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Matti Keloharju
Samuli Knüpfer
Joacim Tåg

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Matti Keloharju
Harvard Business School

Samuli Knüpfer
BI Norwegian Business School

Joacim Tåg
Research Institute of Industrial Economics

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Gender Gaps in CEO Appointments and Executive Pay*

Matti Keloharju

Aalto University School of Business, Harvard Business School, CEPR, and IFN

Samuli Knüpfer

BI Norwegian Business School, CEPR, and IFN

Joacim Tåg

Research Institute of Industrial Economics (IFN)

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Abstract

This paper uses exceptionally rich data on Swedish corporate executives and their personal characteristics to study gender gaps in CEO appointments and pay. Both gaps are sizeable: 18% for CEO appointments and 27% for pay. At most one-eight of the gaps can be attributed to observable gender differences in executives' and their firms' characteristics. Further tests suggest that unobservable gender differences in characteristics are unlikely to account for the remaining gaps. Instead, our results are consistent with the view that male and female executives sharing equal attributes neither have equal opportunities to reach the top, nor are they equally paid.

JEL-classification: G34, J16; J24; J31

* E-mails: mkeloharju@hbs.edu, samuli.knupfer@bi.no, joacim.tag@ifn.se. We thank Matti Sarvimäki and the seminar participants at Harvard Business School for their comments, and the Academy of Finland, Deloitte Institute of Innovation and Entrepreneurship, and Marianne and Marcus Wallenberg Foundation for financial support.

1. Introduction

Using an exceptionally comprehensive set of characteristics of the top executives of a large sample of Swedish firms, Figure 1 shows that male executives tend to outperform female executives in the characteristics that predict attaining the position as the Chief Executive Officer (CEO). However, the gender difference in the predicted likelihood to become a CEO, 1.7%, is small when compared to the actual 18% gender gap in CEO appointments. This result points toward the possibility that female executives sharing equal abilities and skills as their male peers do not have equal opportunities in the executive labor market. This paper analyzes the merit of this argument.

Ours is not the first study to show women are underrepresented in the upper echelons of corporations. In S&P 500 companies, women account for 45% of the work force but hold only 25% of the executive and senior-level official and manager positions. The fraction of women is even smaller at the very top of the organization: women account for 4% of the CEO positions (Catalyst 2015a). And when women are appointed to top executive positions, they tend to earn less than men. Bertrand and Hallock (2001) find that women earn 45% less than men among the highest-paid corporate executives.

What accounts for these gender gaps? One possibility is that they arise from gender differences in personal characteristics and choices, such as educational background, career aspirations, work experience, preferences for competitive and risky environments, and parental responsibilities. Alternatively, women may suffer from discrimination, either statistical or taste-based.[2] Given the difficulty in ruling out the importance of differences in characteristics that remain unobservable to the econometrician, economists tend to exercise caution before drawing conclusions on the residual explanation, discrimination.

Our study is unique in having access to an exceptionally large sample of corporate executives and an unrivalled set of their characteristics. Two features of our data set make it unlikely that any substantial unobservable gender differences in characteristics remain

[2] See Becker (1959) for his classic analysis of taste-based discrimination. Phelps (1972) and Arrow (1973) are the first to study statistical discrimination.

unaccounted for. First, as Bertrand and Hallock (2001), we confine our analysis to individuals who already are in a top position, either as the CEO or another top executive. These individuals have been self-selected to their positions based on their talent, skills, motivation, and career ambitions, which likely makes them fairly similar in these respects. Moreover, their opportunity costs of dropping out of the labor force or reducing work hours to care for children are unusually high, which helps to mitigate the effect of unobserved differences in childrearing or household work.

Second, we are able to link personal data on corporate leaders and their relatives with comprehensive firm-level data. Our data cover the entire adult population of Sweden and all its firms, including private ones. We are able to collect an unprecedentedly comprehensive battery of individual and firm characteristics, which allows us to address a host of potential explanations for gender differences. 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 start by documenting the gender gap in appointments and in pay, and in the characteristics that may explain them. In our sample, 30% of the male executives and 12% of the female executives are CEOs, which gives rise to an 18% gender gap in appointments. Male executives earn on average 27% more than female executives. We find that the characteristics significantly vary between men and women. Female executives tend to have higher levels of education and they are more likely to have graduated with a business degree. They also have worked in a larger number of firms and are more likely to have acquired experience in consulting or investment banking. Their male siblings also attain higher cognitive ability test scores in the military enlistment.

What women gain in some characteristics, they lose in others. They are less likely to graduate from the most prestigious educational tracks and they have less labor market experience. They have experienced more career interruptions despite the fact they have fewer children than men. Women also are less likely to be married. And they are less likely to participate in the stock market, a potential indication of their lower willingness to take risk.

Because some characteristics seem to work in women's favor while others put them at a disadvantage, we summarize the overall gender differences in the characteristics by adopting the perspective of a statistician. We predict the likelihood of an individual to attain a CEO position

by running regressions of an indicator for attaining a CEO position on the observable characteristics. We then predict, for each individual regardless of his or her current executive position, the likelihood to attain a CEO position. This approach reveals that the predicted likelihood of male executives to attain a CEO position is somewhat higher than that of female executives, as illustrated in Figure 1.

Can these observable differences between men and women explain the large and significant gender gaps in CEO appointments and pay? We analyze this question by regressing an indicator for CEO appointment and logged pay on an indicator for female executives. When the regressions exclude control variables that can potentially be outcomes of the forces that generate the gender gap in CEO appointments, observable variables explain at most one-eight of the appointment and pay gaps. The explained fraction of the pay gap is less than one-half even if we include potential outcomes, such as employment as a CEO.

The fact that the observable gender differences in characteristics are an order of magnitude smaller than the gaps in appointment and pay allows us to draw further inferences on the likely ability of unobserved characteristics to explain the gender gap. Applying Altonji et al.'s (2005) and Oster's (2015) approach to our setting, we find that gender-related selection on variables unobservable to us would need to be 26 times larger than gender selection on observables to explain the appointment gap, and 4 times larger than gender selection of observables to explain the pay gap. If we omit from our set of regressors such variables that themselves can be a function of the same forces that generate the gender gaps in appointments and pay, the selection on unobservables would need to be 20 times larger than that on observables to be able to explain the pay gap. Collectively, our evidence speaks against the idea that women and men of same ability have equal opportunities in the executive labor market.

Do our results generalize to other countries? We believe they do. Sweden is one of the most egalitarian countries in the world, with the fourth-largest female representation in the corporate boards of listed companies (Catalyst 2015b) and the fifth-largest female representation in the parliament (Inter-Parliamentary Union 2015). The 2015 Gender Gap Index compiled by the World Economic Forum ranks Sweden the fourth-most gender equal country in the world after three other Nordic countries. Therefore, we expect Swedish companies to select and remunerate their executives in at least as egalitarian way as their peers in larger countries.

Our paper contributes to the literature on the gender differences in labor market outcomes, in particular at the top level of organizations. Bertrand and Hallock (2001) analyze gender differences in compensation among top executives. Matsa and Miller (2011) document that boards with a large female representation are more likely to hire female executives. Ahern and Dittmar (2012) and Bertrand et al. (2014) study the effects of imposing a gender quota on the boards of Norwegian companies. Smith, Smith, and Warner (2013) study gender differences in CEO appointments in Denmark. Wood, Corcoran, and Courant (1993) and Bertrand, Goldin, and Katz (2011) find significant gender differences in the earnings of elite-school trained lawyers and MBAs, which widen as their careers progress. Albrecht, Björklund, and Vroman (2003) and Arulampalam, Booth, and Bryan (2007) document that the gender gap in earnings is the highest at the top of the wage distribution. Crozon and Gneezy (2009), Bertrand (2011), and Niederle (2014) review gender differences in individual characteristics. Blau and Kahn (2000) and Goldin (2014) offer reviews of the gender differences in pay.

