or PAA. The test was updated in 2003 and renamed the Prueba de Selección Universitaria.

[6]Results are published in *El Mercurio* in March of the application year. See Online Appendix B.1

reers and the number of spots universities allocate to each career. Though students can construct guesses of cutoff scores based on cutoff scores in past years, these guesses will not be precise. Uncertainty about the location of cutoffs from year to year is consistent with the imprecise control condition required for unbiased regression discontinuity estimation (Lee and Lemieux 2010). Third, each degree program maintains its own curriculum. Students enrolled in different degree programs at the same institution generally do not take courses together. Each of the degree programs studied here has its own physical plant, separated by at least several city blocks from the location of other degree programs, and sometimes by as much as several miles. For this reason, I think of peer effects as operating within degree programs (i.e., institution-degree pairs), not institutions.

3.3 Secondary education institutions

Gains in both skills and peer ties associated with elite college admission may vary depending on students' high school and family backgrounds. In the absence of data on parental income or education, I use high school type to divide students into coarse socioeconomic strata. I focus primarily on two types of high schools: private high schools and non-private high schools. The private high school category consists of what Hsieh and Urquiola (2006) refer to as 'unsubsidized' private schools: private institutions that do not receive public funding. They generally charge high tuition and serve upper-income households. The non-private category includes both municipal schools, which are locally-run schools similar to public schools in the US, and voucher schools, which may be run by private groups but receive public funding and do not charge tuition (Neilson 2013). Unsubsidized private high schools accounted for less than ten percent of high school enrollment in the 1980s and early 1990s (Hsieh and Urquiola 2006).

I also consider finer distinctions between high school types. I divide private high schools into two categories: 'elite' and 'non-elite.' The elite category includes seven historically prestigious schools: St. George's College, Colegio del Verbo Divino, the Grange School, Colegio Sagrados Corazones Manquehue, Colegio Tabancura, Colegio San Ignacio, and Craighouse School. Each school is located in or near Santiago and charges very high tuition.[7] Several are male only (my analysis will focus only on male students). Admissions can be exclusive. For instance, applications for admission to the pre-kindergarten program at the Grange School require a letter of reference from a member of the school community (Grange School 2016). These schools appear frequently in press accounts and studies of the business elite (see, e.g., Engel 2013, SPI). In Online Appendix B, I show that these schools are among the best performing private schools on the

[7] As a fraction of per capita GDP, tuition at these schools is similar to tuition at elite US high schools like Deerfield or Phillips-Andover; see Neilson (2013).

standardized admissions exam, and are also the highest scoring on an index of prestige based on the relative frequencies of last names in a 'Who's Who in Chile' (Hilton 1971) as compared to the general population. Núñez and Miranda (2010) have previously shown that last names are a strong predictor of income in Chile even conditional on other observables.

On the public school side, I consider Instituto Nacional General José Miguel Carrera (henceforth the Instituto Nacional), an exam school located in Santiago. There is no tuition fee at the Instituto Nacional. However, as is the case with exam schools in the US, such as Stuyvesant or Bronx Science, admission depends on students' scores on an entrance exam. It is typically the only public school mentioned in studies of the Chilean business elite (SPI). In 2012, students at the Instituto Nacional had a higher average score on the standardized college admissions exam than students at any other public high school; their scores were similar to those for students at elite private high schools (PUC 2012). I reproduce this finding for the subset of applicants to elite degree programs in Online Appendix B.

I interpret high school type as a proxy for the mix of home, school, and community inputs that differentiate applicants from higher-income backgrounds from those from lower-income backgrounds. I leave for future work questions related to the causal effect of high school background on labor market outcomes, holding other inputs fixed.

3.4 Data collection

3.4.1 Application records

I use three types of data on the college application process. The first is data on admissions outcomes at elite law, engineering and business programs for the years 1974 through 2001. The second is data on admissions outcomes at all CRUCH degree programs for the years 1982 through 2001. The third is data on all admissions test takers between 1980 and 2001. Applicants are a subset of admissions test takers. I use digitized data from hard copies of published application and waitlist announcements stored in the Biblioteca Nacional de Chile. Records include all admitted students as well as a list of marginal rejected students that is typically equal in length to the list of admitted students. Online Appendix B discusses data collection and data availability in more detail and presents an example of newspaper admissions and waitlist records. Beginning in 2000, data on full student preference rankings becomes available. I discuss this data in more detail in section 6.2.

Administrative application records include high school identifiers. However, these identifiers are not consistent across years, and mappings between identifiers and school names are not available in all years. I address this challenge using the following procedure. First, I use students who apply to college in multiple years to create a set of codes that are consistent across years. I then use data on school type from 2000 to classify schools from earlier cohorts. This procedure will work if a) there are at least some multi-year applicants in each high school in each year, b) the set of high schools is stable over time, and c) high school type is stable over time. Match records are higher in more recent application cohorts. For example, I match 79 percent of elite admissions between 1980 and 2001 (the years used for descriptive analysis of income data) and 60 percent of elite applications between 1974 and 1991 (the years used in the regression discontinuity analysis of leadership outcomes). To the extent that the procedure falsely categorizes either private or public high schools, this will bias estimates of differences between the two groups downward, away from my findings of cross-type heterogeneity. Section 5.3 discusses balance in the match to high school data and observed high school type across the admissions threshold. See Online Appendix B for more details on the matching procedure.

The link between application records outcome records relies on government-issued personal identifiers (known as the Rol Único Tributario; abbreviated as RUT). Beginning in 1989, these records were published in the newspaper alongside admissions outcomes. Both before and after 1989, DEMRE maintained records of RUTs in the their administrative application records. I match 94% of applications over the 1974-2001 period to RUTs. Non-matches are due to illegible records in newspaper or archival data. My discussion in the main text focuses on applications that are successfully matched to RUTs. See Online Appendix B for a discussion of the match process. This section also presents evidence that match rates are balanced across the admissions threshold.

3.4.2 Firm leadership records

Publicly traded companies in Chile are required to disclose the identities of top executives and board members to the Superintendicia de Valores y Seguros (SVS), the Chilean analogue to the Securities and Exchange Commission in the US. I obtain leadership data using a web scrape of the SVS website (SVS 2013). I conducted this scrape in March of 2013. The SVS website allows users to search historical filing records by date for each firm. I searched for all executive managers and directors who served between January 1st, 1975 and January 1st 2013. Most firms do not provide leadership records for the earlier part of this period. The median leader was hired in 2009. 92 percent of leaders were hired in 1998 or later.

I observe a total of 10,220 leadership positions, of which 2,522 are held by applicants to elite degree programs in 1974 or later. Of the 2,522, 1,543 are directorships and the remainder are C-suite roles. Applicants hold these positions at a total of 619 firms; there are many firms in which more than one applicant holds a top job. Students go on to lead a variety of companies, including multinationals that are among the largest companies in Latin America, and Latin American subsidiaries of US companies. 34 percent of the leadership roles are at firms listed on the Santiago Stock Exchange (SSE), the third largest exchange in Latin America by market capitalization.[8] The firms in this data span a wide variety of sectors and corporate parents, and include some of the largest companies in the world. See Online Appendix B for more detail on the companies represented in these records and the positions held by applicants.

3.4.3 Tax records

I match admissions test takers in the years 1980 and later to individual tax records at the Chilean tax authority in compliance with Chilean privacy laws.[9] Because test-taking is a requirement for application, the group of admissions test takers includes all applicants to elite programs. Tax records include all labor earnings (reported to the tax authority by employers) as well as income from pensions, rents, taxable capital gains, dividends, and distributed profits. Income data are not topcoded. Compared to Fairfield and Jorratt de Luis (2015), these income records omit business profits that are reinvested in firms. This omission may lead to underestimates of top income shares. In addition to income data, records contain basic employer characteristics, such as sector, for workers employed in long-term contracts. Income records are available on an annual basis for the years 2005 through 2013. I discuss merge rates to tax data in Online Appendix B.1 and provide detail on the tax records in Online Appendix B.4.

Using these records I construct a dataset of labor force participants that excludes individuals who are fewer than 12 years removed from the year of college application (roughly age 30) or who have total annual income below 50% of what one would earn from a full year's work at the monthly minimum wage (about USD $2,300 per year in 2014 dollars). The purpose is to focus the analysis on individuals who have completed their schooling and are at least marginally connected to the labor force. My analysis of income data focuses on students' positions in the income distribution. I partition the income distribution in each year using a set of dummy variables indicating a student's presence in given percentile range. Because I am interested in top outcomes, these categories are finest at the top: boundaries are the 90th percentile, the 95th per-

[8] In January 2013, SSE market capitalization was $334 billion USD. Source: World Federation of Exchanges (2013).

[9] The following is a required disclosure. SOURCE: Information contained herein comes from taxpayers' records obtained by the Chilean Internal Revenue Service (Servicio de Impuestos Internos), which was collected for tax purposes. Let the record state that the Internal Revenue Service assumes no responsibility or guarantee of any kind for the use or application made of the aforementioned information, especially in regard to the accuracy, currency, or integrity.

centile, the 99th percentile, the 99.5th percentile, and the 99.9th percentile. In 2013, the threshold for a top 0.1% income was roughly $340,000. Average income in the top 0.1% in that year was about $550,000, and average income in the top 0.01% was about $1.4 million. Online Appendix B.4 describes the income values at boundaries of other categories.

4 High income degrees

4.1 Identifying high-income degrees

This section contrasts students admitted to elite degree programs to the broader population of college applicants in terms of background characteristics and career attainment. The upper panel of Table 1 describes the samples of test takers and admitted students. The 'Test takers' column describes students taking the admissions exam. Just under two million students took the admissions exam between 1980 and 2001. Of these, 1.8% were admitted to one of the six elite degree programs. Students admitted to elite degree programs score substantially higher on their reading and math entrance exams than other students.[10] I observe high school type data for 79 percent of students admitted to elite degree programs, of whom 60% attended private high school. Conditional on admission, students who attended private high school score slightly higher on their admissions exams than students who did not. The 'All admitted' column of Table 1 describes students admitted to some degree program between 1982 and 2001. Students admitted to elite degree programs make up 4.9% of all admitted students. They have substantially higher test scores than the broader pool of admitted students and are more likely to have attended private high schools.

Students admitted to elite programs are much more likely to go on to hold top positions than the broader population of applicants. Figure 1 and Table 1 consider differences in leadership production and top income attainment within and across degree programs. Panel A of Figure 1 plots mean test scores for admitted students on the horizontal axis against the average count of leadership positions held by admitted students on the vertical axis. Each degree program in a business-focused field– law, engineering, and economics– corresponds to a different marker shape. The UC and PUC programs in these fields have solid fill, while non-elite programs in the same fields have hollow fill. The figure shows that the business, engineering, and law programs at UC and PUC are the most selective within their respective fields and confirms anecdotal evidence that these programs are more likely than others to produce leaders of large firms. The

[10]The standardized admissions exam is normed to have a mean of 500 and a standard deviation of 100 across all test takers in each subject in each year. Some students take the exam in multiple years, and in this table I report scores for the first time students take the exam. First-time takers score somewhat lower than test takers as a whole.

top four and six of the top nine programs in terms of leadership production are in the elite, business-focused set. Students admitted to elite programs attain top positions at a rate of 4.1 per one hundred students, compared to 0.2 per one hundred students in the broader population. Of the 3,664 leadership positions matched to admissions test takers between 1980 and 2001, 1,488, or 41%, were held by the 1.8% of students admitted to elite degree programs.

Students admitted to elite degree programs also have high incomes. As shown in Panel B of Figure 1, average incomes for students admitted to elite degree programs are similar to those for students admitted to medical degree programs and among the highest across all programs. Elite degree programs include the top two and six of the top nine non-medical programs in terms of average earnings. Students admitted to elite degree programs earn just over $79,000 USD on average.

Though mean incomes at elite business-focused programs are similar to those at elite medical programs, students at business programs are much more likely to have top incomes. Panel C of Figure 1 shows the density of income by percentile of the broader income distribution for students admitted to the business-focused programs at PUC and UC and for students admitted to the medical programs at the same universities. Densities for both degree types are fairly low below the 95th percentile. Students admitted to medical degrees are more likely to have income between the 95th and 99.5th percentiles. Above the 99.5th percentile, the density of the income distribution for medical admits falls to zero, while the density for business-focused students rises. Students admitted to the elite business focused programs have incomes in the top 0.1% of the overall distribution in 1.6% of of earnings years, compared to 0.3% for students admitted to medical degrees. As was the case with leadership positions, students admitted to elite degree programs account for a large share of the highest part of the income distribution for admissions test takers. Students admitted to elite degree programs accounted for 38.0% of the top 0.1% of the distribution between 2005 and 2013, and 45.9% of the top 0.01%.

Within the elite degree programs, students from private high schools are much more likely to obtain top positions. Panel D of Figure 1 shows the density of the income distribution for students from private and non-private high schools who are admitted to the elite business focused programs. The densities rise in parallel through roughly the 99.5th percentile. Above the 99.5th percentile, the density for students from private high school backgrounds rises, reaching roughly double its level at the 99.5th percentile by the very top of the income distribution. There is no similar uptick in the density for students not from private high school. Similarly, students from private high schools hold 5.3 leadership positions per hundred students, compared to 1.6 positions per hundred for students not from private schools.

Differences in the probability of attaining top outcomes by high school background persist after conditioning on admissions test score. Panels E and F of Figure 1 show, respectively, average counts of leadership positions and the share of admitted students with top 0.1% incomes by position in the test score distribution for admitted students at elite programs. Gaps in rates of top attainment are pronounced across the range of test scores for admitted students.

The descriptive analysis thus far includes all applicant-year observations where the applicant is at least 12 years removed from college application, or approximately age 30. However, students generally do not reach top positions in the income distribution until mid-career. Figure 2 shows age profiles for log income and top 0.1% share by high school type for students admitted to elite degree programs. Ages are calculated based on years since application. The gap in log income between students from private and non-private high schools rises over the career, from roughly 37 log points at age 30 to 45 log points by age 40. Incomes in the top 0.1% are rare before applicants reach their late 30s. Rates of top attainment then rise sharply for students from private high school backgrounds, reaching 4.2% by age 40 and 5.0% by age 50. Increases are much smaller for students without private high school backgrounds.

I draw three conclusions from the descriptive analysis. First, the business, law, and engineering programs at UC and PUC stand out relative to programs in other fields and other programs in the same field for the high rates at which their students attain top positions in management and in the income distribution, and for the large share of these positions they hold. The concentration of top attainment within a small number of programs motivates an investigation of their causal effects. Second, within these programs there are big differences in rates of top attainment by student background. This motivates an analysis of heterogeneous effects. Third, it takes most students until mid-career to attain top positions. The regression discontinuity analysis will focus on applicants at ages 40 and older, to allow time for applicants to advance in their careers to the point where top outcomes become feasible.

