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What prevents women from reaching the top?

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Abstract

We use rich data on all business, economics, and engineering graduates in Sweden to study the lack of women among chief executive officers (CEOs). A comprehensive battery of graduates' characteristics explains 40% of the gender gaps in CEO appointments and 60% among graduates with children. The explanatory power mostly comes from absences and unemployment, which are about twice as likely for women as men. These gender differences increase following childbirth, and they persist in the long run. We present and discuss potential explanations to the explained and remaining gaps. Although the large unexplained share makes it hard to pinpoint the exact reason for the gender gap in CEO appointments, the large contribution of labor market attachment to the explained share suggests work–family trade-offs are an important part of the story.

KEYWORDS
CEOs, family, gender gap, labor market attachment, qualifications

JEL CLASSIFICATION
G34, J16, J24, J31

1 | INTRODUCTION

Women do not fare well in the executive labor market. For example, in S&P 500 companies, they account for 45% of the workforce but hold only 27% of the executive and senior-level official and manager positions. The fraction of women is even smaller at the very top of the organization: they account for 6% of the chief executive officer (CEO) positions (Catalyst, 2020). This low representation of women at the top is often referred to as the glass ceiling.

What prevents women from reaching the top? We study this question by following the careers of 14 cohorts of business, economics, and engineering graduates—the three most common fields of education for CEOs—over a quarter century and ask how their educational qualifications, family background, labor market and executive experience, and absences explain their career success. Our data cover the entire adult population of Sweden and all its employers, including private firms and the public sector, resulting in an exceptionally large sample of 143,000 graduates. We collect a comprehensive battery of characteristics of the graduates and their families, which allows us to analyze a host of gender differences in individual characteristics that likely are consequential for making it to the top. We complement the dataset with survey responses on the monthly hours worked by graduates. Almost all of our data come from official government registries and thus are likely more reliable than the biographical and self-reported data used by many studies on top executives.

We first analyze gender differences in individual characteristics relevant for making it to the top. We find graduate women are about twice as often as men absent or not employed during the sample period, which spans about one-half of the duration of their working life, including the years when they would be most likely to progress on their careers. Women work on average 15% shorter hours than men. Women are also less likely to have experience as an executive than men, in particular from executive assignments in production and operations, and sales and marketing, the two most common functional backgrounds for CEOs. At the same time, women are more likely to have a business or economics degree than men, the fields most predictive of making it to the top. Because of these different and potentially countervailing forces, it is not ex ante obvious how much graduate characteristics are able to explain CEO appointments, or even which gender the market views to be on average more qualified for a CEO job.

Armed with these findings, we study the joint role of educational qualifications, family background, labor market and executive experience, and absences in explaining top executive outcomes. A Blinder–Oaxaca (Blinder, 1973; Oaxaca 1973) decomposition allows us to estimate how the labor market for CEOs values the bundle of characteristics each graduate possesses and how the value of this bundle differs by gender. This decomposition suggests the gender gap in CEO appointments is in part explained by careers, in particular by prior executive-level experience men are more likely to secure. At the same time, women's higher likelihood of having a business or economics degree means that educational qualifications do not explain the gap, but rather widen it.

Characteristics related to labor market attachment—parental leave, sick leave, unemployment, and being outside of labor force—are by far the most important contributor to gender gaps in CEO appointments. The attachment explains 26% of gender differences in CEO appointments. Among graduates with children, attachment explains as much as 41% of the gender gap in CEO appointments, that is, more than the 40% of the gap we cannot explain. The gaps in labor market attachment primarily arise following the birth of the first child, when women's absences increase and working hours decline relative to those of men. The gaps narrow as the children grow up, but importantly, they do not return to their prechildbirth levels during the 10 years following the birth of the first child.

Our empirical setting does not afford us the luxury to claim that labor market attachment or career decisions are independent of the graduates' probability of reaching the top. For example, women may choose to differentially invest in their career in anticipation of labor market discrimination, which may then affect their ultimate career outcomes. Moreover, despite of our comprehensive battery of characteristics, a large share of the gender gap remains unexplained. We discuss three broad classes of explanations for this unexplained gap at the end of the paper—gender differences in job preferences; gender differences in leadership skills; and discrimination—but, like the literature in general, we lack the tools to differentiate between them. Instead, we offer additional evidence and arguments that allow the reader to better interpret our findings.

We give perspective to the discrimination hypothesis by drawing from Statistics Sweden's Work Environment Survey (wave of 2015), which asks its respondents about their experienced gender discrimination at work. The fraction of reported gender discrimination among female (male) respondents in our sample is relatively small, 9% (2%). Because the (unexplained) gender gap is so large, it is unlikely that discrimination can directly account for it. If discrimination is to explain a substantial share of the CEO gender gap, the most plausible path would appear to go through women's underinvestment in their careers due to anticipated discrimination rather than directly.

Although the large unexplained share makes it is hard to pinpoint the exact reason for the gender gap in CEO appointments, the large contribution of labor market attachment to the explained share suggests work–family trade-offs are an important part of the story. Uneven distribution of family responsibilities, perhaps due to gender norms, can plausibly put a disproportionate burden on the careers of women. This can be particularly important in the upper echelons where even small differences in productivity can have large consequences (Gabaix & Landier, 2008).

Our paper contributes to the literature in the following ways. First, our exceptionally large battery of variables and long-time series on careers allows us to document gender differences in prospective CEO characteristics, and how these differences build up over time, in much greater detail than the previous literature and can directly address the assumption of no gender differences in qualifications. The degree of such differences is important for determining how much it matters that women are less represented in leadership. To the extent women adopt policies different from men (e.g., Adams & Ferreira, 2009), low female representation in the executive suite could affect how resources are allocated in the economy.

Second, our rich data allow us to trace a large share of the gender gap for CEOs to graduates' labor market attachment, plausibly a product of their family life and the career compromises that follow from it. CEOs are of particular interest because of their power (e.g., Adams et al., 2005) and their importance to the firms they work for (e.g., Bennedsen et al., 2020; Bertrand & Schoar, 2003). Past work has found family life to explain career outcomes at the managerial level and in the general population (e.g., Kleven et al., 2019), and among high earners (Bütikofer et al., 2018) and high-skill professionals (e.g., Bertrand et al., 2010), but we are not aware of any prior papers being able to convincingly tie labor market attachment to CEO appointments. Literature suggests CEOs differ both from lower level executives (Kaplan & Sorensen, 2021) and the population and other high-skill professionals (Adams et al., 2018; Graham et al., 2013). This difference matters because gender gaps not only tend to increase (e.g., Bütikofer et al., 2018) but also become more consequential the closer one gets to the top. The Swedish context suggests CEO gender gaps and their early-career origins arise even in an institutional setting with a long egalitarian tradition and family friendly policies.

Third and finally, our use of a comprehensive graduate sample allows us to circumvent the self-selection issues imbedded in samples based on disclosures of corporate executives. Sapienza (2010) discusses gender-related selection issues among equity analysts. Apart from CEO appointments, the selection is implicitly included in analyses on CEO pay and turnover (see, e.g., Edmans et al., 2017) that are measured conditional on making it to the top. Bertrand and Hallock (2001) and Becker-Blease et al. (2010) document gender-related differences in top executive pay and turnover, respectively.

Our paper proceeds as follows. The next section describes the data and the institutional setting. Section 3 analyzes gender differences in graduates' labor market attachment, experience, qualifications, family background, and CEO appointments. Section 4 examines the extent to which graduate characteristics can explain CEO appointments and their gender gaps. Section 5 offers additional insight by documenting reported gender discrimination at work and discusses how to interpret our results.

2 | DATA AND INSTITUTIONAL SETTING

2.1 | Data

Our sample consists of university graduates born between 1962 and 1975 with a degree in business, economics, or engineering. We follow these individuals from their 24th birthday onwards in the 1990−2015 panel and study whether they hold a CEO position in year 2015. Attrition only happens if an individual dies or moves out of Sweden, which happens for 6.6% of the graduates during the sample period. The sample graduates account for 13% of CEO position holders meeting our firm restrictions (report total assets, have more than 10 employees, and have at least one non-CEO executive) and 25% of CEO position holders meeting our firm and cohort restrictions. In addition, in some tables we impose minor restrictions driven by data availability either because our data sources have different start

years or because some variables are not available for all graduates (these are detailed below). Our dataset combines information on individuals and firms from Statistics Sweden. All data sources are connected using masked personal identification numbers (at the individual level) or organization numbers (at the firm level).

The bulk of the data come from the LISA database that covers the whole Swedish population of individuals who are at least 16 years old and reside in Sweden at the end of each year. This database integrates information from registers held by various government authorities and covers for most variables in the years 1990—2015. The most important exceptions to this rule are parental leave (observed only in the 1993—2012 period), unemployment (1993—2015), and occupation data for managerial categories (1996—2015). We extract information on labor and total income, wealth, field and level of education, profession, career, family relationships, and experienced gender discrimination, complementing the LISA database with data from the Multigenerational Register, the Wealth Register, and Work Environment Survey. The family records allow us to map each individual to their partners and children. Except for the CEOs, whom Statistics Sweden separately classifies, we identify the executives based on their international ISCO-88 (COM) classification of occupations (codes 122 and 123). These codes are available for executives working for companies with at least 10 employees.[1] The specialist managers are further split into eight functions that include finance and administration, personnel and industrial relations, sales and marketing, advertising and public relations, supply and distribution, computing services, research and development, and specialists not classified into the above categories.