Our paper differs from these studies in many ways. First, we are fortunate to be able to employ a far more exhaustive set of individual-level characteristics than previous studies. We complement these variables with a large set of firm-level variables. Second, the scope of our analysis is broader than usual, as we analyze both the appointments and pay of top executives. Third, and finally, we take extra precautions to avoid using gender-related outcomes as explanatory variables, as suggested by Neal and Johnson (1996). As a result, our variables explain much less of the gender differences in appointments and salaries than in the literature in general.

Our paper proceeds as follows. The next section describes the data. Section 3 motivates the variables we use in our analyses. Section 4 reports the empirical results. Section 5 concludes.

2. Data

We study individuals who worked as a CEO or another top executive in a Swedish firm between 2004 and 2010. In addition, we study the brothers of these executives to impute variables that are not observable for the executives themselves or that may be contaminated by

gender-related discrimination. Our data set combines information on individuals and firms from three sources.[3]

Statistics Sweden. The bulk of the Statistics Sweden data comes from the LISA database that covers the whole Swedish population of individuals who are at least 16 years old and resident in Sweden at the end of each year. This database integrates information from registers held by various government authorities and covers for most variables the years 1990–2011. We extract information on labor and total income, corporate ownership at the person-firm level, field and level of education, profession, career, and family relationships. The family records allow us to map each individual to their parents and siblings. Except for the CEOs, who have a specific legal function tracked accurately by other authorities, we identify the executives based on their international ISCO-88 (COM) classification of occupations (codes 122 and 123).[4] Following Bertrand and Hallock (2001) and Matsa and Miller (2011), we limit the number of executives to at most five (the CEO and the four next-best paid executives) for each firm-year pair. Moreover, we require each firm to have at least the CEO and one other executive to be included in the sample.

The Swedish Companies Registration Office. The Swedish Companies Registration Office 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") and that have appointed a CEO ("verkställande direktör"), excluding firms that operate as banks or insurance companies. These data record various financial statement items, including the total value of assets and the number of employees. By law, each firm has to supply this information to the registration office within seven months from the end of the fiscal year. Financial penalties

[3] The sensitive nature of the data necessitated an approval from the Ethical Review Board in Sweden and a data secrecy clearance from Statistics Sweden. The identifiers for individuals, firms, and other statistical units were replaced by anonymized identifiers and the key that links the anonymized identifier to the real identifiers was destroyed. The data are used through Microdata Online Access service provided by Statistics Sweden.

[4] The ISCO-88 (COM) code 122 corresponds to "production and operations department managers" and the code 123 to "other specialist managers." The occupation data available from the LISA database come mainly from the official wage statistics survey (Lönestrukturstatistiken) and from supplementary surveys of firms (primarily with 2-19 employees) that Statistics Sweden undertakes of firms 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 five years. Occupation information is available for each year, but the information may not be accurate for each year. To ensure that we have accurate occupation information for every year, we require that the information be collected in the relevant year or earlier and for the correct employer-employee link.

and the threat of forced liquidation discourage late filing. The CEO data covers years 2004–11. We have financial statement data from 1999 to 2010.

We also impose the following sample restrictions. Following Bennedsen et al. (2012), we exclude micro firms from our sample, defined here as having fewer than five employees or an asset base below SEK 5 Million (1 SEK ≈ 0.12 USD). The former restriction also helps in excluding holding companies without their own industrial operations from the sample. Moreover, we exclude family firms from our sample to rule out potential gender differences among first-generation entrepreneurs (see, e.g., Koellinger, Minniti, and Schade (2013)) and the effect of family rules favoring male descendants (Bennedsen et al. (2007)).[5]

Military Archives. The Military Archives data include information on the service record, the health status, and the cognitive, non-cognitive, and physical characteristics of all conscripts. The purpose of the data collection is to assess whether conscripts are physically and mentally fit to serve in the military and suitable for training for leadership or specialist positions. The examination spans two days and takes place at age 18. Lindqvist and Vestman (2011) offer a more comprehensive description of the testing procedure.

The data are available for Swedish males who were drafted between 1970 and 1996. Military service was mandatory in Sweden during this period, so the test pool includes virtually all Swedish men born between 1951−1978.

3. Characteristics of executives

What can potentially account for the gender differences in appointments and pay? This section motivates and describes the variables used in our tests. Individual- and firm-level variables are largely discussed separately; we make exceptions to this rule when we discuss how

[5] Companies are classified as family firms on the basis of family relations among major shareholders, called "owners" by the tax authorities, and directors. An individual's family comprises her parents, grandparents, children, grandchildren, siblings, and partner(s). A partner is the person with whom the individual has a child. For each owner and director in a firm, we calculate the number of other family members who are directors or owners in the company. A company is a family firm if at least two family members are owners or board members or at least one owner and one director comes from the same family.

preferences may be revealed by the choice of the employer. Detailed definitions of the individual- and firm-level variables can be found from Table 2 and Table 4, respectively.

3.1.Individual-level variables

We divide our individual-level variables into two broad classes: those that indicate the value of an executive's human capital, and those that indicate how executives use their human capital during their careers. When possible, we highlight potential gender differences in how these variables are expected to manifest themselves in the data.

3.1.1. Human capital

3.1.1.1.Personal traits

A large literature on the role of education and labor market outcomes uses cognitive skills as the sole proxy for ability (e.g. Herrnstein and Murray (1996) and Schmidt and Hunter (1998)). Others argue that non-cognitive skills are also important for predicting labor market outcomes (e.g. Heckman (1995) and Heckman, Stixrud and Urzua (2006)). Yet another sizeable literature documents that height is related to labor market outcomes and leadership (e.g. Steckel (1995, 2009), Persico, Postlewhite, and Silverman (2004), and Case and Paxson (2008)). In addition to these variables, we also analyze the role of physical fitness and muscular strength (e.g. Lindqvist (2012), Lundborg, Nystedt, and Rooth (2014), and Limbach and Sonnenburg (2014)), and the body mass index (Hamermesh and Biddle (1994), Harper (2000)). A good physical condition makes it easier for the corporate executives to endure the long hours they often need to put to their work. Finally, we measure whether an individual has experience as an officer during military service. Apart from favorable test scores, conscripts selected for officer training can be expected to have good leadership ability, demonstrated during the first months of military service.

All personal trait variables are measured by the Swedish military. Military service is mandatory for men but for not women, so we have very few traits observations for female executives. Nevertheless, the family links in our data make it possible to impute these variables for an executive from the test scores of her randomly selected brother. This imputation assumes that the traits have a large family component, an assumption backed up by the evidence in Beauchamp et al. (2011) in Swedish data. We also impute the traits for men even though their

traits are available. Given that executives have done well in life, their traits likely are better than those of their brothers (Adams et al., 2015 finds evidence consistent with this conjecture). Except for imputed officer rank, all trait variables are expressed as differences in terms of standard deviations relative to the test takers in the same cohort. Benchmarking each individual against the same cohort allows us to control for secular changes in measured cognitive ability and height over time (see, e.g. Flynn (1984) and Floud, Wachter, and Gregory (1990)).