5 Regression discontinuity analysis

5.1 Estimation

I obtain estimates of the effects of elite college admission on top attainment using a regression discontinuity design generated by admissions cutoffs. I estimate two types of regression discontinuity specifications. I use the first type to study leadership outcomes. These specifications are of the form

$$Y_{ipc} = f(d_{ipc}) + \Delta A_{ipc} + e_{ipc} \tag{1}$$

where Y_{ipc} is a leadership outcome for student i applying to program p in application cohort c. d_{ipc} is i's score on application p in cohort c relative to the cutoff score, and $f()$ is some smooth function. $A_{ipc} = 1[d_{ipc} \geq 0]$ is a dummy equal to one if i is admitted to p in cohort c. The primary outcome variable of interest is the count of C-suite and directorship positions that applicants hold. I also consider specifications where the dependent variable is a dummy for holding any such position, and specifications that separate by position type.

The second type of specification has the form

$$Y_{ipct} = f(d_{ipc}) + \Delta A_{ipc} + e_{ipct} \tag{2}$$

The second type is identical to the first except that the outcome variable has a panel component. I use specifications of this form to study outcomes observed in tax data, which vary across the 2005 through 2013 outcome years. The outcome I focus on is a dummy variable equal to one if an applicant has an income in the top 0.1% of the year-specific income distribution. I supplement this with an analysis of log income and dummies for other income categories.

In both equations 1 and 2, the parameter of interest is Δ, which captures the effect of admission to an elite program for marginal applicants relative to their next-choice option, averaged across applications and, in equation 2, outcome years. The interpretation of Δ depends on the distribution of students' next choices. As I discuss in section 5.4, students admitted to elite degree programs typically transition from less selective programs in the same or similar fields. Two pieces of supplementary evidence underscore the key role of increasing selectivity in driving the observed effects. First, elite admission has limited effects on the sectors of the economy where students go on to work. Second, evidence from more recent data in which next choice options are recorded shows that changes in peer attributes and not switches across fields are the strongest predictor of labor market gains in the short run. I present these findings in sections 6.1 and 6.2, respectively.

I estimate these specifications using data on students near the admissions threshold at elite degree programs. There is one cutoff for each program in each year. Following Pop-Eleches and Urquiola (2013), I summarize information from these cutoffs by 'stacking' data across all cutoffs. The use of stacked data means that some students may show up in the data more than once. For example, as I show in Section 5.4, there are many students who are rejected from degrees at PUC but admitted to programs in the same field and UC. To account for this in inference, standard errors are clustered at the student level throughout. I note that the presence of student observations in data used to estimate effects at multiple cutoffs becomes rare as I restrict bandwidth to a narrow window around the cutoff value.

I focus on two versions of equations 1 and 2. The first version, which I refer to as the 'BW=10' specification, is a simple mean comparison of outcomes for students within a 10 point score window on either side of the admissions threshold. This specification does not include slope terms. The second version, which I refer to as the 'BW=20' specification, includes students within a 20 point window on either side of the admissions threshold. It allows for separate linear terms in scores above and below the cutoff. Point estimates for top outcomes are very similar across the two specifications. The narrow bandwidth specification increases statistical power in some instances because of the restriction on slope terms. In the text, I will generally refer to point estimates from this specification.

Online Appendix C discusses the selection of optimal bandwidths and polynomial degrees in more detail. Cross-validation procedures show that the polynomial degree that maximizes out-of-sample fit is zero, even at relatively wide bandwidths. This is consistent with my focus on the BW=10 specification, and with the observation that the relationship between the running variable and the rate at which students attain top positions is weak aside from the jump at the threshold point. Online Appendix C also discusses optimal bandwidth selection and standard error calculation using the selection procedures from Calonico et al. (2014) and Calonico et al. (2016) (henceforth CCT and CCFT, respectively). The CCT approach computes MSE-optimal bandwidths and incorporates bias-correction terms that adjust confidence intervals to account for bandwidth size. Inference is not materially affected. Online Appendix C also considers Lee-Card (2010) standard errors that account for possible clustering by value of the running variable, and specifications that add additional control variables. Neither change affects my findings.

I supplement the sharp RD specifications with instrumental variables specifications in which peer private high school share at the admitted degree program is the endogenous regressor. It is likely that no single mediating variable satisfies the exclusion restriction for an unbiased IV estimate. With that in mind, the goal of the IV specification is instead to provide intuition about the way top attainment changes with an intuitive measure of program selectivity. Here I follow a literature on selective secondary exam schools that scales changes in student outcomes with measures of peer achievement (Abdulkadiroğlu et al. 2014). In Section 6.2 I present evidence that the share of peers from private high schools is a stronger predictor of changes in labor market outcomes than other possible mediators, such as changes in peer test scores.

Because I observe the population of admissions outcomes for only a subset of years, I obtain IV estimates using a two-sample procedure in which I compute first stage effects within the subset of years for which peer characteristics at non-elite degree programs are observable and reduced form effects in the full set of years for which elite admissions outcomes are available. I compute standard errors using a bootstrap clustered at the student level.

5.2 Regression discontinuity sample

Marginal students have observable characteristics similar on average to those in the broader applicant sample. Table 2 shows mean values of student-specific covariates for a) the full applicant sample, b) the sample of male applicants, c) the marginal sample of male applicants within 20 points on either side of the admissions threshold, and d) the sample of marginal applicants for whom data on high school type is available. The upper panel describes application-outcome year level data for applicants between 1980 and 1991, while the lower panel describes application-level data for students applying between 1974 and 1991. I use the former sample in my analysis of top incomes and the latter in my analysis of leadership positions.[11]

Applicants in the 1980-1991 sample have high scores on math and reading exams, with averages of 742 and 658 points, respectively, on tests that are normed to have a mean of 500 and a standard deviation of 100 in the population. I successfully assign a high school type to 72% of records. Of this 72%, nearly half (48.5%) of marginal applicants attended private high schools. I observe 80.6% of applicants in the labor force sample, with an average earnings of $87,500 per year. 1.8% of applicants fall in the top 0.1% of the income distribution. 76% of applicants are male, and male applicants have similar test score and high school backgrounds to the overall sample, with slightly higher rates of labor force participation and a roughly 25% higher probability of having a top 0.1% income. The regression discontinuity analysis focuses on male students because labor force participation rates for women in Chile were low during formative early-career years for applicants old enough to be leading firms today.[12] I discuss results for the full sample and for women only in section 6.3. Marginal applicants have attributes similar to those of the full sample, as do the 75% of marginal applicants for whom data on high school type is available.

Applicants over the 1974-1991 period are very similar to those in the 1980-1991 subsample in terms of gender and private high school share. Rates of successful match to high school records are lower prior to 1980. See Online Appendix B.3 for more details. 2.9% hold either a C-suite or directorship position. Because some applicants go on to hold more than one such position, the

[11] Recall that tax data is available only for 1980 and later cohorts. Data on students' standardized math and reading scores are also available only for 1980 and later application years, although the composite indices used to determine admissions outcomes are available in all years.

[12] For example, the female labor participation rate in Chile in 1990 was 32%, compared to 56% in the US at that time (World Bank 2016).

average count of positions is 0.049, or 4.9 per hundred students.

5.3 Validating the discontinuity design

Regression discontinuity estimates will return unbiased estimates of admission effects only if other determinants of leadership outcomes are balanced across the threshold. I consider two tests of cross-threshold balance. The first is to look for a discontinuity in the density of scores at the cutoff point (McCrary 2008). If, for example, more ambitious students were able to manipulate their test scores so as to fall just above the cutoff, one would expect a discontinuously higher density of scores at that point. Figure 3 shows a histogram of scores relative to admissions cutoff value. There is no evidence of clumping above the threshold. The distribution is densest close to the threshold value. 31% of applications are within 10 points of the cutoff, 57% are within 20 points, and 84% are within 40 points. Figure A-1 shows separate density plots for students who attended private high schools and those who did not, as well for applicants to PUC and UC degree programs. Score densities are smooth across the cutoff in each subsample.

The second test of RD validity is to check the balance of predetermined covariates across the threshold. Panels A, B, and C of Figure 4 display binned means of an indicator variable equal to one if students are matched to high school data, an indicator equal to one if a student comes from a private high school background, and a linear, earnings-weighted index of application cohort and institution-major specific dummy variables, respectively. There is no evidence that these variables change discontinuously across the admissions threshold. Regression results reported in Panel A of Table 3 confirm this impression. None of the ten statistical tests reject the null hypothesis of no discontinuity at the 10 percent level. These include tests that subset on the private and non-private high school samples. Panel D of Figure 4 and Panel B of Table 3 considers the effect of elite admission on selection into the labor force sample. Elite admission does not affect labor force participation rates. This mitigates concerns related to, e.g., outmigration in response to admissions outcomes. Note that sample sizes differ very slightly from Table 2 due to missing data.

5.4 Changes in admissions outcomes across the threshold

The interpretation of threshold-crossing estimates depends on the mix of degree programs to which students would otherwise be admitted. Counterfactual admissions outcomes may differ from the target program in terms of both selectivity and field of study. Figure 5 shows the effects of admission to an elite degree program on two measures of selectivity: peer mean combined math and reading scores and the share of peers from private high schools at the degree programs to which students are accepted. The left, center, and right panels show results for the pooled applicant sample, applicants to UC programs, and applicants to PUC programs, respectively.[13]

In the pooled sample, admission to the target degree program is associated with a 9.8 percentage point increase in the share of peers from private high schools, and a 22.6 point gain in peer mean scores. Both peer scores and the fraction of peers from private high schools are lower for students admitted to UC degrees than PUC degrees. This reflects somewhat lower selectivity at the UC programs. Students admitted to the UC programs in law, business, and engineering see the share of peers from elite background rise by 5.9 percentage points from a base of 37.9%, and average peer math scores rise by 22.4 points. Students admitted to the more selective PUC programs see the fraction of peers from private high schools rise by 21.5 percentage points from a baseline of 44.6% and peer math scores rise by 21.8 points.

The left two columns of Table 4 report these results (in the rows marked 'pooled') as well as results allowing heterogeneous threshold-crossing effects by own private high school status. In addition to interactions with the threshold-crossing dummy, the heterogeneous effect specifications include the full set of interactions between own high school background and intercept and slope terms. These results are reported in the rows marked 'main effect' and 'private HS interaction.' Estimates use the BW=10 specification. Students from private high schools who are admitted to elite programs experience slightly smaller gains in peer attributes from elite admission.

The right three columns of Table 4 explore transitions across fields. Cells in these three columns display below-threshold mean values of dummy variables equal to one if a marginally rejected student is admitted to a degree program of the type listed in the column. These are the intercept terms in the regression discontinuity equation. I again present results from specifications that pool across high school types and specifications that allow for interactions between threshold-crossing and own high school type. Most rejected students are admitted to degree programs in the same or similar fields to the program they are targeting. In the pooled sample, 12.4% of marginally rejected students are admitted to the other elite degree program in the same field as their target, and 51.0% are admitted to a non-elite program in the same field. 72.0% of marginally rejected students are admitted to a program in one of the business-oriented fields (business, law, or technology). Students rejected from the less selective UC programs typically transfer out of

[13] Below-threshold measures of peer characteristics are calculated using data for the 91% of marginally rejected students who are admitted to some degree program in the same year. Most of the remaining students are eventually admitted to some degree program. Figure A-3 in the Online Appendix shows results where peer attributes are determined by the highest-scoring (or highest private high school share) program to which a student is ever admitted. This data is available for 96.5% of marginal rejected students. Results are similar to those presented here.

the elite set, while students rejected from PUC programs typically end up at the UC program in the same field. 60.6% of students marginally rejected from UC degree programs are admitted to a non-elite program in the same broad field as their target program. 56.1% of marginal rejected students at PUC are admitted to the same program at UC while another 16.9% are admitted to a program in the same field at another institution. Students from private high schools are more likely to have another elite program as their next option.

To summarize, admission to the elite degree programs studied here has large effects on peer quality as measured by test scores and high school type. These gains accrue to successful applicants to both UC and PUC, and are smaller for students who are themselves from private high schools. Most students have a same-field degree as their next option, with many applicants who do switch fields moving between the business-oriented fields that are the subject of this study. In the analysis that follows, I focus largely on specifications that pool across fields and across applications to PUC and UC. The resulting estimates are best interpreted as the effects of increasing selectivity for students moving between degree programs in the same or similar fields. Sections 6.1 and 6.2 present additional evidence that changes in selectivity play an important role in driving the observed effects. Section 6.3 discusses specifications that disaggregate by institution and field within the set of elite degree programs.

Admissions effects are important insofar as they predict the degree programs students go on to attend. Data on matriculation are unavailable for cohorts used in the analysis of top outcomes, but they are available for a subset of more recent cohorts. I consider the matriculation effects of admission for these more recent students in Appendix Table A-2 and Figure A-2. Admission to an elite degree program raises the probability students matriculate at that program by more than 90 percentage points, with slightly larger effects for students not from private high schools. Effects on graduation are also slightly larger for students not from private high schools.

5.5 Effect of elite admission on leadership and top income attainment

I now consider the effect of admission to elite programs on the probability students attain top positions. Panel A of Figure 6 shows how the count of leadership positions students hold and the probability students will have incomes in the top 0.1% of the distribution differ for students just above and just below the threshold. Discontinuities at the admissions cutoff are clear in both graphs. Elite admission raises the mean leadership positions students hold by 0.020, a 50% gain relative to the below-threshold base of 0.040. It raises the probability a student will have an income in the top 0.1% of the income distribution by 0.008, a 45% gain relative to the base of 0.018.

Table 5 displays regression estimates of threshold crossing effects in the BW=10 and BW=20 specifications (in the columns labeled 'RF', for reduced form), as well as IV estimates that scale the threshold-crossing effects by changes in private high school share at the degree programs to which students are admitted. Threshold-crossing estimates are nearly identical in the two specifications. This is because the relationship between the running variable and top-end labor market outcomes is relatively weak in the neighborhood of the cutoff. I cannot reject the hypotheses that slope terms are equal to zero in the BW=20 specifications at conventional levels, and, as discussed in Online Appendix C, the inclusion of slope terms leads to worse out of sample prediction even at bandwidths of size 20 and larger. In the BW=10 specification, leadership and top income effects are statistically significant at the one percent level. In the BW=20 specification, these effects are significant at the five and ten percent levels, respectively. Instrumental variables estimates indicate that the count of leadership positions students hold rises by about 0.02 for every ten percentage point increase in private school share at the program to which they are admitted, while the share of students with incomes in the top 0.1% of the distribution rises by about 0.009.[14]

The effects of admission on leadership and top income probability vary with high school background. Panels B and C of Figure 6 and the 'Private HS' and 'Non-private HS' rows of Table 5 display estimates of leadership and top income effects for students from private and non-private high school backgrounds. Admission raises the count of leadership positions students from private high schools hold by 0.033, equal to 51% of the base level of 0.065. Effects for students not from private high school backgrounds are approximately zero. Similarly, admission raises the probability students from private schools have incomes in the top 0.1% of the distribution by 1.8 percentage points, a 56% gain relative to a base probability of 3.2 percent. Effects for students from non-private high schools are again zero. Effects in percentage terms are also smaller for students from non-private high schools, even given smaller baseline levels. I discuss this in more detail in Section 5.6. In the BW=10 specification, leadership and top income effects for private high school students are statistically significant at the five percent and one percent levels, respectively. p-values from tests of the hypothesis that effects are equal for students from private and non-private high schools are approximately 0.05. Instrumental variables estimates show similar patterns of heterogeneity. This makes sense given that first stage results by high school type reported in Table 4 are very similar for the two groups. As with the pooled estimates, the BW=20 specification suggests nearly identical but more noisily estimated effects.