Our database additionally includes information on working hours. This information originates from the Salary Structure Statistics that record working hours for the month preceding the survey (September or November). We use data for 1992—2015 and include all graduates working in the public sector and private-sector organizations employing more than 500 employees. Graduates working for smaller companies record working hours if they work for a surveyed company.

Firm-related data come from the FEK database at Statistics Sweden ("Företagens Ekonomi") and CEO information from the Companies Registrations Office. The underlying data Statistics Sweden uses for these databases primarily come from the Companies Registrations Office which keeps track of all companies, both public and private, and their CEOs and directors. The firm data are available for all corporate entities that have a limited liability structure ("aktiebolag"), excluding financial firms that operate as banks or insurance companies. These data record various financial-statement items, including sales and the number of employees. By law, each firm has to supply this information to the registration office within 7 months from the end of the fiscal year. Financial penalties and the threat of forced liquidation discourage late filing.

2.2 | Childcare system in Sweden

Sweden has a high-quality childcare system that has been in place since the mid-1960s. It guarantees each family 12 months of publicly paid parental leave amounting usually to 80% of prior income (before 1995, 90% of prior income), with an option of extending the leave with 3 months at a lower rate. Parents can use up to 90 days per year with publicly financed paid leave (classified as parental leave) for the care of a sick child. Moreover, if they choose to work shorter hours to take care of their children, they have until the end of their parental leave the option to switch back to their full-time job. Since 1995 (2001), both parents need to take 1 month (2 months) of parental leave to qualify for the

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[1] The ISCO-88 (COM) code 122 corresponds to "production and operations managers" and the code 123 to "other specialist managers." Except for CEOs, we cannot differentiate between establishment managers and higher level executives. The occupation data available from the LISA database come mainly from the official Salary Structure Statistics survey ("Lönestrukturstatistiken"). Statistics Sweden also undertakes surveys of smaller firms with at least 10 employees, but not included in the official wage survey. The sampling design in the supplementary surveys is a rolling panel and all eligible firms are surveyed at least once every 5 years. Occupation information is available for each year, but the information may not be accurate for each year. To ensure we have accurate occupation information for every year, we require that the information be collected in the relevant year or at maximum 5 years earlier. If an individual holds multiple executive positions, we assign the individual primarily to the CEO position in the firm with the highest sales and secondarily to a non-CEO executive position in the firm with the highest sales.

TABLE 1   Gender gaps in CEO appointments, CEO pay, and firm size

Panel A: CEO positions			
	All graduates	**CEOs**	**Fraction CEOs (%)**
All	142,712	2,411	1.69
Women	52,236	373	0.71
Men	90,476	2,038	2.25
Fraction women, %	36.60	15.47	
Women less men			−1.54
t-value			(−24.99)
Panel B: CEO pay and its log gender gap			
	CEO pay (mil. SEK)		
	Mean		**Median**
All	1.54		1.06
Women	1.27		1.00
Men	1.58		1.08
Women less men, log, %	−0.13		
t-value	(−3.59)		

Note: The sample consists of business, economics, and engineering graduates who are born in 1962−1975. Panel A reports the gender gaps in the fraction of CEO position holders. These CEOs hold their position in 2015 in firms that report total assets, have more than 10 employees and have at least one non-CEO executive. The gender gap equals the female–male difference in the fraction of CEO position holders and the robust *t*-statistic tests whether the gender gap differs from zero. Panel B reports mean and median pay for the CEO position holders in 2015. The log gender gap is the female–male difference in logged labor income, and the robust *t*-statistic tests whether the gender gap differs from zero. Labor income (in SEK millions, inflated to 2017, SEK 1 ≈ USD 0.12) includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits received from the employer qualify as taxable labor income. Tax authorities deem the taxable income to occur in the year when an employee or executive exercises her stock options or purchases her company's shares at a price that is less than their fair value.

maximum paid leave. Day care is available at highly subsidized rates, although its service hours make it less flexible than the day care in the United States (Henrekson & Stenkula, 2009).

3 | HOW DO FEMALE AND MALE GRADUATES DIFFER FROM EACH OTHER?

3.1 | Gender gaps in CEO appointments

Table 1 Panel A characterizes the careers of female and male graduates by their CEO roles. In 2015, 2411 graduates held a CEO position. Just 0.71% of women make it this far, whereas the corresponding fraction among men is 2.25%. The gender gap in the likelihood to attain a CEO position, −1.54 (= 0.71 – 2.25), is statistically highly significant with a *t*-value of −25. This gap reflects the fact women account for 15% of CEOs as opposed to 37% of the graduates. Figure A1 shows that there is a noticeable gender gap in CEO positions irrespective of age.

Next, we turn our attention to gender differences in CEO pay. Table 1 Panel B reports the mean and median labor income by gender and position. Our income measure includes all income taxed as labor income in a given year; base salaries, stock-option grants, bonus payments, and benefits received from the employer qualify as taxable labor income. The income measure does not include public benefits, providing a better proxy of the value of an executive's services to the company than a broader income measure. Tax authorities deem the taxable income to occur in the year

when an employee or executive exercises her stock options or purchases her company's shares at a price that is less than their fair value.

We find that the mean (median) CEO pay is SEK 1.5 million (1.1 million); SEK 1 ≈ USD 0.12. Male CEOs make on average SEK 1.6 million and female CEOs SEK 1.3 million. The mean logged gender gap in CEO pay is −13% (t-value = −3.6).

Table A1 reports descriptive statistics on the graduates' employers. About three quarters of the graduates are employed in the private sector and one-fifth in the public sector. The vast majority of the private sector employers are privately held: only 2% are listed, and 3% are government owned.

3.2 | Gender differences in graduate attributes

Table 2 reports the means of all individual-level variables, separately for men and women, in the 2015 cross section. Variables that change over time are aggregated over the graduates' careers prior to 2015. Of particular interest is the difference between graduate women and men and between CEOs and graduates and the t-statistics for their differences.

Panel A reports on labor market attachment. We consider four nonoverlapping measures: parental leave, sick leave, unemployment, and being outside of labor force. The three first attachment measures divide the number of days a graduate receives benefit payments for these reasons and divide it by the total number of days a graduate features in the sample. The last attachment measure divides the number of full years a graduate does not record an employer, has no earned income, or is not registered as a student in a university by her total number of years in the sample. Thus, all attachment measures are expressed as annual ratios. The 2015 cross-sectional measures displayed in the table average the annual attachment ratios over a graduate's entire career. The total attachment measure is the sum of individual attachment ratio components.

We find women are about twice as often as men absent or not employed (16.3% vs. 8.6%, t-value = 105) during the sample period, which spans on average about one-half of their working life, including the years when they would be most likely to progress on their careers.[2] Women's working hours are on average 15% shorter than those of men. Differences in labor market attachment between men and women mirror the differences in labor market attachment between CEOs and all graduates. For example, CEOs' actual working hours are on average 17% longer than those of graduates on average.

Panel A also decomposes the share of time absent or not employed to four subcomponents. All of them show similar patterns, though the gender differences vary. The most important component is parental leave, which accounts for about one-half (one-fourth) of graduate women's (men's) time absent or out of employment. In all, women spend more than three times as much time on parental leave as men. Sick leaves display a similar gender difference, perhaps because women are more likely to call in sick to take care of their sick children. Women also spend 17% more time as unemployed job seekers and 39% more time outside of labor force than men. Figure A2 shows that women have lower labor market attachment at almost all ages up to age 50. The gender gaps in attachment emerge already in the twenties, reach their peak by the early thirties, and largely disappear by the early forties.

Panel B studies gender differences in past work experience. Women work for slightly more firms and industries than men, which helps broaden their experience, as it does for CEOs who follow a similar pattern. The nature of experience also differs. On average, women have about twice as much experience from the public sector and nonprofit institutions as men, sectors shunned by CEOs, while they correspondingly have less experience from investment banking, consulting, and other private sector employment. Work experience from the public sector may accumulate a graduate's human capital in a different way than work experience from a company. In addition, working for the public sector

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[2] According to Eurostat, the average duration of working life in Sweden was 41.2 years in 2015.