3.1.1.2.Family background

Birth order is associated with life outcomes. For example, first-borns tend to have higher educational attainment and earnings, have a higher IQ, and are likely to be healthier (see, for example, Black, Grönqvist and Öckert (2015) for a review of the evidence). In addition to birth order, we include variables capturing the size of the family and the number of male siblings. Families with a large number of siblings have fewer parental resources per child, which can deprive them of some of the human capital growth enjoyed by their peers in smaller families (see e.g., Blake (1989) and Black et al. (2005)). We also add a dummy for executives born in one of the three largest cities, where the most important firms tend to be headquartered. Being born in a large city may help give a future executive's career a jump start due to the geographical advantage in hiring and networks. Finally, we add a dummy variable for whether an executive has been born outside of Sweden. This variable can potentially capture many career-relevant aspects, such as knowledge of the Swedish language, access to networks, and ethnic discrimination.

3.1.1.3.Parents' socioeconomic status

Being born to a well-educated and affluent family can help a child in at least two ways. First, parents are likely to pass their human capital on to their children. Second, wealthy parents are also in a better position to offer the monetary resources needed to develop their children's human capital. We separately include both parents' socioeconomic status by including variables measuring whether they are (or were) university educated. We also measure their employment in 1990 (i.e. at the beginning of our sample period) and their position in the income distribution among individuals belonging to the same gender and cohort.

3.1.1.4.Education

The use of the number of years of education as a predictor of wages goes back at least to Mincer (1958). We consider the following four different education categories, which vary by the length of schooling and rigor: university education, vocational education, high school, and basic education. We also include field of education. It measures differences in executives' skill sets and their propensity to specialize and remain as a specialist (as opposed to become a generalist, like the CEO) throughout their executive careers.

3.1.1.5.Labor market experience

We include the length of the potential labor market experience. We also include proxies for general and firm-specific human capital; the former can be expected to be of particular relevance for the CEO, whose job is largely that of a generalist (see, for example, Murphy and Zábojník (2004) and Custódio, Ferreira, and Matos (2013)). We measure general human capital by the number of firms and the number of industries the executive has worked in. Firm-specific human capital is measured using the tenure of the executive in the firm.

Given that non-profit organizations differ from companies, work experience from a non-profit organization may accumulate a future executive's human capital in a different way than work experience from a company. We control for this with a variable measuring the length of non-profit experience. We also control for the number of days an executive has been unemployed during his or her career. Sweden had a severe depression in the early 1990s, which left even many talented individuals, including future business executives, unemployed. Unemployed individuals may lose some of the value of their human capital due to unemployment (Pissarides (1992)), or be scarred by the unemployment experience (Arulampalam (2001)). Finally, we include a variable indicating an economic recession in the year of graduation. This variable builds on Oyer (2008), Custódio, Ferreira, and Matos (2013), and Schoar and Zuo (2015) who find that starting a career at the time of a recession has a lasting impact on career success and pay.

3.1.1.6.Networks

Networks help build careers. Hwang and Kim (2009) and Kramarz and Thesmar (2013) document that better networked CEOs have lower turnover. Engelberg, Gao, and Parsons (2013)

show that better networked CEOs are paid more. We analyze networks by using a dummy variable that measures whether an executive has gone to the same high school as the Chair, conditional of having an age difference of at most two years. In addition, we have dummies for whether the executive has studied in an educational track which has produced a particularly large number of CEOs, or in a track whose graduates tend to have a particularly high income. These variables not only serve as proxies of networks but they also reveal executives' career orientation. Moreover, we have dummies for high schools from which a particularly large fraction of graduates have become CEOs.

3.1.1.7.Past income

The labor market values employees' human capital and effort with pay. We use three labor income measures as proxies of human capital. They are measured over three subsequent five-year periods relative to the income of individuals belonging to the same gender and cohort. By ranking individuals within gender and cohort, we avoid introducing any gender-related biases into the measurement.

3.1.2. Use of human capital at work

3.1.2.1.Family constraints in using human capital

3.1.2.1.1. Family variables

Because of biological differences and social norms, women tend to allocate more time on childrearing and household work than men (see, for example, Becker (1991) and Shelton and John (1996)). Difference in the use of time on these activities, and conversely on work, can influence individuals' career prospects (Bertrand, Goldin, and Katz, 2010). We assess gender differences in childrearing and household work by adding dummies for marital status and the number of children. To consider both current and past childrearing commitments (which may have had an effect on past career progress) we separately control for the total number of children and the number of children currently at home.

3.1.2.1.2. Partner-related variables

Partner's opportunities on the labor market can be expected to affect the amount of time they allocate in childrearing and household work. We control for these opportunities by including

variables on whether the partner is university educated, employed, or a corporate executive. We also add a variable that captures the partner's position in the income distribution among individuals belonging to the same gender and cohort.

3.1.2.2.Preferences affecting the use of human capital

Bertrand (2010) highlights four classes of potentially important gender differences in preferences: risk attitudes, competitiveness, willingness to negotiate, and social preferences. These preferences may influence how effectively individuals utilize their human capital at work, either for the benefit of their company or themselves. Moreover, preferences may be relevant for the development of human capital e.g. via educational choices. We discuss the preferences and our proxies for them in this subsection.

3.1.2.2.1. Risk attitudes

Jianakoplos and Bernasek (1998) and Sunden and Surette (1998) document that women typically hold lower proportions of risky assets than men. Reviews by Eckel and Grossman (2008) and Croson and Gneezy (2009) of the experimental literature come to the same conclusion: women tend to be more risk averse than men. We control for risk tolerance by using an indicator as to whether the executive is a stock market participant. We also impute a dummy for entrepreneurship, another risky endeavor, for the executives from their brothers' choices. The imputation circumvents the near-mechanical correlation between holding a CEO position and founding a company.

3.1.2.2.2. Competitiveness

Gneezy et al. (2003) and Niederle and Westerlund (2007) document significant gender differences in competitiveness: women are less likely to choose a tournament-type compensation scheme than men. Buser, Niederle, and Oosterbeck (2014) find that competitive individuals are more likely to select the most prestigious study tracks, which tend to include more math and science classes. Kamas and Preston (2015) find that competitive individuals are more likely to specialize in engineering, natural sciences, and business as opposed to majoring in social sciences or the humanities. Reuben, Sapienza, and Zingales (2015) study MBA students and find that competitiveness predicts the industry they work in after graduation. We analyze

competitiveness by including dummy variables for the field of education and the industry the executives work at. We separately include the length of work experience in consulting and investment banking, both industries known for their frequent use of tournament-type ("up or out") promotion schemes. Such experiences may also be valuable in building networks and acquiring generalist skills.

3.1.2.2.3. Attitudes towards negotiation

Babcock and Laschever (2003) document significant gender differences in the attitudes towards negotiation: women tend to be less willing to bargain than men. Loprest (1992) finds that men's higher wage growth can be attributed largely to their higher wage growth when changing jobs. We assess the willingness to bargain by using the imputed mean pay increase at the time an individual changes his job. Given that the past pay increases are mechanically related to future pay, and therefore potentially to future gender differences in pay, we assess willingness to bargain using pay increases of the executives' brothers, not of the executives themselves.

3.1.2.2.4. Social preferences

Some of the traits for which gender differences are generally assumed are altruism and cooperation—with women supposedly being more altruistic and cooperative. Niederle (2014) reviews the experimental and field evidence on altruism and cooperation and concludes that the evidence "is more mixed than what one might have expected." Nevertheless, we assess potential gender differences in altruism with two variables: the length of work experience from a non-profit organization and whether the company the executive works for is government owned. These variables are motivated by the work by Benz (2005) and Delfgaauw and Dur (2008) who argue that working for not-for-profit firms or for the public sector is an indication of altruistic preferences.