[14] For first stage estimation, I set private high school shares for the 9% of marginally rejected students whose admissions outcomes I do not observe to the mean value for marginally rejected students who are not admitted to any elite program. This causes IV estimates to differ very slightly from results that would be obtained by dividing the reduced form coefficients by the threshold-crossing estimates for peer private high school share reported in Table 4. See footnote 13 on page 19 for more discussion of missing data.

5.6 Elite admission and the distribution of income

The interpretation of heterogeneous admissions effects by high school background depends on how the rest of the income distribution shifts. It is possible that students not from private high schools realize improvements in labor market outcomes similar to those for private school students, but have below-threshold outcome distributions shifted far enough to the left that even large gains are not sufficient to reach top positions. However, an analysis of the distribution of incomes above and below the threshold suggests this is not the case. Figure 7 shows regression discontinuity plots with log income as the dependent variable for the pooled sample and by high school background, while Figure 8 summarizes intercepts and threshold-crossing effects from a set of RD specifications in which the dependent variables are dummies equal to one if observation falls within the listed percentile range of the population income distribution. Regression results corresponding to both figures are reported in Table 6.

Focusing first on log income, Figure 7 shows easily-observable discontinuities in the full sample and private high school samples. There is little if any visual evidence of a discontinuity in the graph for non-private high school students. Regression estimates from the BW=10 specification indicate that admission to an elite degree program raises student earnings by 11.8% on average, but that gains are much larger from students from private high schools (17.4%) than for those from non-private high schools (7.4%). In the BW=20 specification, the effect estimate for students from private high schools remains large and statistically significant (15.9%), while the effect for students from non-private high schools declines to a small and statisically insignificant 0.021. The difference between the BW=10 and BW=20 specifications arises here because the running variable has a stronger relationship with log income than with the attainment of top positions. These findings are consistent with results from HNZ, who report larger mean income gains for high-SES students from admission to a broader class of selective business programs.

Figure 8 explores the distributional effects of threshold-crossing in more detail. I partition the income distribution in each year into seven categories and create a set of dummy variables equal to one if an individual's income falls a given part of the distribution. I then split the sample by high school type and estimate alternate versions of equation 2 with these dummies as the dependent variables. The figure is based on results from the BW=20 specification. Panel A of Figure 8 displays estimated intercepts. These capture the distribution of income for students who are marginally rejected from their preferred degree program. These percentages sum to less than one because they exclude the not in labor force category. Recall from Figure 4 that match rates to the labor force sample do not change across the cutoff. Students from non-private high school backgrounds are relatively more common below the 95th percentile of the income distribution, while students from private high school backgrounds are more common above the

95th percentile. Below-threshold students from private high schools have a 3.2% chance of being in the top 0.1% of the distribution, 5.7 times higher than the chances for students from non-private high schools.

Panel B of Figure 8 shows estimated threshold-crossing effects, while Panel C shows estimated effects as a percentage of baseline share. For private high school students, admission to an elite degree program decreases the probability of an income below the 90th percentile of the distribution, while increasing the probability of realizing incomes above the 90th percentile. The largest increase in both levels and percentage terms is in the top 0.1% of the distribution. For students not from private high schools, changes are smaller across the distribution. Effects at the very top of the income distribution are close to zero in levels, and small in percentage terms despite the small denominator. Note that the low baseline means for students from non-private high schools produce very noisy estimates of percentage effects, so I cannot reject the hypothesis that percentage effects are the same for students from private and non-private high schools at conventional levels.

6 Interpreting the effects of elite admission

This section extends the regression discontinuity analysis to explore the mechanisms underlying the effects of elite admission on top career outcomes reported in Section 5. I first consider the types of career changes driving the observed effects. I do this by exploring the effects of admission on the sectors in which students work, and also by using data for recent application cohorts that allow for explicit comparisons between outcomes for students with different next-choice degree programs. I next discuss heterogeneity in effects by target field and institution, by finer classifications of high school background, and across different sample definitions. Finally, I consider whether observed patterns in top outcomes are unique to the elite business focused programs studied here, or whether they generalize to students applying to degree programs in medical fields with similar average income.

6.1 Changes in sector of employment

As reported in Table 4, admission to elite degree programs is associated with increasing selectivity, as measured by peer scores or high school backgrounds. For a minority of students it is also associated with a change in field of study. Changes in rates of top outcome attainment may stem from either or both of these transitions. I explore this issue first by considering the effects of elite admission on students' career paths using data on the broad sector of the firms where students work. If changes in top attainment are driven by students switching from, say, careers in journalism to careers in finance, we would expect to observe changes in the allocation of students to sectors across the admissions threshold. Data on sector of employment are available for just over 70% of application-outcome year observations.[15] I create dummy variables corresponding to employment in different sectors and use them as dependent variables in Equation 2.

Table 7 presents estimates of threshold-crossing effects as well as below-threshold means (i.e., intercept terms) for selected sectors. Marginal rejected students are most likely to work in business-oriented sectors. Three sectors (the real estate, rental, or business activities sector, the wholesale and retail trade sector, and the finance sector) account for 45.4% of observations. These three sectors make up large shares of employment for both students from private high school backgrounds (47.2%) and non-private backgrounds (41.2%). Students from non-private high schools are more likely to work in education or public administration (22.6% of observations vs. 13.8% for students from private schools). Threshold-crossing has limited effects on sector mix. The largest effect is to reduce the fraction of students going into public administration by 2.8 percentage points. This effect is similar for students from private and non-private high school backgrounds. There are no statistically significant changes in the rates at which students choose careers in the finance sector, the trade sector, or the real estate/rental sector. These findings suggest that students applying to business-focused programs from both private- and non-private high school backgrounds tend to pursue business-oriented careers, but that students from private high schools do so more successfully.

6.2 Earnings outcomes by below-threshold admission outcome

I next investigate the relative importance of changes in selectivity and changes in major using data on student choice lists. Beginning in 2000, application records include full student choice lists in addition to data on realized admissions and waitlist outcomes. The choice lists allow me to compare outcomes for students based on differences between their target program and their next option. For example, I can look at the effects of admission to elite degree programs only for students who would be admitted to a non-elite degree program in the same field if rejected from the target. The downside of these data is that students applying to college in 2000 or later have not yet reached their peak labor market years, so I cannot look directly at leadership and top income outcomes. Nevertheless the exercise provides a useful complement to the finding that elite admission results in limited changes in sector of work over the long run.

My analysis focuses on students applying to college in between 2000 and 2003. I consider only

[15] These are students who have labor income from long-term contracts.

student-year observations where students are at least 10 years removed from the year of application, or age 28. The data cover applicants to the six elite, business focused degree programs. Based on student choice lists and test scores, I simulate counterfactual admissions outcome that would occur for each student if he were rejected from his targeted degree program. I label this program the next option. Appendix D discusses these data in more detail.

I estimate specifications of the form

$$y_{ipct} = \Delta^0 A_{ipc} + f^0(d_{ipc}) + \sum_n X^n_{ipc} A_{ipc} \Delta^n + \sum_n X^n_{ipc} f^n(d_{ipc}) + e_{ipct} \quad (3)$$

As in Equation 2, y_{ipct} is a labor market outcome for individual i applying to program-cohort pair pc in outcome year t. d_{ipc} is an individual's score relative to the cutoff and A_{ipc} is an admissions dummy. Equation 3 differs from Equation 2 in that in addition to the main effect of admission Δ^0 and smooth function $f^0(d_{ipc})$, both admissions effects and smooth functions are allowed to vary with covariates X^n_{ipc}. The X^n_{ipc} capture differences between attributes of the target degree and the next option degree for each student. To understand these specifications, it is helpful to consider a simple case in which there is only one binary X^n_{ipc}– say, an indicator equal to one if the alternative degree is in a business-focused field. In this case estimating Equation 3 is numerically equivalent to estimating separate RD specifications in the two groups defined by the binary dummy. Δ^n is equal to the difference between effect estimates between the two groups.

In practice, I estimate specifications that include multiple X^n_{ipc}, as well as non-binary X^n_{ipc} such as the difference in peer scores and peer private high school share between the target and next option degree. Relative to standard RD estimation, these specifications impose the restrictions that a) the X^n_{ipc} interact with A_{ipc} and f^n in an additively separable way, and b) that continuous variables interact linearly with the A_{ipc} and f^n. These restrictions allow for tractable estimation of heterogeneity along several characteristics simultaneously. The separability restriction is similar to Kirkeboen et al. (2016). I take log income as the outcome of interest, and focus on the BW=20 specification because, as discussed above, the running variable is predictive of log income. See Online Appendix D for results from the BW=10 specification, as well as balance tests and sample description.

Table 8 presents results. The upper panel presents estimates without interaction terms. Patterns are qualitatively similar to the long-run outcomes presented in section 5.5, with larger effects for students from private than non-private high schools. Sample sizes are smaller here, and effects are more noisily estimated. The lower panel presents estimates that include a main effect term as well as interactions between admission and a) an indicator equal to one if the next degree program is not in the business, engineering, or law fields, b) the gap in peer mean math scores at the target versus the next option field, c) the gap between share of private high school students at the target versus next option program, and d) a dummy variable equal to one if the next option is also an elite program. Peer score gaps and private high school share gaps are demeaned, so that the main effect captures the effect of admission to an elite program for a student whose next option is a non-elite program in a business area with mean test scores roughly 25 points below the target degree and peer private high school share 13 percentage points below the share at the target program.

Key findings are as follows. First, increases in the fraction of students from private high schools are strongly associated with earnings gains, holding other factors constant. The earnings gains associated with increases in peer private high school share are larger for students from private high school backgrounds. In contrast, there is little evidence that students who move to degree programs with higher peer scores experience earnings gains. Second, students who would otherwise be admitted to degrees in non-business areas may realize larger gains than those coming from business areas, but this difference is noisily estimated. At minimum, it is clear that gains are not limited to students transitioning from business to non-business fields. Finally, students admitted to their more preferred elite degree program who would otherwise attend another elite program realize small earnings losses in the short run. My findings here parallel results in HNZ showing that selectivity is an important determinant of earnings outcomes in Chilean higher education, even holding field of study fixed.

Figure 9 displays earnings effects by terciles of the cross-threshold change in peer private high school share for private high school students. This figure confirms that students for whom peer private high school share rises (those in the upper two terciles) experience earnings gains, while students for whom peer private high school share stays constant or falls (those in the lower tercile) experience earnings losses in an RD setting that does not impose the separability or linearity assumptions in Equation 3. I report results from this analysis in Panel C of Table 8. The takeaway from this analysis is that increased degree program selectivity within business-focused fields is a key driver of the observed labor market effects, with peer SES background a much stronger correlate of earnings gains than peer scores.

6.3 Heterogeneous effects by program characteristic, student background, and outcome type

Online Appendix E considers heterogeneous effects by institution, major, disaggregated student background, and disaggregated measures of top outcomes. These findings are in general noisily estimated. Key points are as follows. First, patterns of leadership and log income effects are similar for the PUC and UC programs, while admission to PUC programs has larger effects on top incomes. Second, top income and leadership effects are larger for law and business degrees than for engineering degrees, with similar log income effects across the three fields. Third, top income, leadership, and log income effects are larger for students from one of the seven elite private high schools than from other private high schools, while effects for students from the selective public exam school are close to zero. Fourth, I do not see evidence that admission raises rates of leadership attainment, top income attainment, or log income for women. Fifth, admission increases the rates at which students attain both C-suite and directorship positions, as well as their chances of holding any leadership position. Sixth, and finally, I show students from non-private high schools who are admitted to elite *medical* degree programs realize larger income gains than students from private high schools. This contrasts with the finding for business-focused programs. The takeaway point is that the degrees whose students regularly attain top positions in the economy are also those that offer low returns for poorer students, in contrast to other programs with similar average earnings.

Online Appendix E also considers the possibility that admission to elite degree programs leads to top career attainment in less remunerative sectors. For example, admission to elite degree programs might help students from non-private high schools reach top jobs in government or education. I find no evidence of such effects.

7 Peer ties and leadership outcomes

The analysis above shows that admission to an elite degree program raises the probability of high income and occupational attainment, but only for students from private high schools, which I interpret as a proxy for high-SES background. These gains are the result of students transitioning to more selective degree programs, for the most part within the same or similar fields. Broadly speaking, there are two ways to explain these findings. The first is complementarity between a private high school background and non-peer institutional inputs such as coursework, faculty interaction, or signaling effects at top degree programs. For example, reaching a leadership position could require both skills learned at elite colleges and skills that parents of private high school students teach their children at a young age.

The second explanation is that gains in leadership positions for students from private high schools are driven by the people they meet in college. Students at elite universities may have ties to businesses through which they can refer college peers. Alternatively, school peers may be more productive if they work together, and working with peers may incentivize good performance at work. Students from private high school backgrounds could benefit disproportionately if they are better able to form valuable ties with their college peers. This story is consistent with analysis in section 6.2 showing that short-run earnings gains are largest for private high school students who gain access to degree programs with more private high school peers.

This section separates the effects of peer ties from those of other institutional characteristics by looking at co-leadership rates, which I define as the probability that both members of a pair of students have leadership roles at the same firm. I compare co-leadership rates for students who were college peers (i.e., who attended the same degree program at the same time) to co-leadership rates for pairs who attended the same degree program at different times, or who attended a different degree program at the same time. The intuition is that within a degree program, same-cohort pairs are similar to pairs of students a few years apart in terms of pre-college backgrounds and institutional inputs, but that students in same-cohort pairs are more likely to know each other and to have mutual contacts. If students obtain jobs through contacts, or if peers are more productive when working together, college peers may be more likely to serve on leadership teams at the same firms than other pairs of similar students. If management hiring depends only on non-peer institutional inputs, there would be little reason to expect such a result. The the pairs-based empirical strategy is most closely related to Bayer, Ross, and Topa (2008), who explore how the probability two individuals work at the same address depends on how close together they live.

Panel A of Figure 10 presents co-leadership rates by cohort distance for students in the same degree program and students in the other elite degree program in the same field. The sample includes only pairs of students where both members of the pair are from private high schools (though not necessarily the same private high school). I present separate figures for all private high school students (left graph) and for the subset of private school students from elite private schools (right panel). Recall from Section 6.3 that leadership gains across the admissions threshold were largest for students from elite private high schools. Co-leadership rates are expressed on a per-100,000 pairs basis. One way to think about the group means is as the number of co-leaders who would emerge from a group of about 317 ($\approx \sqrt{100000}$) students. This is roughly the size of the admitted cohort in the engineering program at PUC during the period studied here. In both panels, co-leadership rates for students in the same degree program are relatively flat by cohort distance for students one or more year apart, but much higher for students who are peers in the same program in the same cohort. In contrast, there is no obvious pattern in co-leadership rates by cohort distance for students in different programs in the same field. This indicates that the elevated rates for peers are not driven by a propensity for non-peer students in the same cohort and same field to lead the same firms over the long run.