TABLE 2 Gender differences in graduates' attributes

	Women	Men	Women less men		CEOs less all		N
			Mean	t-value	Mean	t-value	
Panel A: Labor market attachment							
Absences and employment							
Parental leave (%)	7.59	2.36	5.23	(211.71)	−1.64	(−25.89)	142,712
Sick leave (%)	1.34	0.47	0.87	(55.04)	−0.57	(−28.22)	142,712
Unemployment (%)	4.15	3.50	0.65	(19.82)	−2.41	(−48.50)	142,712
Outside labor force (%)	3.19	2.26	0.94	(17.89)	−1.91	(−27.55)	142,712
Total (%)	16.27	8.58	7.69	(104.82)	−6.52	(−58.11)	142,712
Working hours							
Hours (%)	104.66	119.33	−14.67	(−73.06)	16.59	(16.89)	129,227
Panel B: Experience and executive functions							
Experience							
Age	46.08	46.06	0.03	(1.27)	1.03	(13.12)	142,712
Industries worked in	3.62	3.54	0.08	(8.51)	0.21	(6.37)	142,712
Firms worked at	4.97	4.93	0.04	(2.97)	0.54	(11.22)	142,712
Years of consulting or IB experience	0.62	0.64	−0.02	(−2.13)	0.64	(10.36)	142,712
Years of nonprofit experience	0.26	0.12	0.13	(18.71)	−0.11	(−9.43)	142,712
Years of public sector experience	4.23	2.46	1.77	(50.78)	−2.46	(−48.71)	142,712
Years of other work experience	12.97	15.14	−2.17	(−50.22)	3.89	(30.10)	142,712

(Continues)

TABLE 2 (Continued)

Panel B: Experience and executive functions						
Executive functions						
No executive experience	79.18	74.28	4.90	(21.34)	−63.97	(−91.62)	142,712
Production and operations (%)	6.14	9.05	−2.91	(−20.51)	14.24	(16.82)	142,712
Sales and marketing (%)	3.30	4.75	−1.45	(−13.75)	10.22	(14.31)	142,712
Supply and distribution (%)	1.02	1.42	−0.39	(−6.67)	1.11	(3.57)	142,712
Computing and R&D (%)	1.81	3.93	−2.12	(−24.39)	0.89	(2.21)	142,712
Other function (%)	7.43	9.60	−2.18	(−14.44)	15.05	(17.34)	142,712
Finance and administration (%)	5.48	3.96	1.52	(12.79)	4.10	(7.16)	142,712
Personnel and industrial relations (%)	1.57	0.45	1.11	(18.92)	0.05	(0.27)	142,712
Advertising and public relations (%)	0.69	0.27	0.42	(10.36)	0.29	(1.67)	142,712
Panel C: Education and family background						
Education						
Business and economics degree (%)	56.68	28.19	28.49	(108.17)	7.51	(7.34)	142,712
Top-income high school (%)	8.74	18.41	−9.67	(−54.14)	3.77	(4.73)	142,712

(Continues)

TABLE 2 (Continued)

Panel C: Education and family background						
Top-CEO high school (%)	6.20	12.59	−6.39	(−41.83)	4.67	(6.42)	142,712
Family background						
Birth order	1.56	1.58	−0.02	(−4.97)	0.04	(2.32)	142,712
Family size	2.18	2.24	−0.06	(−10.48)	0.13	(6.67)	142,712
Number of male siblings	0.60	0.64	−0.04	(−8.84)	0.07	(4.25)	142,712
Born in top-3 county (%)	0.44	0.45	−0.01	(−3.07)	0.06	(6.22)	142,712
Immigrant (%)	0.24	0.22	0.02	(7.26)	0.00	(0.50)	142,712

Note: This table reports gender differences in graduates' attributes, aggregated over their career prior to 2015, in the 2015 cross section. CEO less all compares CEOs to all graduates, irrespective of the gender gap. Panel A reports on labor market attachment. Parental leave, Sick leave, and Unemployment count the number of days a graduate receives benefit payments for these reasons and divide it by the total number of days a graduate features in the sample. Outside labor force is the number of years a graduate does not record an employer, has no earned income, or is not registered as a student in a university scaled by her total number of years in the sample. Total is the sum of these attachment measures. Hours scale the number of monthly reported working hours by the sample median 145. Panel B reports on experience and executive functions. Consulting or IB experience measures work experience from the following industries (SNI stands for Standard for Swedish Industrial Classification): Business and management consultancy activities (SNI2002, SNI1992 = 74,140), Business and other management consultancy (SNI2007 = 70,220), Security broking and fund management (SNI2002, SNI1992 = 67, 120), or Investment fund management activities (SNI2007 = 66, 301). Other work experience counts work experience outside consulting, IB, nonprofit, or public sector. Executive functions indicate an individual holding an executive function in a firm with at least 10 employees in 1997–2014. Panel C reports on education and family background. Top CEO (income) high school indicates the top 25 high schools in 2015 based on the fraction of high school graduates that become CEOs (median labor income) and the high school having more than 100 graduates. Birth order and Number of siblings have been calculated using data on all individuals of at least 16 years of age since 1990. Born in top-3 county indicates individuals individuals born in Stockholm, Skåne, or Västra Götaland whereas Immigrant indicates individuals individuals born outside of Sweden

or not-for-profit firms may be an indication of altruistic preferences (Benz, 2005; Delfgaauw & Dur, 2008), of which some evidence of gender differences exists.[3]

Panel B reports on gender differences in past work experience in different executive functions. About 26% of men have experience as an executive, while the corresponding share for women is 21%. Perhaps even more importantly, a larger share of men has experience from executive assignments in production and operations (9.1% vs. 6.1%), and sales and marketing (4.8% vs. 3.3%), the two most common functional backgrounds for CEOs. (Anecdotal accounts of gender gaps in business refer to the role of functional experience in explaining CEO assignments as the "pipeline" hypothesis.) Women figure more importantly in particular in personnel and industrial relations.

Panel C reports on gender differences in education. Different fields of education develop different skill sets, and the choice of field may inform of graduates' propensity to specialize and remain specialists through their careers.[4] The field of education also correlates with competitiveness, in which large gender differences exist (e.g., Niederle & Vesterlund, 2007).[5] We find women are more likely to have a business or economics degree than men, the fields most predictive of making it to the top.

Panel C shows women are less likely to select into the top-25 education tracks with the largest proportion of top executives or ones offering the highest income. Not attending these education tracks as frequently may deprive women of valuable networks, which may prove useful later in their careers.[6] In addition, attending these education tracks may reveal women's career orientation and inform of their competitiveness.

Panel C also reports on gender differences in family backgrounds. Women tend to come from smaller families, and they are earlier in birth order. Birth order may affect the development of personality and leadership traits: first-borns act as role models for the later-born children (Sulloway, 1996). Black et al. (2018) find that firstborns are more likely to end up in occupations requiring leadership ability. Women are less likely to have been born in a large city, which may expose them to fewer opportunities and networks. Finally, a larger share of graduate women than men are immigrants. Immigrants constitute a potentially important pool of talent, but they could also be more exposed to discrimination.

4 | CONTRIBUTION OF GRADUATE CHARACTERISTICS TO GENDER GAPS IN CEO APPOINTMENTS

4.1 | Results from core sample

Large gender differences in educational qualifications, executive experience, and labor market attachment motivate us to analyze whether the differences in these measures are large enough to generate the gender gaps in CEO appointments we observe in our data. Table 3 evaluates this by reporting results from linear probability model regressions of the CEO dummy on the female dummy and controls. The first column represents a regression that includes the female dummy as the sole regressor. This regression corresponds to Table 1, which finds a coefficient on the female dummy of −1.54. The second column reports regressions that also control for education and family background. The gap widens to −1.78, a manifestation of the fact that women are more likely to have a business background than men, an important predictor of CEO appointments.

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[3] Women are sometimes assumed to be more altruistic and cooperative than men. Niederle (2016) reviews the evidence on altruism and cooperation and concludes it "is more mixed than what one might have expected."

[4] The opposite of becoming a specialist is to become a generalist, a job description commonly associated with CEOs. Murphy and Zábojník (2004) and Custódio et al. (2013) analyze generalist CEOs.

[5] Kamas and Preston (2018) find competitive individuals are more likely to specialize in engineering, natural sciences, and business as opposed to social sciences or humanities.

[6] Hwang and Kim (2009) and Engelberg et al. (2013) report evidence of the value of networks for executive careers.

TABLE 3 Regressions explaining gender gaps in CEO appointments

Dependent variable	CEO indicator			
Specification	(1)	(2)	(3)	(4)
Panel A: Full sample				
Female dummy	−1.54	−1.78	−1.26	−0.91
	(−25.05)	(−25.90)	(−18.12)	(−13.49)
Controls				
Age	Yes	Yes	Yes	Yes
Education	No	Yes	Yes	Yes
Family background	No	Yes	Yes	Yes
Absences and unemployment	No	No	Yes	Yes
Experience	No	No	No	Yes
Executive functions	No	No	No	Yes
Mean LHS	1.69	1.69	1.69	1.69
Adjusted R^2	0.004	0.01	0.01	0.07
Number of observations	142,712	142,712	142,712	142,712
Panel B: Including working hours available for a subsample				
Female dummy	−1.38	−1.61	−0.94	−0.75
	(−22.42)	(−23.21)	(−13.27)	(−10.90)
Controls				
Age	Yes	Yes	Yes	Yes
Education	No	Yes	Yes	Yes
Family background	No	Yes	Yes	Yes
Absences and unemployment	No	No	Yes	Yes
Working hours	No	No	Yes	Yes
Experience	No	No	No	Yes
Executive functions	No	No	No	Yes
Mean LHS	1.52	1.52	1.52	1.52
Adjusted R^2	0.004	0.01	0.01	0.06
Number of observations	129,227	129,227	129,227	129,227

Note: This table reports results from regressions of the CEO indicator in year 2015 on a dummy for women and controls. Every column includes age dummies as controls. Columns 1 through 4 gradually add controls indicated in each column. Panel A reports on the controls available for the sample of graduates with children whereas Panel B restricts the sample further to graduates for which data on working hours are available. The *t*-values are based on robust standard errors. Coefficients and mean LHS are reported in percentage points.

The third column adds labor market attachment variables. The coefficient for the female dummy drops by 29% to −1.26. The fourth column further adds controls for experience and executive functions. The female indicator drops further to −0.91, where it is 28% lower than in specification 3 and 40% lower than in the unconditional regression in specification 1. These results show that labor market attachment combined with experience directly relevant for gaining a CEO position can explain a meaningful fraction of the gender gap, whereas the remaining battery of controls has little explanatory power.