3.2. Firm-level variables

3.2.1. Size, age, and profitability

Our regressions include a battery of variables used in prior analyses of executive pay: firm size, profitability, growth opportunities, risk, firm age, and industry (see, for example, Core, Holthausen, and Larcker (1999), Graham, Li, and Qiu (2012), and Custódio, Ferreira, and Matos

(2013)). Given that most of the sample companies are private, we estimate growth opportunities using sales growth and risk using the volatility of the return on assets. These variables are also potentially useful in the CEO appointment regressions. For example, an executive position in a large company is likely to be more coveted than an executive position in a smaller company.

3.2.2. Female friendliness

Firms that are friendly to females in general can be expected to be friendly to female executives as well. We include several variables that proxy for the female friendliness of the firm. The fraction of females of the total workforce in the company is one such measure. From the point of view of the executives and the CEO in particular, the fraction of female directors (Matsa and Miller (2011)) and the female friendliness of the Chair are expected to be especially relevant. We measure the female friendliness of the Chair by adding variables for whether the Chair is a female, has a daughter, or has a university education. We expect women to be more favorable to female CEO candidates (Matsa and Miller (2011)). We also expect Chairs to be better able to relate to gender issues if they have daughters (see Washington (2008) for related evidence on U.S. legislators) and if they are better educated.

3.2.3. Ownership and group structure

The ownership base of a company may influence the prestige, independence, and pay of its executives. An executive position in a listed firm is likely to carry more prestige than a position in an otherwise similar non-listed company. Listed firms also frequently have a more dispersed ownership base, which is likely to make the job of the CEO more independent. Likewise, CEOs of parent and stand-alone firms can be expected to have more power and be more independent than the CEOs of subsidiaries. Our regressions include controls for status as a parent, stand-alone firm, or as a subsidiary. We also control for whether a company is government owned. Like publicly listed firms, government owned firms are subject to more publicity, which can put constraints on executive pay and the firm's ability to discriminate against women.

4. Results

4.1. Gender gaps in CEO appointments, pay, and characteristics

Table 1 reports the number of person-year observations by gender and position. 27% of the sample individuals are CEOs. Of the other executives, the largest groups work in production and operations (29%), sales and marketing (20%), and finance and administration (19%). Women account for 8% of the CEOs and 21% of the other executives. After CEOs, the female fraction of executives is the smallest in computing and R&D (10%), supply and distribution (12%), sales and marketing (14%), and production and operations (14%).

Table 2 reports the means of all individual-level variables, separately for women, men, and the full sample. Of particular interest is the difference between women and men and the *t*-statistic for their difference. We report on 60 variables, which are divided into 13 different groups. 26 of the variables are continuous and 34 dummy variables. These variables will be used in future regressions as such except for the dummies on the marital status and the level and field of education, where the dummies sum up to one and one of the dummies drops out from the regressions. The variables for the first 7 groups—level of education, educational specialization, career orientation and networks, career, family background, family, and risk tolerance—are available for virtually all individuals and are reported on in Panel A, B, and C.

Panel D reports on the remaining six groups of variables. Five of them—personal traits, parents' socioeconomic status, parent related variables, risk tolerance, and bargaining—are available only for subsets of the sample and are reported as robustness checks. The last variable group, which reports on past position in the age-gender labor income distribution, is potentially affected by the forces that generate the gender gaps in CEO appointments and pay and we therefore report its results as a robustness check.

Panel A shows that 47% of female corporate executives are university educated, while the corresponding fraction for men is 38%. Engineering and business degrees are the most common educational backgrounds. Women are much more likely to have a business or economics education than men (50% vs. 29%), while men are correspondingly much more likely to have an engineering degree (44% vs. 10%). Panel B finds that men are more likely to have chosen one of the top-5 education tracks that produce the highest proportion of CEOs, and that of top earners. Male executives are on average 48 years old, 2.7 years older than female executives. They have on average 4.3 years longer labor market experience, though from fewer companies and

industries than women. The fact that the gap in work experience is larger than the age gap is consistent with the idea that men have experienced fewer career interruptions than women. Men also have on average 40 days less unemployment experience. The difference in unemployment experience may at least partly be explained by the fact that female executives are more likely to have graduated during a recession.

Panel C reports that female executives are much less likely to be married or cohabit (59%) than male executives (71%), and they have fewer children. Women are also much more likely to be divorced. 54% of the female executives own stocks either directly or indirectly, while the corresponding fraction for men is 71%. This is consistent with the idea that men have a greater risk tolerance than women.

Panel D first reports on personal traits. All trait variables except for the body mass index are positive. This means brothers of executives have a higher cognitive and non-cognitive ability, are taller, slimmer, and in better physical condition than the population. Consistent with Adams, Keloharju and Knüpfer (2015), the differences relative to the population are relatively small, at most 0.38 standard deviations. Women's brothers are smarter and slimmer than men's brothers, while men's brothers have a higher non-cognitive ability than women's brothers.

Panel D also reports on parents' and partners' socioeconomic status. Female executives appear to come from higher socioeconomic strata than male executives: Female executives' parents are on average better educated, and their mothers have higher earnings. Female executives' spouses are much more likely to be executives themselves than male executives' spouses (32% vs. 12%). Partly as a result of this, their partners earn more than other individuals of the same gender in the same cohort.

Panel D also reports on gender differences in bargaining. The imputed mean pay increase at the time of job change, calculated when an individual changes employer, is 18.8% for women and 16.5% for men. This result, which rests on the assumption that bargaining has a large family component, goes against the idea that women would be worse bargainers than men. Given that the mean pay increase has a mechanical link with pay, and is therefore a likely gender-related outcome, we impute this variable using data on the executive's randomly selected brother.

Finally, Panel D studies how executives' pay has changed over time relative to the other individuals in their gender and cohort. Female executives start at somewhat lower age-gender

ranks than men (top 27% vs. top 25%), but just before our sample period, the female disadvantage turns into an advantage (top 11% vs. top 13%).

Table 3 reports descriptive statistics on labor income by gender and type of position. The mean pay of male CEOs is SEK 1.1 million, while that for female CEOs it is SEK 1.0 million. The mean logged pay gap is 7%. Other executives earn about 60% as much as the CEO. The mean pay of the other executives who are male is SEK 0.69 million, while for females it is SEK 0.55 million. Their mean logged pay gap is 22%. The pay gap is largest in finance and administration, where it is 36%. The pay gap among all executives, 27%, is larger than that among CEOs or other executives alone. This is because CEOs are much better paid than other executives and because there is such a large gender gap in appointments to the CEO position.

Table 4 reports descriptive statistics on the sample companies. Panel A reports on continuous variables. The mean (median) total assets are SEK 970 million (SEK 53 million). Although not reported formally, the mean (median) number of employees is 166 (45). The mean fraction of women among employees is 32% and among directors 10%. The former fraction is relatively low, because women tend to work for larger firms and because most sample companies are relatively small.

Table 4 Panel B reports on fractions. 7% of the firms have a female Chair, and 61% of the Chairs have a daughter. 60% of the firms are either stand-alone firms or parents (and not subsidiaries of other parents). 30% of the companies are subsidiaries of a domestic parent and 10% of a foreign parent. 8% of the firms are government owned and 3% are listed.

Table 5 reports on the fraction of women and the gender gap in pay by firm size. Women account for the largest fraction of the executives in the smallest quantile of companies. There they account for 11% of the CEOs and 30% of the other executives, while their corresponding fractions in the largest quintile of companies are 8% and 16%, respectively. The gender gap in CEO pay is also the largest in the largest companies, while the gender gap in other executives' pay is at its largest for the smallest companies.

Taken together, these results show that female executives are less likely to be appointed as CEOs than men and they also are paid less. Many of the characteristics significantly vary between male and female executives. For example, female executives tend to have higher levels of education and in fields that are more relevant to the executive's job, while men tend to have more labor market experience and fewer career interruptions.