Panel B of Figure 10 displays co-leadership rates for pairs of students from private high schools by the position of the applicant relative to the admissions cutoff. I focus on the way admission changes applicants' co-leadership outcomes with three types of students: admitted students at the target degree program (e.g., the law program at PUC) in the same application cohort (i.e., students who will be applicants' college peers), admitted students at the target degree program separated by at least one year, and students from different degree programs in same field and same admission cohort. In contrast to the regression discontinuity graphs presented above, Panel B of Figure 10 displays binned means within a 40 point window on each side of the admissions threshold, and uses a wider bin width. Rates of co-leadership are relatively low compared to overall leadership rates,[16] reducing statistical power. I therefore focus this discussion on a) broad comparisons of means above and below the threshold, and b) global polynomial specifications that allow for separate slopes above and below the threshold rather than a local regression discontinuity analysis.

Students who are not admitted to their target program are similarly likely to co-lead firms with students accepted to the same cohort in their target program, with students accepted to other cohorts in that program, and with students from nearby cohorts in other same-field degree programs. Students admitted to their target program become roughly three times as likely to co-lead firms with their college peers, but are no more likely to co-lead firms with other types of admitted students. For example, a student admitted to PUC Law class of 1983 is much more likely than a student rejected from that degree program to serve on the same corporate board as another PUC Law student from the class of 1983. However, he is no more likely than the rejected student to serve on the same corporate board as a student from the PUC Law class of 1980, or from the UC Law class of 1983. Statistical tests reported in Table A-3 reject the hypothesis that the observed gain in co-leadership for same degree, same cohort pairs is equal to zero, but fail to reject the hypothesis that co-leadership gains for other pair types are zero.

These results are consistent with a story in which ties between peers from private high schools play an important role in driving the increase in leadership hiring associated with admission to an elite degree program. It is natural to ask whether students from non-private high schools also benefit from peer ties at elite degree programs. The finding of no causal effect of admission in the regression discontinuity analysis suggests they may not. To explore this question I estimate single-difference specifications of the form

$$Y_{ij} = \alpha + \sum_{g} C_g(t_i, t_j)\pi_g + e_{ij} \tag{4}$$

[16] 428 male students from private high schools admitted to elite degree programs between 1974 and 1991 held at least one leadership position. Of these, 258 (60%) held a positition at the same firm as another private school student from the same field, and 195 (46%) with a private school student from the same program, and 78 (18%) with a private school student from the same program and at most one cohort apart.

within the sample of applicant pairs admitted to the same degree program, and difference-in-differences specifications of the form

$$Y_{ij} = \alpha + \beta S(p_i, p_j) + \sum_g C_g(t_i, t_j)\gamma_g + \sum_g S(p_i, p_j)C_g(t_i, t_j)\pi_g + e_{ij} \tag{5}$$

in the sample applicant pairs admitted to same-field elite degree programs. Y_{ij} is a dummy equal to one if i and j hold leadership positions in the same firm. Denoting the application year for applicant i as t_i and the program where i is admitted as p_i, $C_g(t_i, t_j)$ is an indicator function equal to one if $|t_i - t_j| = g$, while $S(p_i, p_j)$ is an indicator equal to one if $p_i = p_j$. The coefficients of interest in both equations are the π_g. High values of π_0 relative to estimates for larger g indicate higher rates of co-leadership for college peers relative to non-peers. Equation 4 compares co-leadership rates for college peers relative to non-peers admitted to the same program, while equation 5 uses both same program and same field, different program students as controls. In both specifications, g takes values between zero and three, with values of g greater than or equal to four pooled into a single omitted category. For students from private high schools, estimates of Equation 4 are equivalent to comparing the same-program co-leadership rates in Panel A of Figure 10 to the value for $g = 4$, while estimates of Equation 5 can be obtained by differencing out the other-program effects and then making the same comparison.

As is standard in difference-in-difference analyses, the key assumption underlying the interpretation of π_0 as a causal effect of peer status on co-leadership outcomes is that firm-program effects and firm-cohort effects are additively separable; i.e., that there are not differential changes in the skill match between degree programs and firms over time. As is often the case in difference-in-difference analyses, it is difficult to conclusively rule out violations of separability. That co-leadership rates are elevated only for students exposed to each other in the classroom helps alleviate this concern, as does the finding of a discontinuous break in co-leadership rates for admitted students.

Table 9 presents results. Panel A presents estimates of the π_g from Equation 4 and Panel B from Equation 5. The first two columns present estimates for pairs of students in which, respectively, both members of a pair are from private schools, and both members of a pair are from elite private schools. Effects are expressed relative to the omitted category of a four or more year cohort gap. As expected we see elevated rates of co-leadership only for students who are peers in the same cohort. Effect estimates are statistically significant at at least the 10% level in each specification. The single-difference specification indicates that students who are peers in the same cohort in the same program are 126% more likely to lead the same firm than students separated by four or more cohorts. For students from elite private high schools only, the effect estimate in percentage terms is 137%. Difference-in-difference estimates are slightly larger than single-difference estimates.

The third column in Table 9 shows effects for pairs of elite admits where one member is from a private high school and another member is not. Overall rates of co-leadership are lower for such pairs. Estimated peer effects are small and statistically insignificant. The fourth column of Table 9 shows estimates for pairs of students where neither member has a private high school background. Estimated peer effects are small here as well. The estimated effect at $g = 0$ in the difference-in-differences specification is significant at the 10 percent level. I interpret this effect cautiously because it is not replicated in the single difference specification. As shown in Online Appendix F, there is no visual evidence of a spike in co-leadership rates for peers in either the mixed-school type or non-private school samples.

The analysis of co-leadership rates shows that a) students from private high school backgrounds who are admitted to elite degree programs become more likely to lead firms with their same-background college peers, but not with same-background non-peers, and b) that students not from private high schools are no more likely to lead the same firms as their peers regardless of background. These findings parallel results from sections 5 and 6 showing that leadership gains from elite admission accrue only to students from private high school backgrounds. Both sets of results are consistent with the idea that ties to college peers play an important role in determining top outcomes. In contrast, it is difficult to reconcile the finding that there are no changes in co-leadership rates with non-peers with stories where peer ties play no role in hiring.

Online Appendix G formalizes this intuition using a simple model of leadership hiring in which hiring depends on student skills and referrals from school peers. The model maps gains in co-leadership rates with non-peers to skill effects, and differentially large gains in co-leadership rates with peers to peer effects. It provides the basis for a decomposition of the total effect of admission into a 'skill' component and a 'peers' component using the co-leadership estimates presented here. Results from this exercise suggest that peer ties can account for essentially all of the observed effect within at least one model of leadership hiring.

In supplementary analyses, I consider heterogeneity in co-leadership outcomes underlying the main estimates. Both baseline co-leadership rates and the effects of college peer status are large for students who attended the same private high school, though they are also present for students who attended different private high schools. This suggests that one factor underlying the increase in co-leadership rates associated with admission (visible in Panel B of Figure 10) is an increasing value of ties between students who may have already known each other in high school. Increases in rates of co-leadership are driven by pairs that include at least one directorship position. I also consider alternate clustering strategies for pairwise inference, and find results similar to those presented here. I present these findings in Online Appendix F.

8 Discussion

This paper considers the role of elite colleges in providing a pathway for talented students from non-elite backgrounds into positions at the top of the income distribution and into leadership roles at major firms. To address this question, I combine novel data on applicants to elite business, law, and engineering programs in Chile with a regression discontinuity design that exploits score-based admissions cutoffs. I link these records to data on top managers and directors at all publicly traded firms in Chile and to administrative tax records. Descriptively, I find that students admitted to elite degree programs account for 41% of leadership positions and 38% of the top 0.1% of the income distribution for college admissions test takers aged 30 and over, despite making up just 1.8% of this population. Admission to an elite degree program raises the number of leadership positions students hold by 50%, and their probability of attaining income in the top 0.1% of the distribution by 45%. However, the gains accrue only to students who attended private high schools. Students who attend other types of high schools, including elite public schools, do not realize any gains in top outcomes from elite college admission. The primary driver of effects for students from private high schools appears to be increases in selectivity within the same or similar field of study.

The composition of leadership teams at particular firms suggests that ties formed between college peers from private high schools are an important driver of hiring. Difference-in-difference estimates suggest that being peers in an elite degree program raises the rate at which pairs of private school students lead the same firms by 126% of the baseline co-leadership rate. Students who are not from private high schools are no more likely to co-lead firms with college peers who attended private high schools than they are with students from different degree programs or different cohorts.

One surprising aspect of these findings is that, even in the presence of a transparent admissions system based only on test scores and grades (and notably without the legacy preferences common in the US), elite colleges widen the gap in rates of top career attainment between students from wealthy and less wealthy backgrounds. This is despite the fact that, as in the US, elite colleges in Chile view identifying and developing talented students from non-elite backgrounds as an important part of their mission. See Agosin (2012) and Lewis (1997) for mission statements from UChile and Harvard. My findings suggest that these efforts have not been fully successful, perhaps because students from poorer backgrounds are unable to form the kinds of social ties with richer classmates that facilitate access to top positions. Whether efforts to increase social integration at the secondary or postsecondary level can raise career attainment for lower-income students at elite degree programs is a topic for future work.

The welfare implications of these findings are ambiguous. On one hand, the dominance of a small group of elites may reduce social welfare. The failure of elite universities to facilitate innovation amongst the economic elite could be a driver or a symptom (or both) of the type of growth-reducing elite entrenchment described, e.g., in Acemoglu and Robinson (2006, 2008, 2012). On the other hand, my findings could have positive or negative implications for the efficiency of corporate management. In the context of informational frictions, signals conveyed through peer ties formed at elite colleges between pairs of students from wealthy backgrounds may help firms make better hires for top positions. Peer references would then increase efficiency, although possibly less so than if they were available for all students. Peer ties may also affect managerial productivity directly. Recent papers suggest that peer connections among managers could either reduce efficiency by encouraging lax oversight or inefficient compensation decisions (Fracassi and Tate 2012; Shue 2013), or increase efficiency by facilitating the flow of information within and across firms or taking advantage of peer complementarities in production (Cohen et al. 2008; Oyer and Schaefer 2012). Peer ties may also mitigate agency problems associated with the transfer of firm control, as described in Caselli and Gennaioli (2005, 2013). Network inputs into manager performance could offset any welfare losses created by informational frictions in hiring. This is a topic for future research.

Another important question is whether results from Chile can be extrapolated to other countries. Levels of inequality in Chile are similar to those in other Latin American countries and the US (Fairfield and Jorratt de Luis 2015). It seems likely that access to elite educational institutions and family networks play a smaller role in Chile than in other Latin American countries, which are characterized by slower growth, similar levels of inequality, and less business transparency. Comparisons with the US and European countries are more challenging, due to differences in the size and geographic and social dispersion of the business elite. Chile has a relatively small corporate sector concentrated in one city, Santiago. The US has a much larger set of business leaders distributed across several major population centers. At the national level, peer ties between corporate leaders may be stronger in Chile, but elite university attendance in the US could be more valuable if opportunities to network with a nationally-recruited group of elite students are rarer. The direction of 'bias' in Chilean estimates of overall admissions effects and heterogeneous admissions effects by family background relative to population parameters in the US is unclear. What is clear is that the evidence presented here is consistent with the qualitative 'two Harvards' story often told about US institutions (Mills 1956, Kantor 2013). Further quantitative study of the determinants and long-run consequences of peer ties formed at elite universities in Latin America and elsewhere is an important subject for future work.

References

Abdulkadiroğlu, Atila, Joshua Angrist, and Parag Pathak, "The elite illusion: Achievement effects at Boston and New York exam schools," *Econometrica*, 2014, *82* (1), 137–196.

Acemoglu, Daron and James A. Robinson, "Political losers as a barrier to economic development," *The American Economic Review*, 2000, *90* (2), 126–130.

____ **and** ____ , "Economic backwardness in political perspective," *American Political Science Review*, 2006, *100* (1), 115–131.

____ **and** ____ , "Persistence of Power, Elites, and Institutions," *The American Economic Review*, 2008, *98* (1), 267–93.

____ **and** ____ , *Why nations fail: The origins of power, prosperity, and poverty*, Random House Digital, Inc., 2012.

____ **, Simon Johnson, and James A. Robinson**, "The Colonial Origins of Comparative Development: An Empirical Investigation," *The American Economic Review*, 2001.

Agosin, Manuel, "Standard Alignment Plan FEN," December 2012.

Alvaredo, Facundo, Anthony B Atkinson, Thomas Piketty, and Emmanuel Saez, "The top 1 percent in international and historical perspective," *The Journal of Economic Perspectives*, 2013, *27* (3), 3–20.

Arcidiacono, Peter and Sean Nicholson, "Peer effects in medical school," *Journal of Public Economics*, 2005, *89* (2), 327–350.

____ **, Jane Cooley, and Andrew Hussey**, "The Economic Returns to an MBA," *International Economic Review*, 2008, *49* (3), 873–899.

Atkinson, Anthony B, Thomas Piketty, and Emmanuel Saez, "Top incomes in the long run of history," *Journal of economic literature*, 2011, *49* (1), 3–71.

Bertrand, Marianne and Antoinette Schoar, "Managing with style: The effect of managers on firm policies," *The Quarterly Journal of Economics*, 2003, *118* (4), 1169–1208.

Bivens, Josh and Lawrence Mishel, "The Pay of Corporate Executives and Financial Professionals as Evidence of Rents in Top 1 Percent Incomes," *Journal of Economic Perspectives*, 2013, *27* (3), 57–78.

Black, Sandra E. and Paul J. Devereux, "Recent developments in intergenerational mobility," *Handbook of labor economics*, 2011, *4*, 1487–1541.

Calonico, Sebastian, Matias D Cattaneo, and Rocio Titiunik, "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs," *Econometrica*, 2014, *82* (6), 2295–2326.

——, ——, Max H Farrell, and Rocıo Titiunik, "Regression Discontinuity Designs Using Covariates," Technical Report, working paper, University of Michigan 2016.

Cappelli, Peter and Monika Hamori, "The path to the top: Changes in the attributes and careers of corporate executives, 1980-2001," NBER WP 10507, 2004.

Caselli, Francesco and Nicola Gennaioli, "Credit constraints, competition, and meritocracy," *Journal of the European Economic Association*, 2005, *3* (2-3), 679–689.

—— and ——, "Dynastic management," *Economic Inquiry*, 2013, *51* (1), 971–996.

Chetty, Raj, Nathaniel Hendren, Patrick Kline, Emmanuel Saez, and Nicholas Turner, "Is the United States still a land of opportunity? Recent trends in intergenerational mobility," *The American Economic Review*, 2014, *104* (5), 141–147.