TABLE 4 Decompositions of gender gaps in CEO appointments

	Estimate	z-value	Fraction
Panel A: Decomposing gender gaps in CEO appointments			
Gender gap	−1.54		
Total explained	−0.62	(−14.50)	40%
Education	0.19	(7.87)	−12%
Family background	0.01	(2.36)	−0.4%
Experience	−0.08	(−9.47)	5%
Executive functions	−0.34	(−16.70)	22%
Absences and unemployment	−0.39	(−13.00)	26%
Number of observations	142,712		
Panel B: Decompositions in the subsample with working hours			
Gender gap	−1.38		
Total explained	−0.62	(−13.71)	45%
Education	0.17	(7.24)	−13%
Family background	0.003	(1.02)	−0.2%
Experience	−0.03	(−2.88)	2%
Executive functions	−0.29	(−15.33)	21%
Absences and unemployment	−0.39	(−11.81)	28%
Working hours	−0.08	(−4.44)	6%
Number of observations	129,227		

Note: This table reports results of Blinder–Oaxaca (Blinder, 1973; Oaxaca 1973) decompositions of the gender gaps in CEO appointments. These decompositions are based on the regressions reported in column 4 of Panels A and B in Table 3. Panel A reports on the controls available for the sample of graduates with children whereas Panel B restricts the sample further to graduates for which data on working hours are available. The z-statistics are based on robust standard errors. Estimates are reported in percentage points

Panel B additionally controls for working hours for the subset of the graduates for which data on this variable are available. As in Panel A, the largest change in the female dummy occurs in column 3, which introduces the attachment variables and working hours to the regression.

Apart from the female dummy that informs us about the gender gaps, the regression coefficients on the predictors of CEO appointments are of interest. Table A2 reports on these coefficients for the specification that includes controls for all individual characteristics. These results are in broad accordance with the unconditional differences between CEOs and graduates reported in Table 2. Apart from labor market attachment, in particular, variables related to executive experience are important predictors of CEO appointments.

Table 4 performs a Blinder–Oaxaca (Blinder, 1973; Oaxaca 1973) decomposition exercise that allows us to assess the joint contribution of all characteristics to CEO gender gaps. This exercise offers identical estimates of unconditional and conditional gaps, as do the regression coefficients reported in Table 3, but it has the added benefit of providing information on the contribution of each variable subset to the gap. In the main specification, reported in Panel A, our variables explain 40% of the gap, which is the same result as in Table 3 Panel A specification 4. This share is noteworthy because measures of graduates' productivity at work are bound to be noisy. The decomposition finds absences and unemployment explain 26%, executive experience 22%, and other experience 5% of the gap. These components add up to more than 40% because the stronger predictive power of women's educational attributes with CEO appointments widens the gap by 12%.

Panel B tabulates the gaps for a subsample for which we also have data on working hours. As noisy as the working hours variable is—it is based on a survey from one month in a year—it explains 6% of the gender gap in future CEO appointments. Absences and unemployment and executive experience continue to explain about as much of the gender gap as in Panel A. Combined, labor market attachment and working hours explain 34% of the gender gap.

4.2 | Role of family

The large explanatory power of the labor market attachment variables motivates us to study in more detail the role family plays in CEO appointments. For that purpose, we first report on gender differences in family-related attributes. Then, we document how different components of labor market attachment vary as a function of childbirth. Finally, we repeat our decomposition analyses as a function of graduates' parental status.

Table A3 reports gender differences in family-related attributes. Graduate women have slightly fewer children than men (difference = −0.04, $t = -6.3$), whereas there is no significant gender difference in the share of graduates having children. Interestingly, CEOs are much more likely to have children than graduates on average (the difference is 12 percentage points), and they also have more children. Thus, children per se do not appear to be a significant impediment to a top executive career.

To study the impact of childbirth on labor market attachment of women and men, we report results from an event study that tracks graduates' (Figure A3, Panel A) or their partners' (Panel B) average fraction of days absent from work, in unemployment, and outside the labor force relative to the birth year of their first child. Panel C compares the labor market attachment of graduate women with children to graduate women without children.

Denoting by Y the outcome of interest for individual i in year s and at event time t in subsample g (graduates or their partners), we run the following regression:

$$Y_{ist}^g = \alpha^g \cdot I[i = \text{woman}] + \sum_j \beta_j^g \cdot I[j = t] + \sum_k \gamma_k^g \cdot I[k = \text{birth year}]$$

$$+ \sum_y \delta_y^g \cdot I[y = s] + \sum_j \theta_j^g \cdot I[i = \text{woman}] \cdot I[j = t] + \vartheta_{ist}^g, \tag{1}$$

where we include an indicator for women (first term); the full set of event time dummies for 15 years surrounding childbirth (second term); birth year dummies (third term); calendar-year dummies (fourth term); interactions of the female indicator and the years surrounding childbirth year dummies (fifth term); and the error term (sixth term). The calendar-year dummies control for annual trends in the outcome variable. Figure A4 uses the same methodology to gauge the effect of childbirth on working hours. Kleven et al. (2019) use similar methods to estimate child penalties in earnings in the population of Danish workers.

Although benchmarks vary, all panels in Figures A3 and A4 tell the same story: the labor market attachment and working hours of women tend to plunge at the time of childbirth and recovering from this career shock takes several years. There is still a large gap in these dimensions 10 years after childbirth. Table A4 reports these results more formally.

The above analyses are consistent with family life having an important effect on gender differences in labor market attachment. This motivates us to analyze gender gaps separately by the graduates' parental status. Table 5 reports the results from such a Blinder–Oaxaca decomposition.

The gender gap is more than three times as large for graduates who are parents than for graduates who are not (−1.83 vs. −0.53). Moreover, we can also explain a much larger share of the gap for graduate parents (60%) than for nonparents, for whom we are unable to explain any of the gender gap (in fact, the inclusion of the control variables widens the gap by 12%, but this result is not statistically significant at conventional levels). In the case of parents, the explanatory power almost exclusively comes from absences and unemployment (41%) and executive functions (26%). In the case of nonparents, executive functions do not explain any of the gap (the variable's contribution to the gender

TABLE 5 Decompositions of CEO gender gaps for graduates with and without children

	Graduates with children			Graduates with no children		
	Estimate	z-value	Fraction	Estimate	z-value	Fraction
Panel A: Decomposing gender gaps in CEO appointments						
Fraction CEOs	1.94			0.84		
Gender gap	−1.83			−0.53		
Total explained	−1.10	(−17.70)	60%	0.07	(1.23)	−12%
Education	0.22	(7.69)	−12%	0.06	(1.80)	−12%
Family background	−0.01	(−3.17)	0.5%	0.04	(2.50)	−7%
Experience	−0.09	(−10.15)	5%	−0.04	(−1.91)	7%
Executive functions	−0.47	(−18.23)	26%	0.03	(1.22)	−6%
Absences and unemployment	−0.75	(−15.39)	41%	−0.03	(−1.05)	6%
Number of observations	110,487	32,225				
Panel B: Decompositions in the subsample with working hours						
Fraction CEOs	1.74			0.73		
Gender gap	−1.66			−0.38		
Total explained	−1.12	(−16.96)	68%	0.08	(1.48)	−21%
Education	0.21	(7.23)	−13%	0.04	(1.07)	−10%
Family background	−0.01	(−3.46)	1%	0.02	(1.30)	−5%
Experience	−0.03	(−3.38)	2%	0.00	(0.18)	−1%
Executive functions	−0.41	(−17.05)	25%	0.05	(2.09)	−13%
Absences and unemployment	−0.76	(−14.27)	46%	−0.03	(−0.83)	7%
Working hours	−0.11	(−4.70)	7%	−0.001	(−0.05)	0.3%
Number of observations		101,003			28,224	

Note: This table reports the Blinder-Oaxaca (Blinder, 1973; Oaxaca 1973) decomposition in Table 4 using subsamples of graduates with children and no children. These decompositions are based on the regressions reported in column 4 of Panels A and B in Table 3. The z-values are based on robust standard errors. Estimates are reported in percentage points

gap is a negative −6%, $t = 1.22$); if anything, controlling for the variable widens the gap. This not only suggests the explanatory power of executive functions arises from children, but it also hints that some of women's sorting into executive functions that are not predictive of becoming a CEO may be driven by children.

These results persist in a subsample for which we also have data on working hours; Panel B shows that we can explain 68% of the gender gap. As before, absences and unemployment and executive functions play the most important role in bridging this gap. The next most important variable is working hours, which explains 7% of the gap.

Family firms tend to exhibit a preference for promoting sons over daughters (e.g., Bennedsen et al., 2007). This preference could manifest itself not only at the CEO level but also at lower levels, giving sons better access to experience and, in particular, to executive experience. Family firm practices may affect daughters also in another way. To the extent they internalize the traditional gender roles implied by firm succession practices, they may respond by prioritizing family over career. This would predict they are less attached to the labor market than women without a family firm background.

We test these hypotheses by dividing our sample into two subsamples: (1) Graduates who cannot have gained work experience in a family firm, defined here as firms in which the graduates' parents have had recorded ownership at some point since 1992 when the ownership data starts. (2) Graduates whose parents have recorded ownership. We drop from the analysis those graduates for whom we do not have data on both parents.