4.2. *How do gender differences in characteristics contribute to gender gaps in CEO appointments and pay?*

Table 6 evaluates how much of the gender gap in CEO appointments and pay can be attributed to gender differences in the executives' characteristics. The three leftmost columns of Table 6 report results from linear probability model regressions of the CEO dummy on female dummy and controls. The first row represents a regression that includes female dummy as the sole regressor. The second row reports regressions that also control for individual characteristics listed in Table 2 Panel A, B, and C, and dummies for the number of executives in the firm. The third row additionally controls for the firm-level characteristics listed in Table 4.

The regression including just the female dummy has a coefficient of −0.178 and a *t*-value of −41. In other words, the gender gap in appointments is 17.8% when no controls are included. The R^2 of this regression is 0.023. The female coefficient changes to −0.161 and the R^2 increases to 0.136 when we control for the individual characteristics. Controlling also for firm-level variables on the third row changes the gap coefficient to −0.176, i.e. almost to the same as without controls. The R^2 of this regression is 0.145.

The three rightmost columns report results from OLS regressions of logged labor income on female dummy and controls. The first row suggests that the female dummy coefficient is −0.270 with a *t*-value of −36. The R^2 of this regression is 0.031. Controlling for individual characteristics on the second row narrows the pay gap to −0.243 and increases the R^2 to 0.305. Controlling for firm characteristics on the third row shrinks the gap to −0.234 and increases the R^2 further to 0.452. Finally, the fourth row adds information on the executive's position as a CEO or other executive function as listed in Table 1. These variables are potentially affected by the same mechanisms that drive the gender gaps in CEO appointments and pay, so these regression results must be interpreted by caution. The pay gap narrows to −0.145 and the R^2 increases to 0.561.

Apart from the female dummy, the regression coefficients on the predictors of CEO appointments and executive pay are of interest. Table 6 Panel B (Panel C) reports on the appointment (pay) coefficients for the specification that includes controls for individual (individual and firm) characteristics. We confine our reporting of the appointment regression results to the individual level characteristics, because firm level variables have less obvious of a role in this specification.

The appointment and pay specifications largely agree on how the predictors are associated with executives' job market success. Executives with a university degree tend to be better paid, but those with a degree in teaching or services tend to be less well paid than the executives on average. More career oriented executives reach better job market outcomes, as is witnessed by the large positive coefficients for educational paths that are associated with high incomes. A longer labor market experience and experience from more companies are strongly positively related to labor market success, while longer unemployment spells and experience from more industries are negatively related to job market success. Conditional on becoming executives, immigrants do better than native Swedes on average. Married and divorced executives (as opposed to singles) do better, as do executives with more children. Finally, stock market participation is strongly positively associated with executives' job market success.

Firm-level variables have largely the expected relations with pay. Executives who work in large, publicly traded firms and in firms with foreign parents, are better paid. Executives who work in government-owned companies are less well paid.

Table 7 reports results from Oaxaca-Blinder (1973, 1973) decompositions of the gender gap in CEO appointments and in executive pay. The decomposition regressions offer identical estimates of unexplained and explained gaps as do the regression coefficients reported in Table 6, but they have the added benefit of offering information on the contribution of each variable subset to the gap.

Panel A Specification 1 reports results for variable categories that are available for the full sample analyzed in Table 7. 30.1% of the male executives are CEOs, while the corresponding fraction for females is 12.2%. Only 0.017 of the 0.178 appointment gap can be explained by the observable variables. The career variables explain 0.021 of the appointment gap, followed by risk tolerance (0.012), career orientation and networks (0.008), and family (0.007). On the other hand, educational specialization (−0.014) and the level of education (−0.008) contribute negatively to the gap, highlighting the fact that female executives tend to have an educational background that is more conducive to attaining a CEO position than that of males. Specification 2 adds firm characteristics to the regression. This widens the unexplained gap to 0.176, i.e. by 0.015 from the one with individual characteristics alone. Firm characteristics thus contribute negatively to explaining the appointment gap.

Specification 3 decomposes the logged labor income of the executives. The total gap is 0.270. The individual level variables narrow the gap to 0.243, i.e. by 0.027 from the one without any controls. As in the case of appointment gap, including the level and field of education variables to the regression tends to widen the gap and including career and risk tolerance variables tends to narrow the gap. Adding firm characteristics in Specification 4 narrows the gap further to 0.234. This happens largely because the coefficients for the education variables decrease from the previous specification, suggesting that these variables are correlated with firm characteristics. In Specification 5, the variable set that most contributes to the decrease in the gap (by 0.090) is the added set of CEO position and firm functions. This variable set includes potential outcomes—the gender of the appointed CEO may be a function of the forces that drive the gender gap in pay—so one must interpret this result with caution.

Table 7 Panels B and C analyze the robustness of our results by including additional characteristics to the CEO appointment gap (Panel B) and pay gap decomposition regressions (Panel C). We study five different specifications, of which the four first use clearly smaller subsamples than our main analysis. The last specification adds variables on the executives' past income. These data are available for virtually all sample individuals, but we have relegated the analysis to a robustness check because past income likely is a gender-related outcome.

The results for both Panel B and C suggest that four of the five additional variable sets contribute negatively to the gaps. The only variable set that attains a positive coefficient, personal traits, is not statistically significantly positive at the 5% level. These results speak against the idea that that the additional variables would be able to account for the gaps.

Table 7 Panels A–C report decomposition results that estimate appointment and pay regression parameters from the entire executive sample. Panel D reports the decomposition results assuming that either men or women serve as the reference group in this estimation. The results are qualitatively similar to the ones reported in Panel A. For example, using women as the reference group in a regression with individual characteristics increases the fraction explained by 0.003 in the appointment regression, while it decreases the fraction explained by −0.002 in the pay regression.

All in all, our results suggest that it is difficult to attribute the gender gaps in appointments and pay to gender differences in individual and firm characteristics. In our key specifications, no

more than 0.017, i.e. 10% of the 0.178 CEO appointment gap, and 13% of the pay gap, can be accounted for by observables.

4.3. What do the observable characteristics tell us about the role of unobservables?

The large set of observables we employ and their inability to explain the gender gaps makes it unlikely that unobservable differences in the characteristics relevant for the executive labor market would be able to account for the gap. We formalize this point by quantifying how important unobservables would have to be to account for the remaining gap. Altonji et al. (2005) and Oster (2015) develop a way to assess the role of unobservables based on how observables influence the outcomes. Oster (2015) uses a bounding approach to calculate an estimate that is based on observing how the coefficient estimate and R^2 change when observables are added to the model. The lower bound β^* is given by:

$$\beta^* = \tilde{\beta} - \tilde{\delta}\frac{(\beta_0 - \tilde{\beta})(R_{max} - \tilde{R})}{\tilde{R} - R_0},$$

where β_0 is the estimate from the baseline model, $\tilde{\beta}$ is the estimate from the model with the full set of observed controls, R_0 is the explanatory power from the baseline model, $\tilde{R}$ is the explanatory power from the model with the full set of observed controls, $\tilde{\delta}$ is the relative importance of observed versus unobserved variables in generating selection bias, and R_{max} is the maximum explanatory power of a hypothetical regression that controls for all relevant observed and unobserved factors. It equals the minimum of one and the R^2 from the regression controlling for all observable factors multiplied by a factor of 1.3.