Cohen, Lauren, Andrea Frazzini, and Christopher Malloy, "The Small World of Investing: Board Connections and Mutual Fund Returns," *Journal of Political Economy*, 2008, *116* (5), 951–979.

Dale, S.B. and A.B. Krueger, "Estimating the Payoff to Attending A More Selective College: An Application of Selection on Observables and Unobservables," *Quarterly Journal of Economics*, 2002, *117* (4), 1491–1527.

Dale, Stacy B and Alan B Krueger, "Estimating the effects of college characteristics over the career using administrative earnings data," *Journal of Human Resources*, 2014, *49* (2), 323–358.

de Giorgi, Giacomo, Michele Pellizzari, and Silvia Redaelli, "Identification of social interactions through partially overlapping peer groups," *American Economic Journal: Applied Economics*, 2010, pp. 241–275.

Dobbie, Will and Roland G Fryer Jr, "The impact of attending a school with high-achieving peers: evidence from the New York City exam schools," *American Economic Journal: Applied Economics*, 2014, *6* (3), 58–75.

Ellison, Glenn and Edward L. Glaeser, "Geographic Concentration in US Manufacturing Industries: A Dartboard Approach," *The Journal of Political Economy*, 1997, *105* (5), 889–927.

Engel, Eduardo, "Las protestas son repercusiones de la Gran Recesion," *Que Pasa*, August 1st 2013.

Fairfield, Tasha and Michel Jorratt De Luis, "Top income shares, business profits, and effective tax rates in contemporary Chile," *Review of Income and Wealth*, 2015.

Fracassi, Cesare, "Corporate Finance Policies and Social Networks," *Mimeo*, 2012.

——— **and Geoffrey Tate**, "External networking and internal firm governance," *The Journal of Finance*, 2012, *67* (1), 153–194.

Frydman, Carola and Dirk Jenter, "CEO compensation," NBER WP 16585, 2010.

——— **and Raven E. Saks**, "Executive compensation: A new view from a long-term perspective, 1936–2005," *Review of Financial Studies*, 2010, *23* (5), 2099–2138.

Gallego, Francisco and Borja Larrain, "CEO compensation and large shareholders: Evidence from emerging markets," *Journal of Comparative Economics*, 2012, *40* (4), 621–642.

Grange School, "Admissions," 2016. Accessed June 25th, 2016.

Güner, A Burak, Ulrike Malmendier, and Geoffrey Tate, "Financial expertise of directors," *Journal of Financial Economics*, 2008, *88* (2), 323–354.

Hastings, Justine S., Christopher A. Neilson, and Seth D. Zimmerman, "Are Some Degrees Worth More than Others? Evidence from college admission cutoffs in Chile," NBER WP 19241 2016.

Hilton, Ronald, *Who's who in Latin America: a biographical dictionary of notable living men and women of Latin America*, Vol. 1, Blaine/Ethridge Books, 1971.

Hoekstra, Mark, "The Effect of Attending the Flagship State University on Earnings: A Discontinuity-Based Approach," *The Review of Economics and Statistics*, 2009, *91* (4), 717–724.

Hsieh, Chang-Tai and Miguel Urquiola, "The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program," *Journal of public Economics*, 2006, *90* (8), 1477–1503.

Kantor, Jodi, "Class Is Seen as Dividing Harvard Business School," *New York Times*, September 9th 2013.

Kaplan, Steven N., "Executive compensation and corporate governance in the US: perceptions, facts and challenges," NBER WP 18395 2012.

Kaufmann, Katja Maria, Matthias Messner, and Alex Solis, "Returns to Elite Higher Education in the Marriage Market: Evidence from Chile," *Mimeo*, 2013.

Kirkeboen, Lars, Edwin Leuven, and Magne Mogstad, "Field of Study, Earnings, and Self-Selection," *The Quarterly Journal of Economics*, 2016, p. qjw019.

Kopczuk, Wojciech, Emmanuel Saez, and Jae Song, "Earnings inequality and mobility in the United States: evidence from social security data since 1937," *The Quarterly Journal of Economics*, 2010, *125* (1), 91–128.

Lazear, Edward P., Kathryn L. Shaw, and Christopher T. Stanton, "The Value of Bosses," Technical Report, National Bureau of Economic Research 2012.

Lee, David S. and Thomas Lemieux, "Regression Discontinuity Designs in Economics," *Journal of Economic Literature*, June 2010, *48* (2), 281–355.

Lefort, Fernando and Eduardo Walker, "Ownership and Capital Structure of Chilean Conglomerate: Facts and Hypotheses for Governance," *Revista ABANTE*, 2000, *3*, 3–27.

Lewis, Harry R., "The Mission of Harvard College," February 1997.

Malmendier, Ulrike and Geoffrey Tate, "CEO overconfidence and corporate investment," *The journal of finance*, 2005, *60* (6), 2661–2700.

Marmaros, David and Bruce Sacerdote, "Peer and social networks in job search," *European Economic Review*, 2002, *46* (4), 870–879.

____ **and** ____ , "How do friendships form?," *The Quarterly Journal of Economics*, 2006, *121* (1), 79–119.

Mayer, Adalbert and Steven L. Puller, "The old boy (and girl) network: Social network formation on university campuses," *Journal of Public Economics*, 2008, *92* (1), 329–347.

McCrary, Justin, "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test," *Journal of Econometrics*, 2008, *142* (2), 698–714.

Miller, William, "American historians and the business elite," *The Journal of Economic History*, 1949, *9* (2), 184–208.

____ , "The Recruitment of the American Business Elite," *The Quarterly Journal of Economics*, 1950, pp. 242–253.

Mills, C. Wright, *The Power Elite*, Oxford University Press, 1956.

Nguyen, Bang Dang, "Does the Rolodex matter? Corporate elite's small world and the effectiveness of boards of directors," *Management Science*, 2012, *58* (2), 236–252.

North, Douglass C., John Joseph Wallis, and Barry R. Weingast, *Violence and social orders: A conceptual framework for interpreting recorded human history*, Cambridge University Press, 2009.

Núñez, Javier I. and Leslie Miranda, "Intergenerational Income Mobility in a Less-Developed, High-Inequality Context: The Case of Chile," *The BE Journal of Economic Analysis & Policy*, 2010, *10* (1).

Öckert, Björn, "What's the value of an acceptance letter? Using admissions data to estimate the return to college," *Economics of Education Review*, August 2010, *29* (4), 504–516.

Organization for Economic Cooperation and Development, "Education at a Glance 2012: OECD Indicators," 2012.

Oyer, Paul and Scott Schaefer, "The Returns to Attending a Prestigious Law School," *Mimeo*, 2009.

Petersen, Mitchell A, "Estimating standard errors in finance panel data sets: Comparing approaches," *Review of financial studies*, 2009, *22* (1), 435–480.

Piketty, Thomas, Arthur Goldhammer, and LJ Ganser, "Capital in the twenty-first century," 2014.

Pop-Eleches, Cristian and Miguel Urquiola, "Going to a better school: Effects and behavioral responses," *The American Economic Review*, 2013, *103* (4), 1289–1324.

Reyes, Loreto, Jorge Rodriguez, and Sergio S. Urzua, "Heterogeneous Economic Returns to Postsecondary Degrees: Evidence from Chile," NBER WP 18817, 2013.

Rolando, Rodrigo, Juan Salamanca, and Marcelo Aliaga, "Evolucion Matricula Educacion Superior de Chile, Periodo 1990-2009," Sistema Nacional de Informacion del Educacion Superior, June 2010.

Roth, Alvin E. and Elliott Peranson, "The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design," *American Economic Review*, 1999, *89* (4), 748–782.

Saavedra, Juan Esteban, "The learning and early labor market effects of college quality: A regression discontinuity analysis," *Mimeo*, 2009.

Sacerdote, Bruce, "Peer effects with random assignment: Results for Dartmouth roommates," *The Quarterly Journal of Economics*, 2001, *116* (2), 681–704.

Saez, Emmanuel and Gabriel Zucman, "Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data," *The Quarterly Journal of Economics*, 2016, *131* (2), 519–578.

Seminarium Penrhyn International, "La Educacion de los Lideres Corporativos," Technical Report 2003.

Shue, Kelly, "Executive networks and firm policies: Evidence from the random assignment of MBA peers," *Review of Financial Studies*, 2013, *26* (6), 1401–1442.

Solon, Gary, "Intergenerational mobility in the labor market," *Handbook of labor economics*, 1999, *3*, 1761–1800.

——, "Cross-country differences in intergenerational earnings mobility," *The Journal of Economic Perspectives*, 2002, *16* (3), 59–66.

Sorokin, Pitirim, "American millionaires and multi-millionaires: A comparative statistical study," *Journal of Social Forces*, 1925, *3* (4), 627–640.

Superintendicia de Valores y Seguros (SVS), "Mercado de Valores: Registros," 2013. Accessed June 25th, 2016.

Taussig, Frank William and Carl Smith Joslyn, *American Business Leaders: A Study in Social Origins and Social Stratification*, Macmillan, 1932.

Temin, Peter, "The American business elite in historical perspective," NBER Historical Paper 104, 1997.

——, "The stability of the American business elite," *Industrial and Corporate Change*, 1999, *8* (2), 189–209.

US News and World Report, "Best Global Universities in Latin America," 2016. Accessed June 25th, 2016.

Useem, Michael and Jerome Karabel, "Pathways to top corporate management," *American Sociological Review*, 1986, pp. 184–200.

Warner, William Lloyd and James C. Abegglen, *Occupational mobility in American business and industry, 1928-1952*, University of Minnesota Press, 1955.

World Bank, "World Development Indicators," 2016.

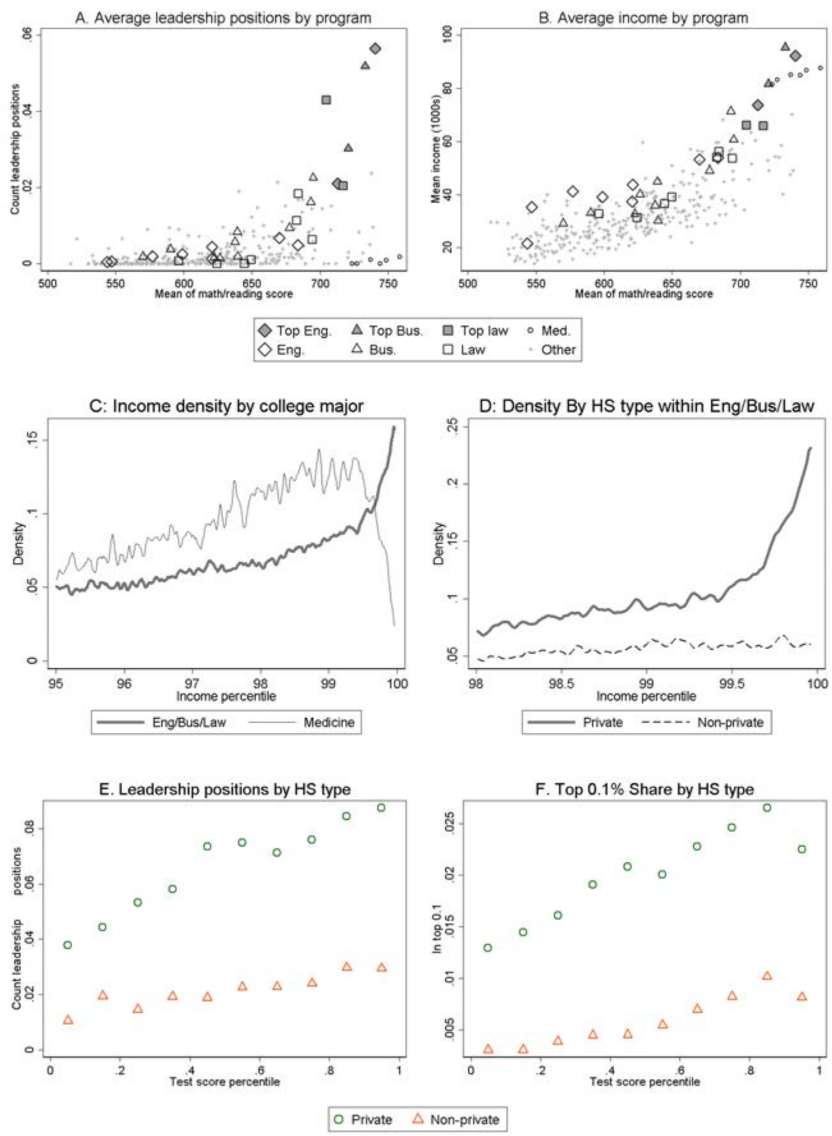
World Federation of Exchanges, "Monthly Report January 2013," 2013. Accessed March 2013.

Zhang, Hongliang, "The mirage of elite schools: evidence from lottery-based school admissions in China," *Mimeo, Chinese University of Hong Kong*, 2013.

Zimmerman, Seth D., "The Returns to College Admission for Academically Marginal Students," *Journal of Labor Economics*, 2014, *32* (4), 711–754.