Table A5 reports the extent to which graduate characteristics can account for the gender gap in the two subsamples. We account for 62% of the gap in the family firm subsample and 46% in the nonfamily firm subsample. This difference can mostly be traced to two sources. A large part of the additional explanatory power in the family firm subsample comes from the executive functions and experience variables, as predicted by the intrafamily favoritism story. A decomposition of the results suggests that these two variable classes account for 33% of the fraction explained in the family firm subsample, while the corresponding fraction in the nonfamily firm subsample is 24%. This is consistent with men benefitting more than women from employment in a family company.

Labor market attachment is another large contributor to the greater explained share among family firms. The variable class explains 45% and 32% of the gender gap among graduates with a family firm and nonfamily firm background, respectively. These results are consistent with daughters of entrepreneurs being more inclined to assume traditional gender roles, leading them to prioritize family over career.

5 | DISCUSSION

As we reported in Table 4, labor market attachment explains 28%, and our full battery of graduate characteristics explains 40% of the gender gap in CEO appointments. To interpret these results, it is useful to realize that labor market attachment, career decisions, and education are not necessarily exogenous to ultimate career outcomes. For example, women may choose to differentially invest in skills in anticipation of labor market discrimination or binding gender norms, which then shows up as lower potential wages relative to men and, hence, promotes household specialization (Cortés & Pan, 2020). Thus, observing attachment to explain a lion's share of the gap does not necessarily mean the gap is equally much explained by women's "free choice," rather than forces that push women to choose to be less attached to the labor market. Controlling for variables contaminated by these choices could cause unexplained differences to understate the role discrimination or gender norms play in determining the gender gap.

The 40% explained share means that 60% of the gender gap in CEO appointments remains unaccounted for. We discuss three broad classes of explanations for this unexplained gap: gender differences in job preferences; gender differences in leadership skills; and discrimination. Although we lack the tools to differentiate between these explanations, we can offer arguments and additional evidence that allows the reader to better interpret our findings.

The first class of explanations relates to gender differences in job preferences. Women may have stronger family preferences or productivity at home than men and switch away from market work when needed at home. Consistent with this explanation, Bleske-Rechek and Gunseor (2021) find women enjoy childcare tasks more than men do and also report a greater desire for responsibility for these tasks compared to men. When the children are very young, the ability to breastfeed gives women a biological advantage. In a related scenario, couples follow gender norms which are only broken if the economic reasons for doing so are overwhelming, for example, in case the woman's career potential is exceptionally high relative to her husband (see, e.g., Akerlof & Kranton, 2000, and Bertrand et al., 2015, for the literature on gender norms). Another version of the gender norm story is that women may underestimate the effect of childbirth on employment (Kuziemko et al., 2020), leading them to accept a traditional gender role based on miscalibrated career expectations.

The second class of explanations for the unexplained gender gap is that men have better leadership skills than women. Gender differences in leader productivity could give rise not only to the gender gap in CEO appointments but also to the gender gap in CEO pay, as observed, for example, in the United States (Bertrand & Hallock, 2001) and Sweden (Table 1). These productivity differences are difficult to observe, except perhaps in special circumstances. Ahern and Dittmar (2012) argue Norway's pioneering board gender-quota law caused a significant drop in the stock price at

the announcement of the law, deterioration of operating performance, and a large decline in Tobin's Q over the following years.[7] However, given that the qualifications of the future directors were not known at the time of passing the quota law, it is not obvious whether its short-term effects, if any, were due to differences in director qualifications or due to unobservable gender differences in productivity. Ahern and Dittmar (2012) and Bertrand et al. (2019) find that the women appointed to these boards were observably less qualified than their male counterparts.

Our extensive batteries of executive experience and career variables control for the most obvious sources of a potential gender difference in leadership skills and other qualifications.[8] At the same time, in particular, the executive experience variables are plausibly affected by choice or discrimination and must be interpreted with caution. The fact that our analysis includes decompositions makes it easier for the reader to critically interpret the variables more likely plagued by endogeneity.

The third and final class of explanations is discrimination. Systematic demand based or institutional barriers may present a glass ceiling blocking women's progress to the highest corporate levels, despite their gains at lower levels and in middle management. Discrimination could potentially explain not only the gender gap in appointments but also the gender gaps in pay, which tend to accelerate throughout the income distribution (see Albrecht et al., 2003, for related evidence in Sweden). One important challenge to the discrimination explanation is that firms exercising it would act against their own best interest. Becker's (1957) model of taste-based discrimination suggests that because discrimination is unprofitable, competitive forces should reduce or eliminate employer discrimination.[9] Empirical evidence indicates competitive pressure tends to be associated with a reduction in the gender wage gap (see, e.g., Black & Strahan, 2001; Hellerstein et al., 2002).

We give perspective to the discrimination interpretation by drawing from Statistics Sweden's Work Environment Survey, which asks its respondents about their experienced exposure to gender discrimination at work.[10] Table A6 reports the findings from the 2015 wave of the survey, the first to include questions on discrimination. One hundred ninety-two of the 142,712 graduates in our sample participated in this survey. The fraction of reported gender discrimination among female (male) respondents in our sample is 9% (2%); the gender difference in reported discrimination is statistically significant at the 5% level ($t = 2.32$). We find very similar levels of experienced exposure to discrimination in a much larger sample including all university graduates from the same cohorts regardless of their field of study. This suggests the reported discrimination among our sample graduates corresponds to that of other well-educated individuals, many of whom work in sectors where the share of women is larger.

This evidence needs to be interpreted with care. First, it corresponds to the experience of the average graduate, not necessarily to that of the graduates who have progressed in their careers to a high level where they are more subject to a potential glass ceiling effect. Second, it represents the situation at the end of the sample period and not during the formative years of their careers. Goldin (2014) and others report that gender gaps have decreased over time, so it is plausible that the underlying forces behind these gaps have also changed over time. And finally, survey methods have their limitations, including when asking about sensitive subjects. To the extent respondents perceive questions regarding discrimination to be socially unacceptable or undesirable, they are likely to underreport those experiences (Tourangeau & Yan, 2007; Williams & Mohammed, 2009).

With the above caveats in mind, the fraction of the graduates who report having experienced gender discrimination is relatively small. Could a relatively rare occurrence explain the CEO gender gap? Probably not directly, because the

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[7] Eckbo et al. (2021) challenge this evidence, pointing out difficulties in attributing quota-related news to specific dates; the need to account for contemporaneous cross-correlation of stock returns when judging the statistical significance of event-related abnormal stock returns; and the fundamental difficulty of separating quota-induced valuation effects from the influences of firm characteristics and macroeconomic events. They conclude that the valuation effect of the quota law is statistically insignificant.

[8] For example, Fernandez-Mateo and Fernandez (2016) highlight the role experience plays in gender differences in executive search.

[9] See Guryan and Charles (2013) for a discussion of taste-based and statistical discrimination and the challenges in disentangling between them.

[10] The survey asks the following yes-no question: "Do you experience that you are in your workplace exposed to discrimination due to your sex?" The survey has a separate question on experienced discrimination at work due to gender identity or gender expression. Much fewer respondents say they are discriminated due to them.

gap is so large: graduate men are over three times as likely to be appointed as CEOs as graduate women. Therefore, if discrimination is to explain a substantial share of the (unexplained) CEO gender gap, a more plausible path would appear to go through expectations. Risk-averse graduate women may view the possibility of experiencing career-jeopardizing discrimination significant enough to affect their choices. As a result, they may prioritize their spouse's career.

Although the large unexplained share makes it is hard to pinpoint the exact reason for the gender gap in CEO appointments, it seems work–family trade-offs are an important part of the story. In Sweden, gender norms have already been shifted by policies that encourage fathers to take up more parental leave. If these norms continue to converge to a more egalitarian standard, we expect a larger share of women to eventually reach the top executive suite.

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REFERENCES
Adams, R., Almeida, H., & Ferreira, D. (2005). Powerful CEOs and their impact on corporate performance. *Review of Financial Studies*, *18*, 1403–1432.

Adams, R., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, *94*, 291–309.

Adams, R., Keloharju, M., & Knüpfer, S. (2018). Are CEOs born leaders? Lessons from traits of a million individuals. *Journal of Financial Economics*, *130*, 392–408.

Ahern, K. R., & Dittmar, A. K. (2012). The changing of the boards: The impact on firm valuation of mandated female board representation. *Quarterly Journal of Economics*, *127*, 137–197.

Akerlof, G., & Kranton, R. (2000). Economics and identity. *Quarterly Journal of Economics*, *115*, 715–753.

Albrecht, J., Björklund, A., & Vroman, S. (2003). Is there a glass ceiling in Sweden? *Journal of Labor Economics*, *21*, 145–177.

Becker, G. (2010). (1957). *The economics of discrimination*. University of Chicago Press.

Becker-Blease, J. R., Elkinawy, S., & Stater, M. (2010). The impact of gender on voluntary and involuntary executive departure. *Economic Inquiry*, *48*, 1102–1118.

Bennedsen, M., Nielsen, K. M., Pérez-González, F., & Wolfenzon, D. (2007). Inside the family firm: the role of families in succession decisions and performance. *Quarterly Journal of Economics*, *122*, 647–691.