We now apply the above formula to the gender gap in CEO appointments and executive pay. Consider first the CEO appointment regression analyzed in the three first columns of Table 6. If we assume that observed and unobserved variables generate equally much selection bias, i.e. $\tilde{\delta}$=1, and that the full model includes all the individual characteristics analyzed in Table 2 Panel A, B, and C, then the formula gives the female dummy a bound of −0.155. Setting the bound to zero and solving for $\tilde{\delta}$, we find that the selection bias for the unobserved variables would need to be 26 times greater than that for the observables for the true gender gap to be zero. Such a disparity in selection appears unreasonable. The third row in Table 6 shows that controlling also

for firm characteristics changes the gender gap estimate from −0.178 to −0.176. Because these numbers are so close to each other, the selection bias for the unobserved variables would need to be 248 times greater than that for the observables for the true gender effect to be zero.

We next consider the executive pay regression analyzed in the three rightmost columns of Table 6. Adding individual characteristics to the model on the second row narrows the gap from −0.270 to −0.243. Applying Oster's approach to this model gives the female dummy a bound of −0.234. Adding firm characteristics on the third row narrows the gap to −0.234 and decreases the bound to −0.223. Here, the selection bias for the unobserved variables would need to be 20 times greater than that for the observables for the true gender gap to be zero, which appears implausible. Finally, adding endogenous CEO and executive position variables on the fourth row to the regression equation would give the female dummy a bound of −0.106, and the selection bias for the unobserved variables would need to be 3.7 times greater than that for the observables for the true gender effect to be zero. Collectively, these results speak against the idea that selection due to unobservable variables is responsible for the observed gender gap in CEO appointments and executive pay.

Finally, we study whether the gender gaps in CEO appointments and executive pay have changed over time. Catalyst (2014) reports that the fraction of female CEOs among Fortune 500 companies increased from zero in 1995 to 4.8% in 2014. Table 8 reports on the female dummy coefficients in each year using a specification that includes the female dummy and individual-level controls (CEO appointment regression) and the female dummy and individual- and firm-level controls (pay regression), as reported on in Table 6 Panel B and C, respectively. Both gaps remain large throughout the sample period. The female dummy coefficient in the CEO appointment regression varies between −0.157 and −0.164, while the corresponding coefficient in the pay regression varies between −0.223 and −0.255. There are no clear trends in either gap. In the CEO appointment regression, the female coefficient remains about the same in all years. In the pay regression, the gap first widens from −0.236 in 2004 to −0.255 in 2006, and then gradually narrows to −0.224 in the last sample year.

5. Conclusion

This study uses a comprehensive sample of Swedish corporate executives to study the gender gap in pay and in the likelihood of being appointed as the CEO of a company. We find large gender gaps in both appointments and pay. Decompositions that use exceptionally rich data on the executives' characteristics suggest that at most one-eight of the appointment and pay gaps can be attributed to observable gender differences. Further tests suggest that unobservables would have to play an order of magnitude larger role than all the observable characteristics to be able to explain the gender gaps. The small explanatory role of a large set of observables and an unlikely large role for further unobservables is consistent with the idea that male and female executives that share equal attributes neither have equal opportunities to reach the top, nor are they equally paid.

To lessen the role of unobservables, our analysis focuses on individuals who have already made it to the executive level. This means that our results say little about the gender differences in the characteristics that make people seek an executive position, or whether female executives differ more from the average woman than male executives differ from the average man. Instead, what our results show is that the differences between men and women are small once they reach the executive suite and that these differences cannot account for the large gender gaps in CEO appointments and pay.

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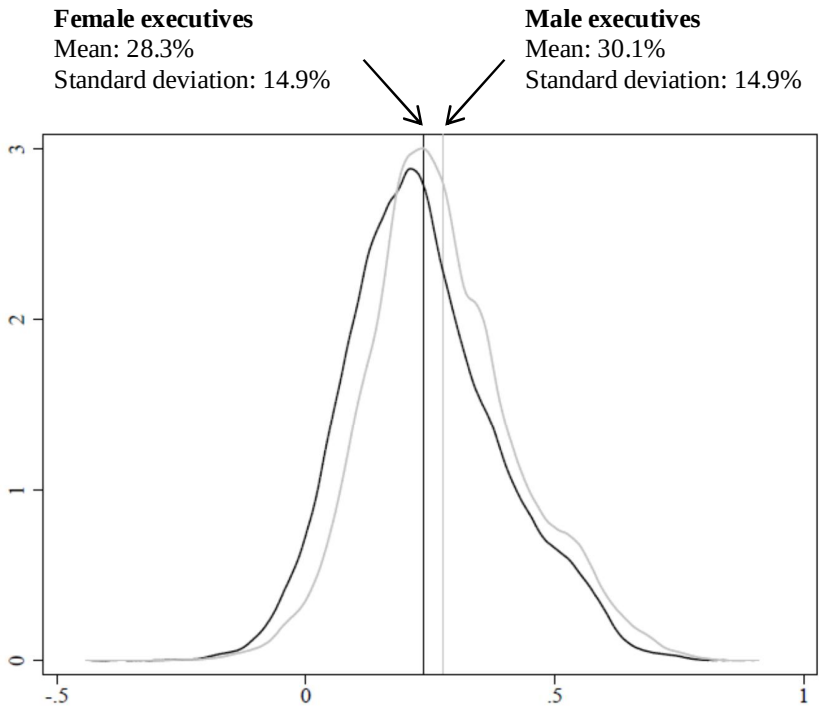

Figure 1. Female and male executives' predicted likelihood to attain a CEO position
This figure plots the distributions of female and male executives' characteristics that are relevant for attaining a CEO position. The combination of characteristics relevant for a CEO position comes from a linear probability regression that explains a dummy for a CEO position with a large set of individual characteristics. This regression is reported in the three leftmost columns of Table 6 Panel A, second line, and further in Table 6 Panel B. Based on the regression, each executive obtains a predicted likelihood of attaining a CEO position. The kernel densities of the predicted likelihood are then plotted separately for female and male executives.

Table 1

Number of executives by gender and position

The sample consists of the executives of all Swedish non-family companies with at least 5 employees and SEK 5 million of total assets (1 SEK ≈ 0.12 USD). The other executive sample includes all executives other than the CEO designated by Statistics Sweden as holding an executive position. When there are more than four such individuals, we select the four individuals with the highest labor income in the previous year. The data is from 2004 to 2010 and the unit of observation is person-year.

	Number of individuals			Fraction women
	All	Women	Men	
CEOs	39,026	3,078	35,948	7.9%
Other executives	105,683	22,077	83,606	20.9%
of which in:				
Production and operations	30,626	4,206	26,420	13.7%
Finance and administration	20,905	8,699	12,206	41.6%
Personnel and industrial relations	4,043	2,044	1,999	50.6%
Sales and marketing	21,339	2,889	18,450	13.5%
Advertising and public relations	1,034	460	574	44.5%
Supply and distribution	6,081	744	5,337	12.2%
Computing and R&D	7,011	696	6,315	9.9%
Other	12,228	1,960	10,268	16.0%
All executives	144,709	25,155	119,554	17.4%