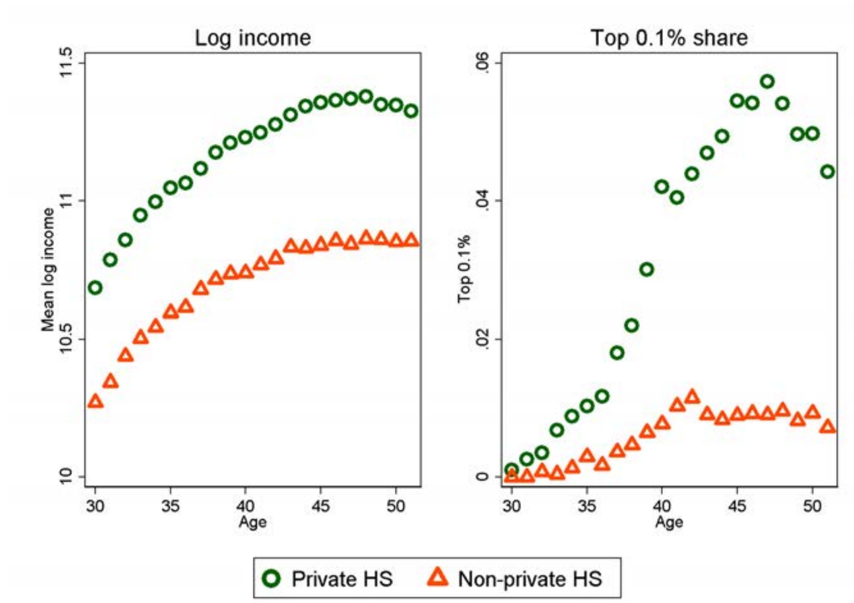
Tables and figures

Figure 1: High income shares by educational background



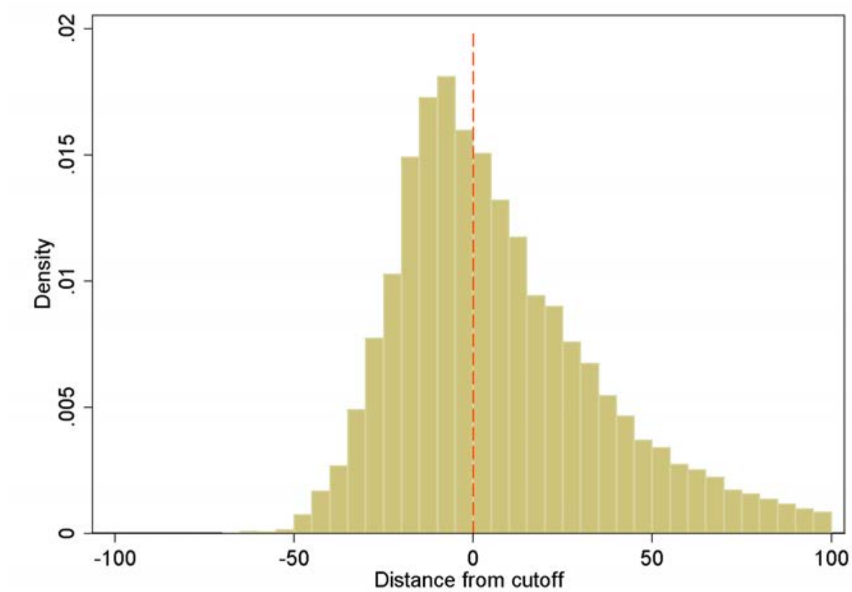
Panel A: mean leadership positions by degree program. Each point is a degree program, with marker shapes indicating degree field. Shaded degree programs are the six elite business-focused programs. Medical programs are identified by the 'Med' legend. Horizontal axis is mean of students' math and reading score. Panel B: Same as panel A but for average income. Panel C: Income densities. Horizontal axis is percentile of year-specific income distribution for population of admissions test takers age 30 and over. Vertical axis is density of income distribution for listed majors at PUC and UC. Density computed using Epanechnikov kernel with bandwidth 0.02 percentiles. Panel D: Density of income by percentile of population income distribution for students admitted to engineering, business, or law programs at UC and PUC, split by high school type. Panels E/F: mean leadership positions (E) and share in top 0.1% of income distribution (F), split by high school type. Horizontal axis is percentile of admissions test distribution for admitted students. Points are means within centered ten percentile bins.

Figure 2: Income and top income shares by age and high school type



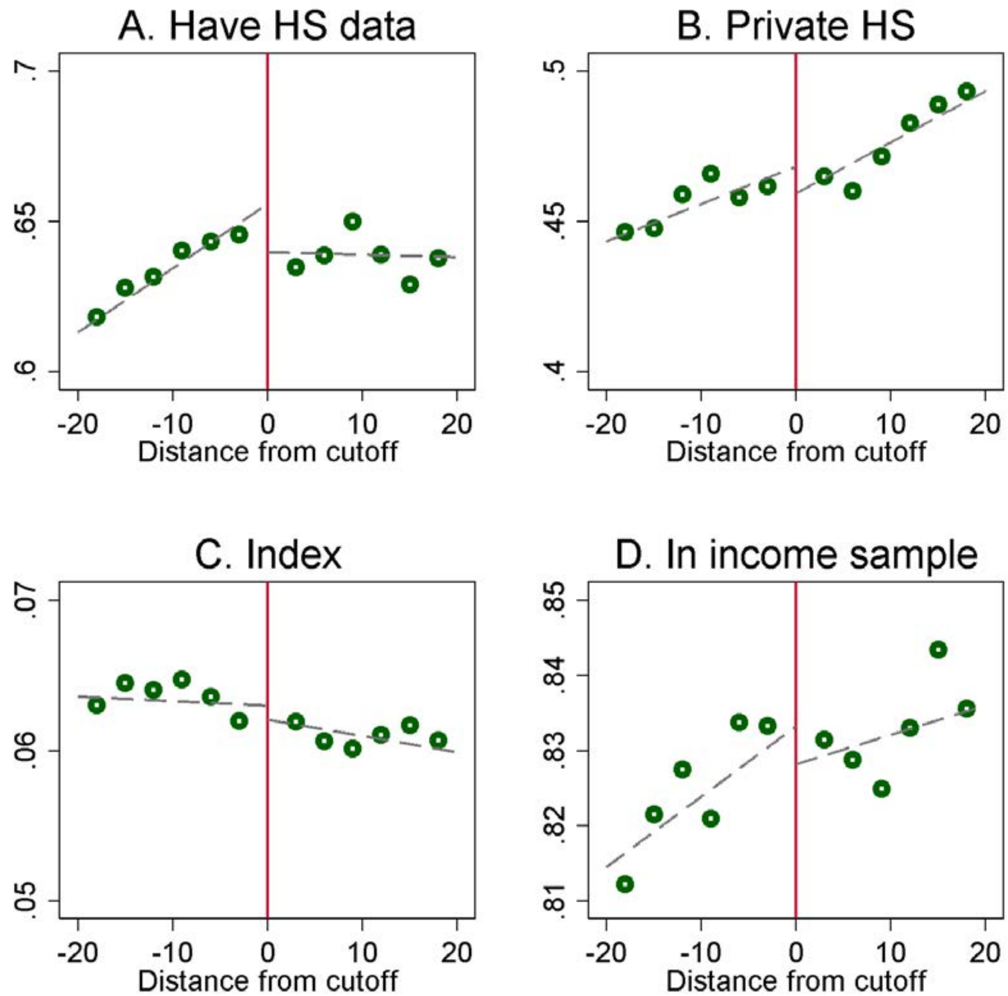
Mean log income and share in top 0.1% of population income distribution by high school type. Sample is students admitted to UC/PUC programs in Bus/Eng/Law. Earnings measured 2005-2013 for students applying for admission between 1980 and 2001. Age is calculated based on elapsed time since application, which is assumed to take place at 18.

Figure 3: Histogram of scores relative to cutoff for elite applications



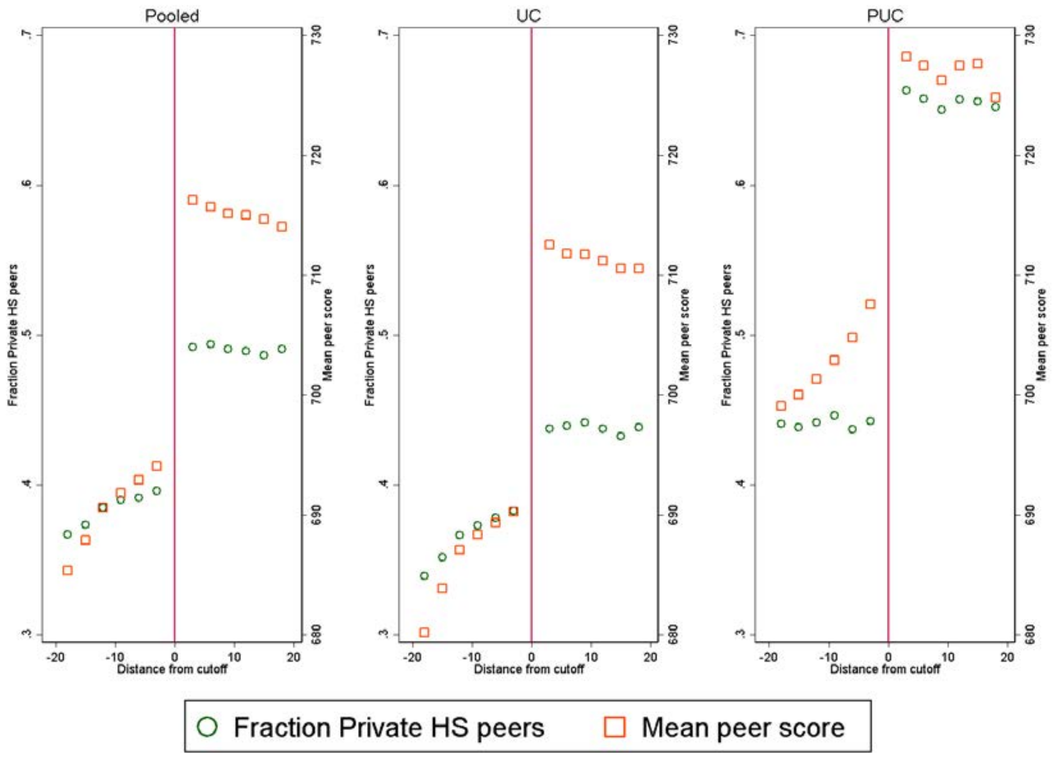
Density of scores for 1974-1991 applicants to elite degree programs. Densities reported within bins of width 5.

Figure 4: Predetermined covariates by position relative to threshold



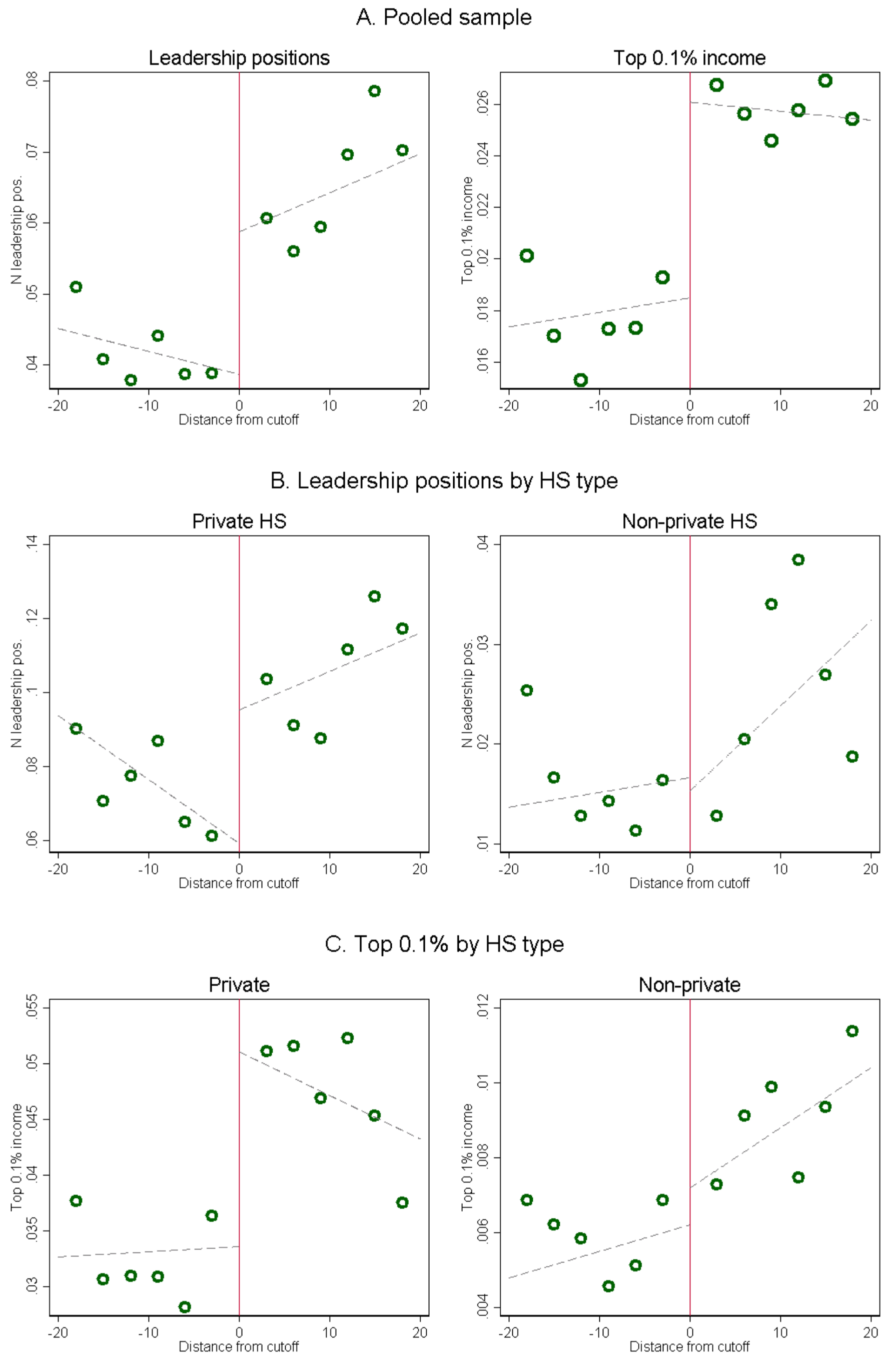
Binned means and fitted values of predetermined covariates by position relative to admissions threshold. Dependent variables given by panel title. Points reflect average outcomes for applicants within three points on either side of the horizontal axis value. Fitted lines obtained using BW=20 specification. Sample is male applicants to elite degree programs.

Figure 5: Changes in peer characteristics across the admissions threshold



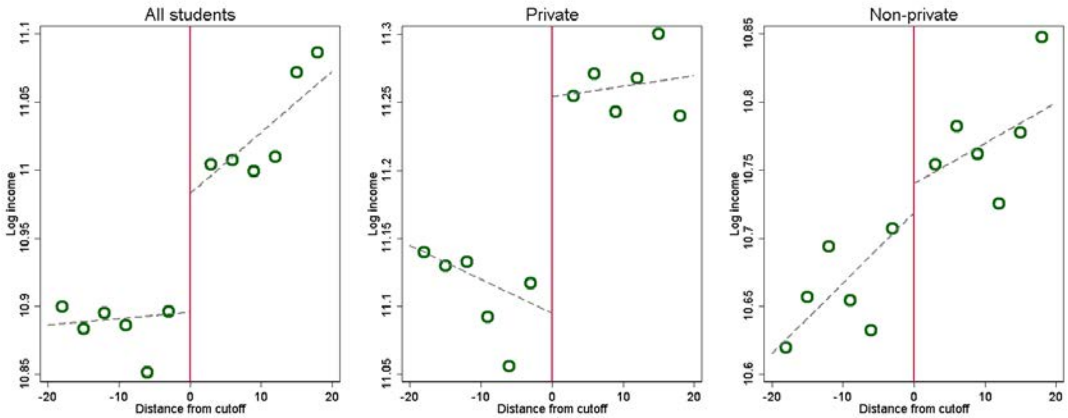
Changes in the fraction of students from private high schools and the mean peer math score at the degree programs to which students are admitted by position relative to threshold. Points reflect average values for applicants within three points on either side of the horizontal axis value. Left panel pools across UC and PUC programs. Center and right panel split applications to UC and PUC programs. Left axis is the fraction of private HS peers, right axis is mean peer scores.