Bennedsen, M., Pérez-González, F., & Wolfenzon, D. (2020). Do CEOs matter: evidence from CEO hospitalization events. *Journal of Finance*, *75*, 1877–1911.

Benz, M. (2005). Not for the profit, but for the satisfaction? Evidence on worker well-being in non-profit firms. *Kyklos*, *58*, 155–176.

Bertrand, M., Black, S. E., Jensen, S., & Lleras-Muney, A. (2019). Breaking the glass ceiling? The effect of board quotas on female labour market outcomes in Norway. *Review of Economic Studies*, *86*, 191–239.

Bertrand, M., Goldin, C., & Katz, L. (2010). Dynamics of the gender gap for young professionals in the financial and corporate sectors. *American Economic Journal: Applied Economics*, *2*, 228–255.

Bertrand, M., & Hallock, K. F. (2001). The gender gap in top corporate jobs. *ILR Review*, *55*, 3–21.

Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics*, *118*, 1169–1208.

Bertrand, M., Kamenica, E., & Pan, J. (2015). Gender identity and relative income within households. *Quarterly Journal of Economics*, *130*, 571–614.

Black, S. E., Grönqvist, E., & Öckert, B. (2018). Born to lead? The effect of birth order on noncognitive abilities. *Review of Economics and Statistics*, *100*, 274–286.

Black, S. E., & Strahan, P. E. (2001). The division of spoils: Rent-sharing and discrimination in a regulated industry. *American Economic Review*, *91*, 814–831.

Bleske-Rechek, A., & Gunseor, M. (2021). Gendered perspectives on sharing the load: Men's and women's attitudes toward family roles and household and childcare tasks. *Evolutionary Behavioral Sciences*. Advance online publication. https://doi.org/10.1037/ebs0000257.

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources*, *8*, 436–455.

Bütikofer, A., Jensen, S., & Salvanes, K. (2018). The role of parenthood on the gender gap among top earners. *European Economic Review*, *109*, 103–123.

Catalyst (2020). Pyramid: Women in S&P 500 companies. https://www.catalyst.org/research/women-in-sp-500-companies/.

Cortés, P., & Pan, J. (2020). *Children and the remaining gender gaps in the labor market* [Working paper]. NBER.

Custódio, C., Ferreira, M., & Matos, P. (2013). Generalists versus specialists: lifetime work experience and Chief Executive Officer pay. *Journal of Financial Economics*, *108*, 471–492.

Delfgaauw, J., & Dur, R. (2008). Incentives and workers' motivation in the public sector. *Economic Journal*, *118*, 171–191.

Eckbo, B. E., Nygaard, K., & Thorburn, K. S. (2021). Valuation effects of Norway's board gender-quota law revisited. *Management Science*. Advanced online publication. https://doi.org/10.1287/mnsc.2021.4031.

Edmans, A., Gabaix, X., & Jenter, D. (2017). Executive compensation: A survey of theory and evidence. In B. Hermalin and M. Weisbach Eds.), *Handbook of the economics of corporate governance* (Vol. 1, pp. 383–522). Elsevier.

Engelberg, J., Gao, P., & Parsons, C. A. (2013). The price of a CEO's rolodex. *Review of Financial Studies*, *26*, 79–114.

Fernandez-Mateo, I., & Fernandez, R. M. (2016). Bending the pipeline? Executive search and gender inequality in hiring for top management jobs. *Management Science*, *62*, 3636–3655.

Gabaix, X., & Landier, A. (2008). Why has CEO pay increased so much? *Quarterly Journal of Economics*, *123*, 49–100.

Goldin, C. (2014). A grand gender convergence: Its last chapter. *American Economic Review*, *104*, 1091–1119.

Graham, J., Harvey, C., & Puri, M. (2013). Managerial attitudes and corporate actions. *Journal of Financial Economics*, *109*, 103–121.

Guryan, J., & Charles, K. K. (2013). Taste-based or statistical discrimination: The economics of discrimination returns to its roots. *Economic Journal*, *123*, F417–F432.

Hellerstein, J. K., Neumark, D., & Troske, K. R. (2002). Market forces and sex discrimination. *Journal of Human Resources*, *37*, 353–380.

Henrekson, M., & Stenkula, M. (2009). Why are there so few female top executives in egalitarian welfare states? *Independent Review*, *14*, 239–270.

Hwang, B., & Kim, S. (2009). It pays to have friends. *Journal of Financial Economics*, *93*, 138–158.

Kamas, L., & Preston, A. (2018). Competing with confidence: The ticket to labor market success for college-educated women. *Journal of Economic Behavior & Organization*, *155*, 231–252.

Kaplan, S., & Sorensen, M. (2021). Are CEOs different? Characteristics of top managers. *Journal of Finance*, *76*, 1773–1811.

Kleven, H. J., Landais, C., & Sogaard, J. E. (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics*, *11*, 181–209.

Kuziemko, I., Pan, J., Shen, J., & Washington, E. (2020). *The mommy effect: Do women anticipate the employment effects of motherhood?* [Working paper]. NBER.

Murphy, K. J., & Zábojník, J. (2004). CEO pay and appointments: A market-based explanation for recent trends. *American Economic Review Papers and Proceedings*, *94*, 192–196.

Niederle, M. (2016). Gender. In: J. H. Kagel and A. E. Roth (Eds.), *Handbook in experimental economics* (pp. 481–553). Princeton University Press.

Niederle, M., & Vesterlund, L. (2007). Do women shy away from competition? Do men compete too much? *Quarterly Journal of Economics*, *122*, 1067–1101.

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review*, *14*, 693–709.

Sapienza, P. (2010). Discussion of self-selection and the forecasting abilities of female equity analysts. *Journal of Accounting Research*, *48*, 437–443.

Sulloway, F. J. (1996). *Born to rebel: Birth order family dynamics, and creative lives*. Pantheon.

Tourangeau, R., & Yan, T. (2007). Sensitive questions in surveys. *Psychological Bulletin*, *133*, 859–883.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: evidence and needed research. *Journal of Behavioral Medicine*, *32*, 20–47.
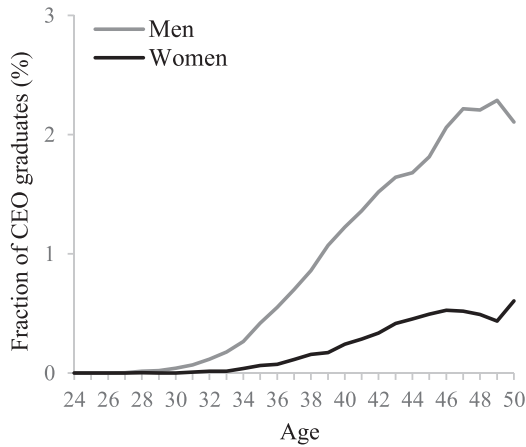
APPENDIX

FIGURE A1 The fraction of CEOs by gender and age. X-axis: Age; Y-axis: Fraction of CEO graduates (%)
Note: This graph depicts the fraction (in percent) of graduates attaining a CEO position stratified by gender and age. Each data point in the graph corresponds to the average fraction of business, economics, and engineering graduates holding a CEO position. The sample, observed in 1993−2012, consists of graduates born in 1962−1975
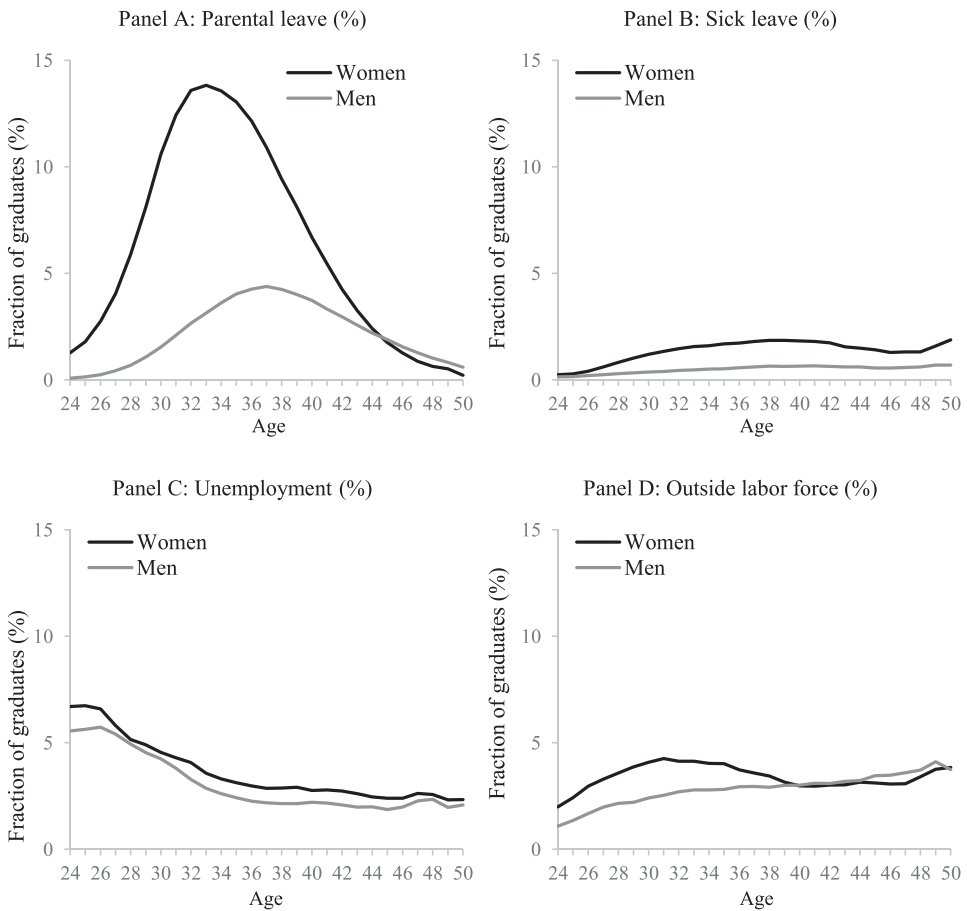
FIGURE A2 Labor market attachment by gender and age. All panels: X-axis: Age; Y-axis: Fraction of graduates (%)