Table 2

Descriptive statistics on individual characteristics

This table reports descriptive statistics on the sample executives' and their families' characteristics. Panel A reports on the level of education and educational specialization. Panel B reports on career orientation and networks and career. *Top income education track* takes the value of one if the combination of the level of education and educational specialization is among the top-5 specializations in 2004–2011 in median total income. *Top CEO education track* takes the value of one if the combination of the level of education and educational specialization is among the top-5 specializations in 2004–2011 in the number of CEOs. *Top CEO high school* takes the value of one if the high school is in the top-5 high schools in 2004–2011 in terms of the share of graduates that become CEOs and if it has more than 700 observations (about 100 graduates). *Same high school as Chair* takes the value of one if the executive has gone to the same high school as the Chair and their age difference is at most two years. All the career variables except for unemployment have been estimated using data from 1990 until the year of observation; the unemployment data is available from 1992 on. Unemployment is measured using information on the days the individual has raised unemployment benefits. *Consulting or IB experience* measures work experience from the following industries: Business and management consultancy activities (SNI2002, SNI1992=74140), Business and other management consultancy (SNI2007=70220), Security broking and fund management (SNI2002, SNI1992=67120), or Investment fund management activities (SNI2007=66301). *Graduated in recession* takes the value of one if the executive graduated in a year when Sweden experienced negative GDP growth (1977, 1991, 1992, or 1993). Panel C reports on family background, family, and risk tolerance. Family background tells about the conditions in the family the executive was born. *Birth order* and *Number of siblings* have been estimated using data on all individuals of at least 16 years of age since 1990. *Born in top-3 city* takes the value of one if the individual has been born in Stockholm, Göteborg, or Malmö. Immigrant takes the value of one if the individual has been born outside of Sweden. The family variables refer to the family the executive has established him- or herself. *Stock market participant* dummy is estimated using data both on direct stock holdings and indirect holdings via mutual funds. Panel D reports on personal traits, functional experience at the executive level, parents' socioeconomic status, partner related variables, bargaining, and past income. Personal traits come from the tests conducted on male conscripts at age 18. These data cover individuals born between 1951 and 1978. The traits are imputed by using data on executives' randomly selected brothers' test scores. Except for *Imputed officer rank*, a dummy for the (reserve) officer rank, a summary measure of aptitude and performance in the military, the variables are expressed as differences in standard deviations from the cohort mean. *Imputed cognitive ability* is estimated using data on brother's performance in four different subtests. These tests have been designed to measure inductive reasoning, verbal comprehension, spatial ability, and technical comprehension. We use the summary result of these tests, which is measured on a stanine scale. *Imputed non-cognitive ability* is assessed using psychological test results and one-on-one semi-structured interviews. This test evaluates each conscript's social maturity, intensity, psychological energy, and emotional stability. We use the summary result of these tests, which is measured on a stanine scale. *Imputed physical fitness* is measured in a cycle ergometry test. *Imputed muscular strength* is measured in a combination of knee extension, elbow flexion, and hand grip tests. *Imputed body mass index* is the ratio of brother's weight and height squared. Parents' socioeconomic status, if available, is measured using data from year 1990. Parent's rank in age-gender labor income distribution refers to their income rank among all individuals of the same gender in a given cohort. Partner-related variables are available only when an individual has a partner who is in the data. *Imputed entrepreneurship* is a dummy variable that takes the value of one if the executive's randomly selected brother has drawn entrepreneurial income in the 1990–2010 period. *Imputed mean salary increase at job change* is the mean wage increase when an individual switches the establishment and firm affiliation. It is estimated using data on a randomly selected brother. *Labor income in age-gender distribution 1990–94* refers to own average past rank in age-gender labor income distribution in years 1990–1994. Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits 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. The unit of observation is person-year.

Panel A: Level of education and educational specialization						
	All	Women	Men	Diff.	*t*-value	*N*
Level of education						
Basic	0.060	0.035	0.065	-0.031	(-11.77)	144,709
High school	0.323	0.293	0.330	-0.036	(-6.00)	144,709
Vocational	0.222	0.199	0.226	-0.028	(-5.26)	144,709
University	0.395	0.473	0.379	0.095	(14.08)	144,709
Educational specialization						
No specialization	0.118	0.114	0.119	-0.005	(-1.12)	144,709
Law	0.013	0.021	0.012	0.009	(5.06)	144,709
Business and economics	0.326	0.501	0.289	0.213	(31.84)	144,709
Health and medicine	0.018	0.050	0.011	0.039	(13.31)	144,709
Natural science	0.027	0.028	0.026	0.002	(0.93)	144,709
Teaching	0.016	0.035	0.012	0.024	(9.25)	144,709
Engineering	0.381	0.099	0.440	-0.340	(-69.98)	144,709
Social sciences	0.036	0.056	0.032	0.024	(8.71)	144,709
Services	0.010	0.022	0.008	0.014	(7.48)	144,709
Other specialization	0.056	0.073	0.052	0.021	(6.30)	144,709

Panel B: Career orientation, networks, and career						
	All	Women	Men	Diff.	*t*-value	*N*
Career orientation and networks						
Top income education track	0.123	0.060	0.136	-0.076	(-21.25)	144,709
Top CEO education track	0.039	0.011	0.045	-0.035	(-19.31)	144,709
Top CEO high school	0.003	0.003	0.003	-0.001	(-1.07)	144,709
Same high school as Chair	0.057	0.039	0.061	-0.022	(-8.54)	144,709
Career						
Age (years)	47.594	45.372	48.061	-2.689	(-23.79)	144,709
# years of labor market experience	24.603	21.024	25.356	-4.332	(-32.27)	144,709
# years in firm	6.604	5.731	6.788	-1.056	(-15.66)	144,709
# industries worked in	2.129	2.433	2.065	0.368	(24.67)	144,709
# firms worked at	3.667	4.050	3.587	0.463	(18.03)	144,709
# years of consulting or IB experience	0.418	0.584	0.383	0.201	(8.14)	144,709
# years of non-profit experience	0.083	0.168	0.065	0.103	(8.75)	144,709
# days unemployed	72.069	105.279	65.082	40.197	(15.33)	144,709
Graduated in recession	0.088	0.107	0.084	0.023	(6.18)	144,709

Panel C: Family background, family, and risk tolerance						
	All	Women	Men	Diff.	*t*-value	*N*
Family background						
Birth order	1.582	1.542	1.590	-0.048	(-3.88)	144,709
Family size	2.335	2.266	2.349	-0.083	(-5.33)	144,709
# male siblings	0.525	0.520	0.527	-0.006	(-1.01)	144,709
Born in top-3 city	0.478	0.491	0.476	0.015	(2.26)	144,709
Immigrant	0.132	0.132	0.131	0.001	(0.13)	144,709
Family						
Married or cohabitor	0.692	0.588	0.713	-0.126	(-21.08)	144,709
Divorced	0.105	0.149	0.095	0.054	(12.63)	144,709
Single	0.204	0.263	0.191	0.072	(13.34)	144,709
# children	1.374	1.101	1.432	-0.331	(-22.45)	144,709
# children at home	1.089	1.020	1.104	-0.084	(-6.58)	144,709
Risk tolerance						
Stock market participant	0.680	0.541	0.709	-0.168	(-26.63)	144,709

Panel D: Additional characteristics						
	All	Women	Men	Diff.	*t*-value	*N*
Personal traits						
Imputed cognitive ability	0.350	0.404	0.338	0.066	(3.49)	54,305
Imputed non-cognitive ability	0.380	0.339	0.389	-0.050	(-2.54)	54,305
Imputed height	0.152	0.184	0.145	0.040	(1.96)	54,305
Imputed physical fitness	0.232	0.204	0.238	-0.034	(-1.64)	54,270
Imputed muscular strength	0.042	0.048	0.041	0.006	(0.31)	54,281
Imputed body mass index	-0.073	-0.110	-0.065	-0.045	(-2.40)	54,298
Imputed officer rank	0.181	0.184	0.180	0.003	(0.43)	53,135
Parents' socioeconomic status						
Mother is university educated	0.262	0.274	0.259	0.016	(2.16)	70,744
Mother is employed in 1990	0.911	0.918	0.909	0.009	(1.87)	70,838
Mother in age-gender inc. distr. in 1990	0.573	0.591	0.568	0.022	(4.76)	70,838
Father is university educated	0.209	0.226	0.204	0.021	(2.67)	52,817
Father is employed in 1990	0.940	0.938	0.940	-0.003	(-0.57)	52,966
Father in age-gender inc. distr. in 1990	0.640	0.640	0.640	0.000	(0.06)	52,966
Partner related variables						
Partner is university educated	0.450	0.396	0.460	-0.064	(-7.74)	97,964
Partner is employed	0.880	0.915	0.874	0.042	(10.01)	98,113
Partner is CEO or other executive	0.150	0.318	0.121	0.197	(30.18)	98,113
Partner in age-gender income distr.	0.597	0.702	0.579	0.123	(27.76)	98,113
Risk tolerance						
Imputed entrepreneurship	0.277	0.285	0.275	0.010	(1.28)	75,875