Figure 6: Effect of admission on leadership and top income attainment



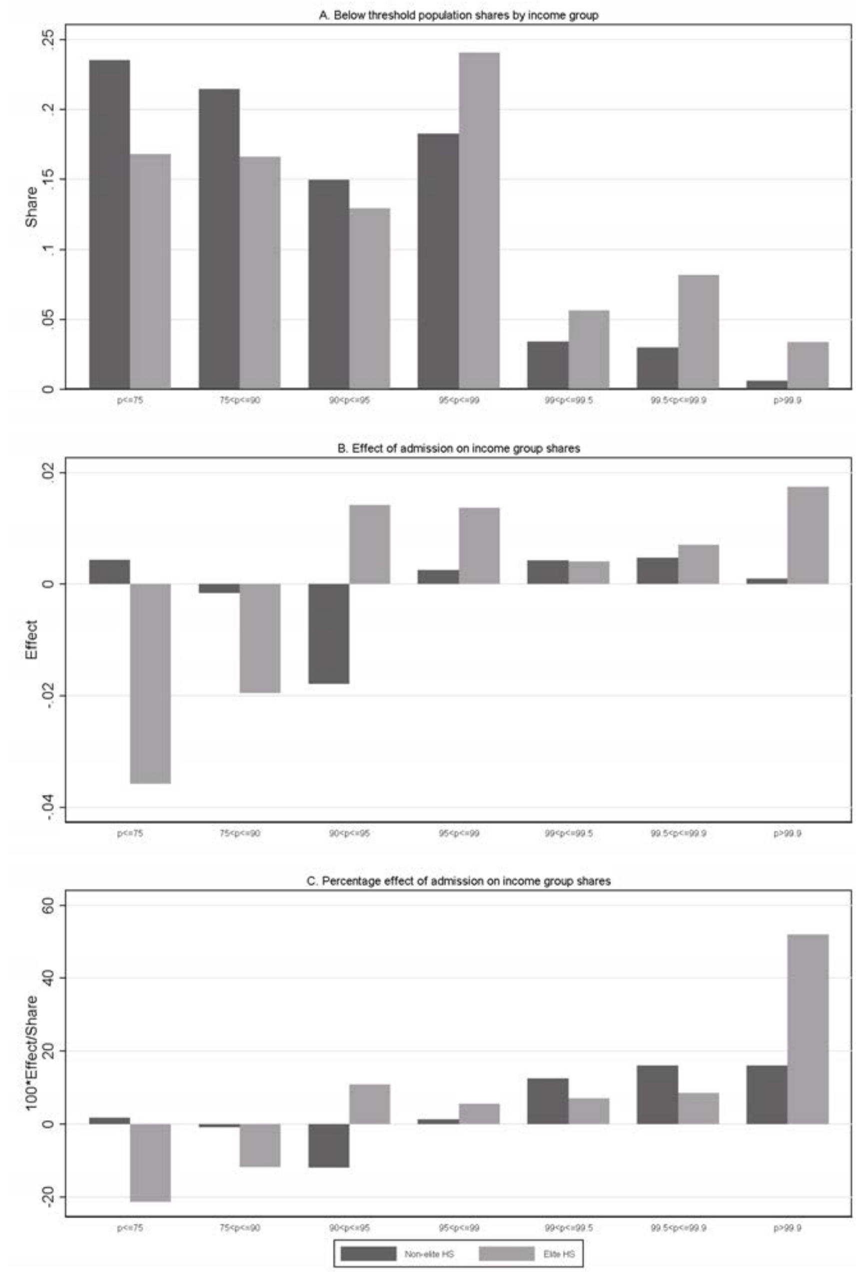
Count of leadership positions and fraction of students with incomes in the top 0.1% of the population distribution by position relative to the threshold. Graphs pool applications across elite degree programs. Points reflect average outcomes for applicants within three points on either side of the horizontal axis value. Fitted values from BW=20 specification.

Figure 7: Log income by position relative to admissions cutoff



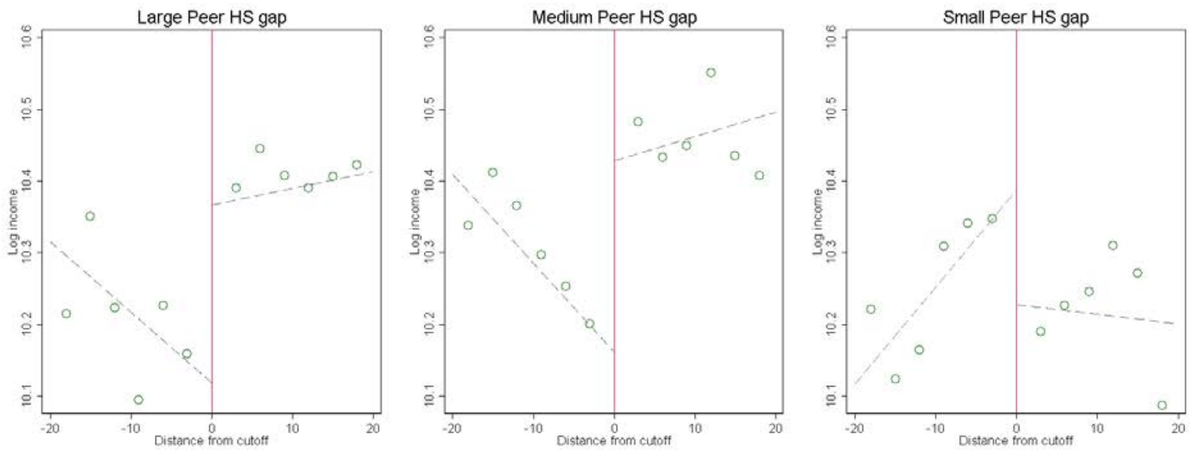
Log income by position relative to the threshold. Graphs pool applications across elite degree programs. Points reflect average outcomes for applicants within three points on either side of the horizontal axis value. Fitted values from BW=20 specification.

Figure 8: Level and percentage effects of elite admission on income distribution



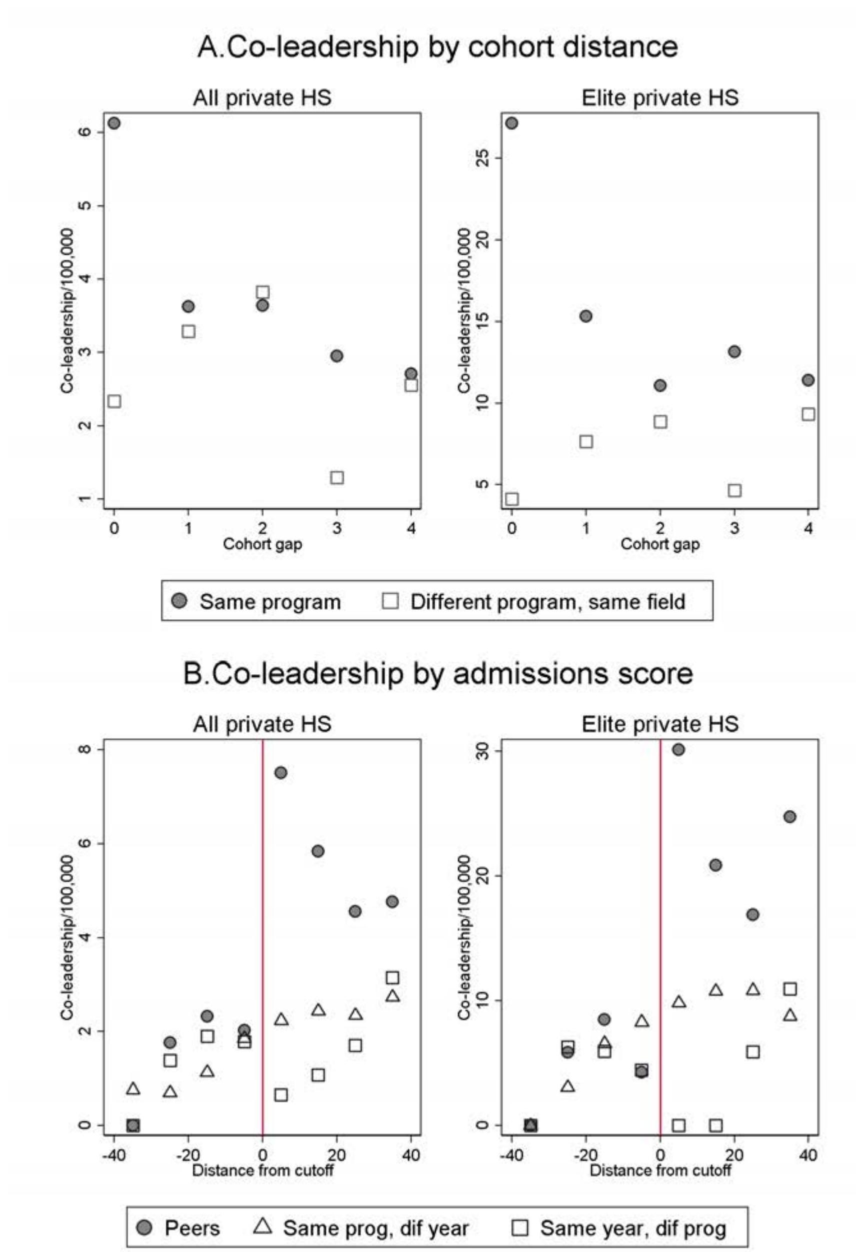
Graphs report estimates of parameters from the BW=20 specification of equation 2 with categorical dummy variables partitioning the income distribution as the dependent variables. Results from these regressions reported in Table 6. Upper panel: Shares of marginal rejected students in different ranges of the (annual) population income distribution by high school background. These are the estimated intercept effects. Middle panel: estimated threshold-crossing effects on categorical variables. Lower panel: threshold crossing effects as a percentage of below-threshold level.

Figure 9: Log income effects by peer private high school share change



Threshold-crossing effects on log income by tercile of peer private high school share gap. Points reflect average outcomes for applicants within three points on either side of the horizontal axis value. Sample: private high school students in 2000-2003 application cohorts. See Section 6.2 for details.

Figure 10: Co-leadership rates for private high school students



Upper panel: rates of co-leadership per 100,000 pairs by absolute difference in application cohort for students in the same field at either the same institution or a different institution. Lower panel: Co-leadership rates for pairs of private high school students by position relative to cutoff and peer relationship. Points reflect rolling averages of means within 10 points on either side of the horizontal axis value. 'Peers' points are co-leadership rates with students admitted to the target institution-major in the same cohort as the applicant. 'Same prog, dif year' are co-leadership rates for applicants with students admitted to the same program in another cohort. 'Same year, different prog' presents co-leadership rates for applicants with students admitted to the other elite program in the field in the same cohort.

Table 1: Descriptive statistics for test taker and admitted students samples

	Test takers (80-01)	Elite admits	Private elite	Non-private elite	All admitted (82-01)
Reading	485	675	686	662	579
Math	481	738	747	724	601
Elite admit	0.018	1.00	1.00	1.00	0.049
Have HS		0.79	1.00	1.00	0.82
Private HS		0.6	1.00	0.00	0.27
Have leadership position	0.001	0.026	0.033	0.010	0.003
Count of positions	0.002	0.041	0.053	0.016	0.004
N individuals	1957450	36211	17106	11497	549170
In LF sample	0.683	0.855	0.859	0.839	0.844
Mean income (1000s)	25	79.4	88.4	63.0	35.9
90th-95th	0.05	0.189	0.188	0.177	0.086
95th-99th	0.04	0.242	0.257	0.193	0.073
99th-99.5th	0.005	0.044	0.049	0.030	0.009
99.5th-99.9th	0.004	0.045	0.056	0.024	0.008
99.9th and up	0.001	0.016	0.023	0.006	0.002
N person-years	9349480	224327	94594	70387	3103113

Descriptions of student characteristics, leadership outcomes, and income distributions. Upper panel reports observations at individual level. Lower panel reports observations at individual-outcome year level for outcome years at least twelve years after the application year, or roughly age 30. Outcome years range from 2005 to 2013. Columns: 'Test-takers' includes all admissions test takers over the 1980-2001 period. 'Elite admits' includes students admitted to one of six elite business-focused programs. 'Private elite' includes students identified as coming from private school backgrounds who are admitted to elite degree programs. 'Non-private elite' includes elite admits who do not attend private schools. 'All admitted' includes all students admitted to any program between 1982 and 2001. Rows: 'reading' and 'math' are students' admissions exam scores from their first test attempt. 'Elite admit' is a dummy equal to one if a student is admitted to one of the six elite degree programs. 'Have HS' identifies students matched to high school types; 'Private HS' identifies the set of matched students who attended private high schools. 'Have leadership position' is an indicator equal to one if a student has some directorship or C-suite position; 'count of positions' counts the total number of these positions. 'In LF sample' is a dummy equal to one for students who match to the labor force dataset. 'Mean income' is in 1000s of 2014 USD. Categorical percentile variables are means of dummies equal to one if a student's income an outcome year falls within the indicated percentile range.

Table 2: Regression discontinuity sample description

	All	Male	Marginal	HS data
A. 1980-1991				
Male	0.76	1.00	1.00	1.00
Age	43.9	43.9	44	44.1
Reading	658	657	653	654
Math	742	746	738	740
Have HS data	0.72	0.75	0.75	1
Private HS	0.485	0.484	0.482	0.482
In LF sample	0.806	0.833	0.828	0.861
Average earnings	87.5	94.3	92.8	93.8
Top 0.1% share	0.018	0.022	0.021	0.023
N application-years	236780	172590	98952	74171
N applicants	30066	21695	12790	8736
B. 1974-1991				
Male	0.77	1.00	1.00	1.00
Age	48.3	48.4	48.4	48.2
Have HS data	0.60	0.63	0.64	1.00
Private HS	0.466	0.468	0.465	0.465
Any leadership position	0.029	0.035	0.03	0.03
Count leadership positions	0.049	0.061	0.052	0.051
Count BOD	0.031	0.039	0.033	0.031
Count C-suite	0.018	0.022	0.018	0.02
N applications	57940	42392	24124	15371
N applicants	43845	31783	18501	11522

Description of sample means and counts. Upper panel describes sample used in estimation of earnings specifications. Observations are at application-outcome year level for outcome years 2005-2013 and application years 1980-1991. Only application-year outcome-year pairs in which students are age 40 or older are included in the sample. Lower panel describes the sample used in leadership specifications, and includes 1974-1991 applications to elite degree programs. Observations at application level. 'All' is full sample of applicants observed in data. 'Male' is sample of male applicants. 'Marginal' restricts sample to students within 20 points on either side of admissions threshold. 'HS data' subsets on marginal students for whom high school can be classified as private or non-private. 'Reading' and 'Math' are student scores on admissions tests. 'Private HS' is a dummy equal to one if students attended a private high school. 'In LF sample' is a dummy equal to one if an application-year record is matched to the labor force sample. Earnings measured in 2014 USD. 'Top 0.1% share' is a dummy equal to one if students have an income record in top 0.1% of the income distribution. 'Any leadership position' is a dummy equal to one if student holds at least one C-suite or directorship position. 'Count leadership positions,' 'count BOD', and 'count C-suite' count the total number of positions, directorships, and C-suite positions students hold.