Note: This graph depicts the average fraction of days absent from work, in unemployment, and outside the labor force by gender and age. The fractions in all panels count the annual number of days a graduate is not attached to the labor market and divide it by the number of days in that year. Panels A and B report the fraction of days spent on parental and sick leave, whereas Panels C and D report the days in unemployment and outside the labor force. The sample, observed in 1993−2012, consists of graduates born in 1962−1975. An individual is defined as being full-time outside of the labor force in a year if the individual is older than 24, has no firm or establishment affiliation, has no reported taxable labor income, no registered days of unemployment, and is not registered at a university as a student or a Ph.D. student
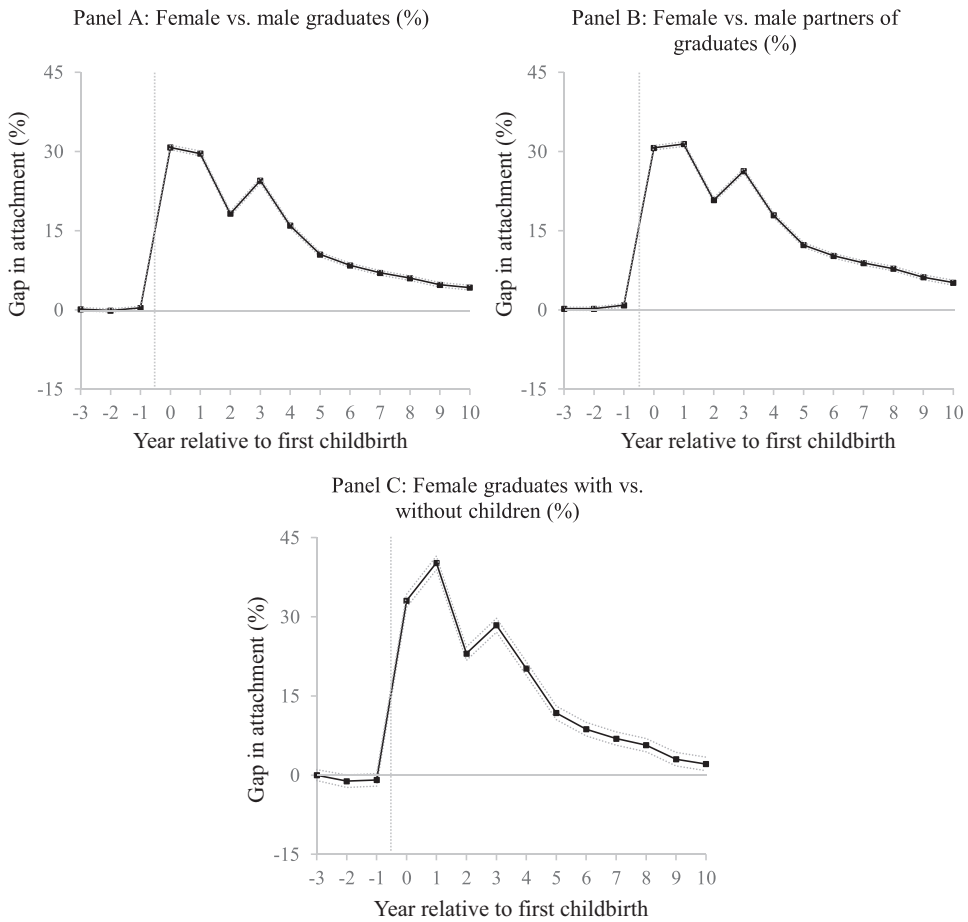
Panel A: Female vs. male graduates (%)

Panel B: Female vs. male partners of graduates (%)

Panel C: Female graduates with vs. without children (%)

FIGURE A3 Women's labor market attachment around first childbirth. All panels: X-axis: Year relative to first childbirth; Y-axis: Gap in attachment (%)

Note: This graph plots the average fraction of days absent from work, in unemployment, and outside the labor force relative to the birth year of the graduate's first child. The estimates (solid lines) and their 95% confidence intervals (dotted lines) are for the coefficients on interactions of the female indicator with indicators for the 15 years surrounding childbirth (−4 omitted). In addition, the regressions include a female dummy, dummies for each of the years surrounding the event, dummies for each calendar year, and dummies for birth year. Panel A includes all graduates who have children, Panel B includes the partners of the graduates, and Panel C compares women with children to women without children, for whom the year of childbirth is imputed based on the distribution of age at first childbirth. The sample, observed in 1993−2012, consists of graduates who are born in 1962−1975. Confidence intervals are based on standard errors that assume clustering at the individual level
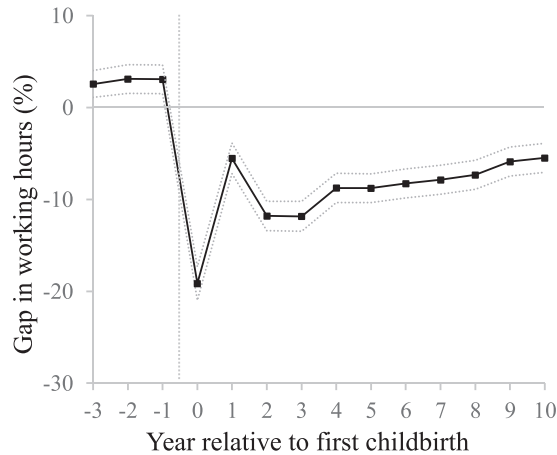
FIGURE A4   Women's working hours around childbirth. X-axis: Year relative to first childbirth; Y-axis: Gap in working hours (%)

Note: This graph plots the fraction of working hours to total hours in a month (set at the sample median of 145 hours). This information originates from the Salary Structure Statistics that record working hours for the month preceding the survey (September or November). Data are available for 1993–2012 and include all graduates working in the public sector and private-sector organizations employing more than 500 employees. Graduates working for smaller companies record working hours if they work for a surveyed company. The estimates (solid lines) and their 95% confidence intervals (dotted lines) are for the coefficients on interactions of the female indicator with indicators for the 15 years surrounding childbirth (−4 omitted). In addition, the regressions include a female dummy, dummies for each of the years surrounding the event, dummies for each calendar year, and dummies for birth year. The sample consists of graduates born in 1962−1975. Confidence intervals are based on standard errors that assume clustering at the individual level

TABLE A1   Descriptive statistics on graduates and employers

Panel A: Fraction of graduates working in the private and public sector in 2015		
	Number of graduates	Fraction (%)
Private sector	108,505	76.0
Public sector	26,264	18.4
No employment	7,943	5.6

Panel B: Descriptive statistics on private sector firms in 2015 (N = 27,754)			
	Mean	Median	SD
Size, age, and profitability			
Sales (mil. SEK)	205	11	1,993
Number of employees	54	7	351
Total assets (mil. SEK)	353	8	4,438
Age (from 1990)	12	11	7
Return on assets	0.222	0.108	0.557
5-year standard deviation of return on assets	0.176	0.099	0.247
Sales growth	0.296	0.063	1.074
Industry			
Agriculture and fishing	0.017		
Mining, manufacturing, and utilities	0.128		
Construction	0.043		
Wholesale, retail, and repair	0.141		
Hotels and restaurants	0.016		
Transport, telecommunications, and storage	0.034		
Information technology	0.125		
Engineering	0.110		
Business activities	0.264		
Financial intermediation	0.001		
Real estate and renting	0.049		
Education	0.017		
Public administration, health, and social services	0.022		

(Continues)

TABLE A1 (Continued)

Panel B: Descriptive statistics on private sector firms in 2015 (N = 27,754)	
Community, social and personal activities	0.033
Ownership structure	
Government owned	0.028
Listed firm	0.022

Note: Panel A reports the fraction of graduates working for private or public sectors, or having no employment in 2015. Panel B reports the characteristics of the firms in the private sector. Sales and Total assets are expressed in SEK millions, inflated to 2017, SEK 1 ≈ USD 0.12. Age is computed from the maximum of 1990 and the year of incorporation. Return on assets is the ratio of earnings before interest and taxes to total assets. Sales growth is calculated relative to the past fiscal year. Both of these variables are winsorized at the 5th and 95th percentiles. Industries follow the international NACE Rev.1.1 classification. Government owned is a dummy variable that takes the value of one if Statistics Sweden classifies the firm or its parent as being owned by the local or national governments. Listed firms are firms that are listed, or have a parent that is listed, on the Swedish stock exchange according to Statistics Sweden