Table 3: Balance on predetermined covariates

	BW=10			BW=20		
	All	Private	Non-private	All	Private	Non-private
A. Predetermined characteristics						
Have HS	-0.005			-0.017		
	(0.008)			(0.012)		
Private HS	0.007			-0.009		
	(0.011)			(0.016)		
Index	-0.001	0.000	0.000	0.002	0.002	0.003
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
N	12933	3853	4462	24009	7096	8190
B. Labor force participation						
In LF	0.002	0.000	0.006	-0.005	0.001	-0.003
	(0.008)	(0.011)	(0.012)	(0.012)	(0.015)	(0.016)
Intercept	0.826	0.873	0.843	0.833	0.876	0.852
N	54134	19507	21412	98935	35733	38434

Significance: *: 0.10 **: 0.05 ***: 0.01. Estimates of equations 1 and 2 where dependent variables are predetermined covariates (Panel A) and labor participation (Panel B). Left three columns are BW=10 specification, right three columns are BW=20 specification. See section 5.1 for a description of these specifications. 'All' column includes all applications. 'Private' and 'Non-private' columns report separate estimates by student high school type. Observations in Panel A are at the application level. 'Have HS' is an indicator equal to one if an applicant's high school can be classified. 'Index' is a linear, earnings-weighted index of application cohort and target degree program fixed effects. Observations in Panel B are at the application-outcome year level. 'In LF' is a dummy equal to one if a student is matched to the labor force sample in a given application-year.

Table 4: Effect of elite admission on peer attributes and other acceptance outcomes

	Effects on peer attributes		Below-threshold acceptance outcomes		
	Peer elite HS	Peer math	Same field other elite	Same field not elite	Any bus field
A. All programs					
Pooled	0.0982***	22.57***	0.124***	0.510***	0.720***
	(0.003)	(0.505)	(0.006)	(0.009)	(0.008)
Main effect	0.106***	23.37***	0.0603***	0.542***	0.0917***
	(0.005)	(0.878)	(0.007)	(0.015)	(0.009)
Private HS interaction	-0.0188**	-3.296***	0.0885***	-0.0686***	0.0126
	(0.008)	(1.205)	(0.013)	(0.021)	(0.013)
N	3925	3925	4143	4143	4143
B. UC programs					
Pooled	0.0591***	22.42***	0.001	0.606***	0.699***
	(0.003)	(0.508)	(0.001)	(0.010)	(0.009)
Main effect	0.0878***	23.38***	0.002	0.590***	0.682***
	(0.005)	(0.805)	(0.001)	(0.015)	(0.015)
Private HS interaction	-0.0402***	-2.892**	-0.002	-0.002	0.002
	(0.007)	(1.185)	(0.001)	(0.023)	(0.022)
N	3150	3150	3331	3331	3331
C. PUC programs					
Pooled	0.215***	21.81***	0.561***	0.169***	0.796***
	(0.007)	(1.191)	(0.018)	(0.014)	(0.015)
Main effect	0.201***	22.48***	0.413***	0.251***	0.713***
	(0.019)	(3.647)	(0.038)	(0.034)	(0.035)
Private HS interaction	0.00422	-3.862	0.198***	-0.135***	0.0968**
	(0.021)	(3.936)	(0.049)	(0.039)	(0.043)
N	775	775	812	812	812

Significance: *: 0.10 **: 0.05 ***: 0.01. Effects of admissions-threshold crossing on peer attributes (left two columns) and description of below-threshold admissions outcomes (right three columns). Panels A, B, and C present findings for all applications, applications to UC programs, and applications to PUC programs, respectively. Observations are at application level and include only the application years 1982 through 1991. These are the years for which applications to both elite degree programs and the broader set of CRUCH programs are available. See Online Appendix B.1 for a discussion. Left two columns: estimates obtained using BW=10 specification where dependent variable is the listed peer attribute. Within each panel the 'Pooled' effect is obtained using all applicants to listed program type. 'Main' and 'Private HS interaction' rows are estimates from specifications that allow for heterogeneous effects for students from private high school backgrounds. The main effect is for non-private students, the interaction term is for private HS students. Right three columns: 'pooled' rows are the fraction of marginally rejected students admitted to degrees of the type listed in the column. 'Main effect' row is the mean for students from non-private HS. 'Interaction' row is the difference between non-private mean and mean for private HS students.

Table 5: Effect of elite admission on income and leadership outcomes

		Leadership		Top Income	
		RF	IV	RF	IV
A. BW=10	All	0.020***	0.197 ***	0.008***	0.089 **
		(0.007)	(0.072)	(0.003)	(0.043)
		12933		54134	
	Private HS	0.033 **	0.343 **	0.018***	0.222 **
		(0.016)	(0.166)	(0.007)	(0.112)
		3853		19507	
	Non-private	0.001	0.006	0.002	0.035
		(0.006)	(0.051)	(0.003)	(0.022)
		4462		21412	
	Test	0.058	0.053	0.031	0.085
B. BW=20	All	0.020**	0.219 *	0.008 *	0.091 *
		(0.010)	0.113	(0.004)	(0.055)
		24009		98935	
	Private HS	0.036	0.411	0.017 *	0.277
		(0.023)	0.257	(0.010)	(0.185)
		7096		35733	
	Non-private HS	-0.001	-0.013	0.001	0.021
		(0.007)	0.071	(0.003)	(0.031)
		8190		38434	
	Test	0.12	0.107	0.121	0.174

Significance: *: 0.10 **: 0.05 ***: 0.01. Estimates of effects of admission on leadership and top income attainment by high school type. Panel A reports estimates from BW=10 specification and Panel B from BW=20 specification. 'RF' columns are estimated threshold-crossing effects, 'IV' columns are IV estimates in which threshold-crossing instruments for peer private high school share at the admitted degree program. See section 5.1 for more details on estimation. Columns denote dependent variables. 'Leadership' is count of leadership positions. 'Top income' is a dummy equal to one if a student has income within the top 0.1% of the distribution. Observations in the top income column are at application-outcome year level, while observations in leadership column are at the application level. 'Test' row reports p-values from tests that the estimates for private and non-private HS students are equal. Standard errors clustered at person level.

Table 6: Effect of elite admission on the distribution of income

	All			Private HS			Non-private HS		
	Baseline	Effect	Fraction	Baseline	Effect	Fraction	Baseline	Effect	Fraction
A. BW=10									
Log income		0.118 ***			0.174 ***			0.074 **	
		(0.023)			(0.038)			(0.036)	
<75	0.2	-0.026 ***	-0.132	0.162	-0.031 ***	-0.193	0.249	-0.018	-0.074
		(0.007)			(0.010)			(0.013)	
75-90	0.184	-0.007	-0.036	0.172	-0.029 ***	-0.171	0.212	0.005	0.024
		(0.007)			(0.010)			(0.011)	
90-95	0.139	-0.008	-0.056	0.143	-0.004	-0.027	0.146	-0.013	-0.089
		(0.005)			(0.009)			(0.009)	
95-99	0.195	0.019 ***	0.097	0.235	0.021 *	0.09	0.167	0.023 **	0.136
		(0.007)			(0.012)			(0.011)	
99-99.5	0.043	0.006 *	0.13	0.056	0.007	0.129	0.034	0.003	0.096
		(0.003)			(0.006)			(0.005)	
99.5-99.9	0.047	0.01 ***	0.215	0.073	0.018 **	0.246	0.029	0.004	0.148
		(0.004)			(0.008)			(0.005)	
99.9-100	0.018	0.008 ***	0.448	0.032	0.018 ***	0.561	0.006	0.002	0.394
		(0.003)			(0.007)			(0.003)	
N	54134				19507		21412		
B. BW=20									
Log income		0.087 ***			0.159 ***			0.021	
		(0.034)			(0.056)			(0.050)	
<75	0.2	-0.019 *	-0.096	0.168	-0.036 **	-0.213	0.235	0.004	0.018
		(0.010)			(0.015)			(0.010)	
75-90	0.183	-0.003	-0.015	0.166	-0.02	-0.118	0.214	-0.002	-0.008
		(0.010)			(0.014)			(0.010)	
90-95	0.136	-0.005	-0.039	0.129	0.014	0.11	0.15	-0.018 **	-0.119
		(0.008)			(0.012)			(0.008)	
95-99	0.203	0.005	0.024	0.241	0.014	0.057	0.183	0.003	0.014
		(0.010)			(0.018)			(0.010)	
99-99.5	0.042	0.004	0.098	0.057	0.004	0.071	0.034	0.004	0.125
		(0.005)			(0.009)			(0.005)	
99.5-99.9	0.051	0.006	0.111	0.082	0.007	0.086	0.03	0.005	0.16
		(0.006)			(0.012)			(0.006)	
99.9-100	0.018	0.008 *	0.41	0.034	0.017 *	0.52	0.006	0.001	0.16
		(0.004)			(0.010)			(0.004)	
N	98935				35733				

Significance: *: 0.10 **: 0.05 ***: 0.01. Estimates of equation 2 using log income and dummy variables for percentile based income categories as the dependent variables. Dummies correspond to percentile ranges given in rows. 'All,' 'Private HS,' and 'Non-private HS' headings report separate results for all applicants, applicants from private high schools, and applicants from non-private high schools, respectively. Within each group, 'Baseline' column reports the mean below-threshold value of the dummy. This is the constant term in the RD specification. 'Effect' reports the threshold crossing coefficient estimate. 'Fraction' reports the effect scaled by the baseline value. Upper panel reports results from BW=10 specification. Lower panel reports results from BW=20 specification. Standard errors clustered at student level.

Table 7: Effect of admission on sector of employment

	All		Private HS		Non-private HS	
name	BL	Effect	BL	Effect	BL	Effect
Agriculture	0.018	0.002	0.027	-0.005	0.009	0.006 *
Fishing	0.004	0.000	0.006	0.001	0.003	0.000
Mining	0.02	0.007 *	0.017	0.009	0.022	0.007
Manufacturing (non-metallic)	0.069	0.009	0.088	0.005	0.059	0.006
Manufacturing (Metallic	0.038	-0.002	0.038	0.004	0.036	-0.006
Utilities	0.027	0.001	0.027	0.003	0.028	0.003
Construction	0.074	0.002	0.08	-0.01	0.073	0.004
Wholesale and retail trade	0.158	0.000	0.164	0.011	0.149	-0.007
Hospitality	0.009	-0.003 *	0.008	-0.001	0.009	-0.002
Transport/storage/communication	0.05	0.005	0.048	0.003	0.056	0.001
Finance	0.125	0.009	0.143	0.017	0.100	0.005
Real estate/rental/business activiites	0.171	0.004	0.165	0.019	0.163	0.008
Public administration	0.115	-0.028 ***	0.083	-0.027 **	0.148	-0.026 *
Teaching	0.065	-0.003	0.055	-0.017 **	0.078	0.003
Social services and health	0.018	-0.002	0.017	-0.005	0.02	-0.002
Other community service	0.037	0.001	0.032	-0.003	0.048	-0.001
Building administration	0.000	0.000	0.000	0.000	0.000	0.000
Foreign business	0.001	-0.001 *	0.002	-0.002	0.000	0.000
Have sector	0.718	0.006	0.735	0.016	0.716	0.002
N	36995		13804		14942	

Significance: *: 0.10 **: 0.05 ***: 0.01. Below-threshold probability and effect of elite admission on the probability of having main job in selected sectors from equation 2 (BW=10 specification). 'All,' 'Private HS' and 'Non-private HS' headings denote sample populations. 'BL' column presents below-threshold baseline probability of working in listed sector (i.e., intercept in RD estimation equations). 'Effect' column presents point estimate of threshold-crossing effect. 'Have sector' is an indicator equal to one if sector data is available for a student. N refer to counts of application-years with available sector data. Standard errors clustered at student level.

Table 8: Effect of elite admission by below-threshold outcome

	All	Priv	Non-priv
A. No interaction terms			
All	0.072	0.114	-0.027
	(0.059)	(0.070)	(0.104)
B. Including interaction terms			
Main effect	0.158	0.243*	0.102
	(0.100)	(0.124)	(0.167)
Non-business	0.137	0.12	-0.006
	(0.174)	(0.214)	(0.283)
Peer score gap	-0.001	-0.001	-0.001
	(0.004)	(0.005)	(0.006)
Private HS gap	1.05***	1.09***	0.664
	(0.321)	(0.398)	(0.561)
Elite program	-0.404**	-0.410**	-0.608**
	(0.166)	(0.200)	(0.297)
C. Split by tercile of private HS gap			
Large gap	0.223**	0.248**	0.143
	(0.092)	(0.121)	(0.142)
Medium gap	0.197**	0.267**	0.080
	(0.094)	(0.110)	(0.165)
Small gap	-0.221**	-0.160	-0.326
	(0.108)	(0.121)	(0.198)
	12185	7849	4336
N			

Significance: *: 0.10 **: 0.05 ***: 0.01. Estimates of Equation 3 by HS type using 2000-2003 application data and the BW=20 specification. Dependent variable is log income. Panel A reports estimates of earnings effects without interaction terms. Panel B reports estimated main admissions effect and estimates of interactions between admission and the listed variables. 'Non-business' is a dummy equal to one if a students' next-choice degree is not in business, law, or engineering. 'Peer score gap' is the difference between mean math scores at the target degree program and mean math scores at the next option. 'Private HS gap' is the difference between the fraction of students from private high schools at the target program and the fraction at the next option. Score gap and HS gap variables are demeaned (using means within the BW=20 sample). See Online Appendix D for descriptive statistics. 'Elite program' is a dummy variable equal to one if a students' next option is another elite degree program. Panel C reports estimates of equation 2 splitting by terciles of peer private HS gap. Sample pools over applications all elite degree programs, and excludes both admitted and rejected students who would not be admitted to any degree program if they were rejected from the target.

Table 9: Difference-in-difference estimates of peer effects on co-leadership

	Private/ Private/	Elite/ Elite	Private/ Non-private	Non-private/ Non-private
A. Single Difference				
Same cohort	3.42 **	15.72 *	0.37	0.29
	(1.37)	(9.17)	(0.31)	(0.30)
1 year gap	0.92	3.91	0.46 *	0.15
	(0.85)	(5.09)	(0.27)	(0.20)
2 year gap	0.94	-0.33	0.24	0.16
	(0.76)	(3.62)	(0.20)	(0.25)
3 year gap	0.24	1.74	0.14	-0.22 ***
	(0.77)	(5.58)	(0.23)	(0.07)
N	5761326	658422	13119911	8207263
B. Difference in differences				
Same cohort	3.64 **	20.93 **	0.58	0.56 *
	(1.67)	(10.19)	(0.56)	(0.32)
1 year gap	0.19	5.58	0.54	-0.02
	(1.20)	(6.14)	(0.39)	(0.42)
2 year gap	-0.33	0.14	0.04	-0.49
	(1.06)	(4.20)	(0.41)	(0.48)
3 year gap	1.51	6.43	0.44	-0.19
	(0.92)	(6.48)	(0.48)	(0.22)
N	10609222	1317245	22022462	11568265

Significance: *: 0.10 **: 0.05 ***: 0.01. Estimates of equations 4 and 5 by sample listed in column. 'Private/private' column consists of pairs of private high school students. 'Elite/elite' column uses pairs of students where both members are from an elite private high school. 'Private/non-private' considers pairs where one student is from a private HS and the other is not. 'Non-private/non-private' is pairs of students both from non-private schools. Standard errors clustered use two-way clustering at the person-person level.