TABLE A2 Gender gaps in CEO appointments: Detailed regression results

	Full sample		Subsample with working hours	
	Coefficient (%)	*t*-value	Coefficient. (%)	*t*-value
Female	−0.91	(−13.49)	−0.75	(−10.90)
Absences and employment				
Parental leave	−6.39	(−11.33)	−6.43	(−10.42)
Sick leave	−3.68	(−6.64)	−3.24	(−5.54)
Unemployment	−4.81	(−10.89)	−5.32	(−10.41)
Outside labor force	−0.86	(−2.91)	−0.96	(−2.10)
Working hours			0.55	(4.33)
Experience				
Industries worked in	−0.07	(−2.14)	−0.02	(−0.80)
Firms worked at	0.001	(0.06)	0.05	(2.26)
Years of consulting or IB experience	0.12	(4.68)	0.09	(3.32)
Years of nonprofit experience	−0.03	(−2.06)	−0.04	(−2.44)
Years of public sector experience	−0.01	(−0.91)	−0.01	(−1.11)
Years of other work experience	0.02	(2.15)	−0.001	(−0.09)
Executive functions				
No executive experience	−13.33	(−31.75)	−10.69	(−26.09)
Production and operations	−6.08	(−16.90)	−4.31	(−12.23)

(Continues)

TABLE A2   (Continued)

	Full sample		Subsample with working hours	
	Coefficient (%)	t-value	Coefficient. (%)	t-value
Sales and marketing	−4.68	(−11.35)	−2.99	(−7.31)
Supply and distribution	−6.40	(−13.00)	−4.90	(−10.05)
Computing and R&D	−8.49	(−23.34)	−6.86	(−19.49)
Other function	−4.59	(−15.38)	−3.26	(−11.04)
Finance and administration	−8.02	(−21.11)	−6.22	(−16.64)
Personnel and industrial relations	−7.90	(−16.36)	−6.35	(−13.21)
Advertising and public relations	−7.09	(−9.32)	−5.54	(−7.21)
Education				
Business and economics degree	0.66	(8.32)	0.62	(7.67)
Top-25 income high school	−0.41	(−2.78)	−0.35	(−2.39)
Top-25 executive high school	0.61	(3.28)	0.56	(3.02)
Family background				
Birth order	−0.07	(−1.34)	−0.07	(−1.33)
Family size	0.11	(1.99)	0.11	(1.87)
Number of male siblings	0.004	(0.07)	0.05	(0.75)
Born in top-3 county	0.06	(0.81)	0.07	(1.02)
Immigrant	0.69	(6.42)	0.63	(5.81)

(Continues)

TABLE A2   (Continued)

	Full sample		Subsample with working hours	
	Coefficient (%)	t-value	Coefficient. (%)	t-value
Age				
41	0.29	(2.33)	0.33	(2.66)
42	0.24	(1.90)	0.19	(1.53)
43	0.60	(4.22)	0.56	(3.97)
44	0.40	(2.89)	0.36	(2.57)
45	0.70	(4.53)	0.64	(4.05)
46	0.70	(4.29)	0.56	(3.49)
47	0.75	(4.59)	0.73	(4.36)
48	0.55	(3.37)	0.53	(3.16)
49	0.96	(5.31)	1.02	(5.41)
50	0.68	(3.87)	0.56	(3.13)
51	0.72	(3.92)	0.58	(3.10)
52	1.13	(5.68)	1.15	(5.54)
53	0.74	(3.72)	0.73	(3.50)
Adjusted R^2	0.07		0.06	
Number of observations	142,712		129,227	

Note: This table details the regression results reported in column 4 of Panels A and B in Table 3. The *t*-values are based on robust standard errors. Coefficients are reported in percentage points.

TABLE A3   Gender differences in family-related attributes

	Women	Men	Women less men		CEOs less all		N
			Mean	t-value	Mean	t-value	
Has children (%)	77.26	77.51	−0.24	(−1.06)	11.58	(17.76)	142,712
Number of children	1.68	1.71	−0.04	(−6.30)	0.39	(18.69)	142,712

Note: This table reports gender differences in the graduates' attributes that relate to their family. The table reports an indicator for having children and the number of children.

TABLE A4 Women's labor market attachment following childbirth

Sample	Full sample					Subsample
Dependent variable	Parental leave (%)	Sick leave (%)	Unemp- loyment (%)	Outside labor force (%)	Total (%)	Working hours (%)
Specification	(1)	(2)	(3)	(4)	(5)	(6)
−3	0.01	0.07	−0.11	0.16	0.13	2.56
	(1.09)	(1.96)	(−1.05)	(1.57)	(0.87)	(3.41)
−2	0.00	0.16	−0.33	0.04	−0.12	3.11
	(0.23)	(3.63)	(−2.89)	(0.37)	(−0.74)	(3.93)
−1	0.02	0.49	−0.54	0.40	0.37	3.08
	(1.79)	(10.26)	(−4.74)	(3.14)	(2.12)	(3.88)
0	28.18	1.86	−1.00	1.73	30.77	−19.15
	(238.18)	(35.57)	(−8.93)	(12.13)	(145.29)	(−20.56)
1	25.32	0.26	−0.07	4.11	29.61	−5.53
	(190.58)	(5.47)	(−0.63)	(25.20)	(123.67)	(−6.55)
2	13.95	1.15	1.01	2.13	18.24	−11.80
	(112.14)	(21.92)	(8.26)	(14.42)	(78.80)	(−14.41)
3	20.33	0.97	0.61	2.58	24.49	−11.84
	(146.63)	(18.58)	(5.15)	(16.89)	(102.09)	(−14.22)
4	12.64	0.67	1.10	1.55	15.96	−8.76
	(97.96)	(12.48)	(9.21)	(10.65)	(69.31)	(−10.81)
5	7.90	0.65	0.91	1.04	10.49	−8.78
	(71.28)	(11.63)	(7.64)	(7.38)	(47.83)	(−10.94)
6	6.14	0.63	0.85	0.81	8.44	−8.27
	(60.50)	(10.88)	(7.20)	(5.71)	(38.95)	(−10.31)
7	5.04	0.67	0.74	0.57	7.01	−7.86
	(51.36)	(10.93)	(6.19)	(4.00)	(32.39)	(−9.79)
8	3.99	0.76	0.88	0.38	6.02	−7.33
	(43.51)	(11.70)	(7.11)	(2.67)	(27.46)	(−9.11)
9	2.80	0.71	0.74	0.50	4.75	−5.88
	(33.74)	(10.33)	(5.92)	(3.35)	(21.50)	(−7.32)
10	2.40	0.80	0.68	0.35	4.23	−5.48
	(29.64)	(10.93)	(5.25)	(2.30)	(18.55)	(−6.79)
Adjusted R^2	0.36	0.01	0.02	0.005	0.18	0.45
Number of observations	1,287,092	1,287,092	1,287,092	1,287,092	1,287,092	574,878

Note: Columns 5 and 6 of this table report the estimates shown in Figure A3 Panel A and Figure A4, respectively. Columns 1–4 break down column 5's total labor market attachment measure to its subcomponents. The estimates and their associated *t*-values are for the interactions of female indicator with indicators for the 15 years surrounding childbirth (−4 omitted). The regressions also include a female dummy, dummies for each of the years surrounding the event, for each calendar year, and for birth year. The *t*-values reported in parentheses use robust standard errors.

TABLE A5 Adding parental ownership of business to decompositions of CEO gender gaps

	Parents do not own business			Parents own business		
	Estimate	z-Value	Fraction	Estimate	z-Value	Fraction
Fraction CEOs	1.64			3.13		
Gender gap	−1.44			−2.88		
Total explained	−0.66	(−11.83)	46%	−1.79	(−8.30)	62%
Education	0.14	(4.91)	−10%	0.50	(5.51)	−17%
Family background	−0.01	(−2.80)	0.5%	−0.02	(−1.72)	1%
Experience	−0.05	(−5.87)	4%	−0.19	(−5.76)	6%
Executive functions	−0.28	(−12.40)	20%	−0.79	(−8.24)	27%
Absences and unemployment	−0.46	(−10.67)	32%	−1.29	(−7.40)	45%
Number of observations		103,374			15,218	

Note: This table reports the Blinder–Oaxaca (Blinder, 1973; Oaxaca, 1973) decomposition in Table 4 using graduates for which the data identify their parents. The table splits these graduates into two subsamples based on a dummy variable that indicates the graduate's parents recording ownership in a business at some point since 1992 when the ownership data starts. The decomposition is based on the regressions reported in column 4 of Panel A in Table 3. The z-values are based on robust standard errors. Estimates are reported in percentage points

TABLE A6 Survey reports of gender discrimination

	Graduates reporting experiences of gender discrimination in current job					
	Business, economics, and engineering			All fields of study		
	Yes	No	Fraction yes (%)	Yes	No	Fraction yes (%)
All	9	180	4.76	37	544	6.37
Women	7	70	9.09	34	348	8.90
Men	2	110	1.79	3	196	1.51
Women less men			7.31			7.39
z-Value			(2.32)			(3.46)

Note: This table reports responses to Statistics Sweden's Work Environment Survey that asks its respondents about their experienced gender discrimination at work. This analysis is based on the 2015 wave of the survey. The table calculates the fraction of graduates reporting gender discrimination separately for men and women and tests whether the gender difference in the fraction reporting discrimination is statistically significant. This calculation is performed in two samples consisting of graduates in business, economics, and engineering and graduates in all fields of study. Both samples focus on graduates born in 1962–1975.