Panel D continued						
	All	Women	Men	Diff.	*t*-value	*N*
Bargaining						
Imputed mean salary incr. at job change	0.169	0.188	0.165	0.023	(3.08)	56,806
Income						
Labor income in age-gender distr.:						
1990-94	0.745	0.729	0.748	-0.019	(-5.24)	141,259
1995-99	0.822	0.824	0.822	0.002	(0.58)	142,968
2000-03	0.875	0.885	0.872	0.013	(5.94)	143,692

Table 3

Descriptive statistics on labor income by gender and position

Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits 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. Observations with zero labor income are excluded from the sample. The income is deflated to 2005 value and is expressed in million SEK (1 SEK ≈ 0.12 USD). The unit of observation is person-year.

	Mean		Median		Std. dev.		Mean log gender gap	*t*-value
	Women	Men	Women	Men	Women	Men		
CEOs	0.998	1.123	0.810	0.854	0.721	1.122	-0.071	(-3.56)
Other executives	0.554	0.685	0.481	0.575	0.341	0.484	-0.216	(-29.59)
of which in:								
Production and operations	0.518	0.624	0.436	0.518	0.343	0.454	-0.214	(-12.98)
Finance and administration	0.512	0.750	0.459	0.622	0.289	0.499	-0.364	(-29.04)
Personnel and industr. rel.	0.639	0.757	0.552	0.603	0.392	0.702	-0.137	(-4.55)
Sales and marketing	0.610	0.716	0.537	0.619	0.343	0.406	-0.183	(-10.81)
Advertising and public rel.	0.633	0.799	0.545	0.643	0.407	0.537	-0.208	(-3.78)
Supply and distribution	0.480	0.535	0.422	0.455	0.284	0.382	-0.123	(-3.62)
Computing and R&D	0.677	0.705	0.608	0.611	0.355	0.457	-0.041	(-1.26)
Other	0.618	0.762	0.527	0.608	0.424	0.635	-0.193	(-8.60)
All executives	0.608	0.817	0.503	0.637	0.432	0.763	-0.270	(-35.65)

Table 4

Descriptive statistics on the sample firms

Panel A reports descriptive statistics on firm size, age, profitability, and the female friendliness of the firm. *Age* is computed by taking the difference between the current year of operation and the maximum of 1990 and the birth year of the firm. *Return on assets* is the ratio of earnings before interest and taxes to total assets for the prior year. *Sales growth* is calculated relative to the past fiscal year and winsorized at the 10th and 90th *percentile. Fraction of females* and *Fraction of female directors* reflect the gender distribution of Swedish nationals, for whom gender is reported in the data. Panel B reports the fraction each kind of company occupies of the sample. The industries in our data are based on the international NACE Rev.1.1 classification. *Parent firm* takes the value on one if the company is a parent and not a subsidiary. *Government owned* takes the value of one if Statistics Sweden classifies a company government owned. The data is from 2004 to 2010 and the unit of observation is firm-year.

Panel A: Continuous variables (N = 39,026)

	Mean	Sd	10%	25%	Median	75%	90%
Size, age, and profitability							
Total assets (mil. SEK)	970	11,116	10	20	53	177	766
Age (from 1990)	12.8	5.3	5.0	9.0	14.0	17.0	19.0
Return on assets	0.097	0.262	-0.061	0.024	0.098	0.187	0.294
5-year sd of return on assets	0.106	0.455	0.019	0.036	0.067	0.116	0.195
Sales growth	0.070	0.246	-0.191	-0.053	0.043	0.167	0.399
Female friendliness							
Fraction of females in firm	0.323	0.213	0.077	0.152	0.278	0.467	0.639
Fraction of female directors	0.103	0.209	0.000	0.000	0.000	0.143	0.333

Panel B: Dummy variables (N = 39,026)

Variable	Fraction	Variable	Fraction
Industry		**Female friendliness**	
Agriculture and fishing	0.004	Chair is female	0.073
Mining, manufacturing, and utilities	0.304	Chair has daughter	0.606
Construction	0.049	Chair has university education	0.512
Wholesale, retail, and repair	0.235		
Hotels and restaurants	0.023	**Group structure**	
Transport, telecomm., and storage	0.058	Stand-alone firm	0.112
Business activities and fin. intermed.	0.259	Parent firm	0.484
Education	0.015	Firm has domestic parent	0.301
Public admin., health, and social serv.	0.018	Firm has foreign parent	0.103
Community, social and personal act.	0.034		
		Ownership structure	
		Government owned	0.081
		Listed firm	0.026

Table 5

Fraction of women and pay gap by firm size and position

This table divides firms into five quintiles based on their total assets. For each quintile, the table reports the fraction of women and the mean log gender gap in labor income, separately for CEOs and other executives. The unit of observation is person-year.

	Fraction of women as:		Mean log gender gap	
	CEOs	Other executives	CEOs	Other executives
Smallest	11.0%	29.8%	2.0%	-17.8%
2	7.9%	26.6%	6.0%	-16.4%
3	7.0%	21.2%	0.3%	-12.3%
4	6.2%	17.6%	-4.3%	-12.5%
Largest	7.5%	15.9%	-12.1%	-12.6%
Largest - Smallest	-3.5%	-13.8%	-14.1%	5.2%
t-value (Largest - Smallest)	(-4.11)	(-15.99)	(-2.99)	(2.70)

Table 6

Gender gap in CEO appointments and pay

The three leftmost columns of Panel A report results from linear probability model regressions of CEO dummy on female dummy and controls. The remaining columns report results from OLS regressions of logged labor income on female dummy and controls. The first row represents a regression that includes the female dummy as the sole regressor. The next two rows report regressions that additionally control for the set of variables listed on each row. Panel B reports results for individual characteristics for the CEO dummy specification reported on the second row in Panel A. Panel C reports results for individual and firm characteristics for the logged labor income specification reported on the third row in Panel A. Individual characteristics refer to variables listed in Table 2 Panel A, B, and C, and unreported dummies for the number of executives in the firm. Firm characteristics are listed in Table 4. CEO position is indicated by a dummy for CEOs and the dummies for executive functions correspond to the categories listed in Table 1. Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits 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. Observations with zero labor income are excluded from the sample. Labor income is deflated to the 2005 value and is expressed in million SEK (1 SEK ≈ 0.12 USD). Standard errors are clustered at the firm level. The unit of observation is person-year.

Panel A: Gender gaps in CEO appointments and pay						
Dependent variable	CEO appointment dummy			Logged labor income		
Independent variables	Coeff.	*t*	R^2	Coeff.	*t*	R^2
Female dummy	-0.178	(-40.82)	0.023	-0.270	(-35.65)	0.031
+ Individual characteristics	-0.161	(-32.79)	0.136	-0.243	(-37.24)	0.305
+ Firm characteristics	-0.176	(-35.05)	0.145	-0.234	(-40.95)	0.452
+ CEO position and executive functions				-0.145	(-27.77)	0.561

Panel B: Coefficients in regressions of CEO appointments					
Independent variable	Coeff.	*t*	Independent variable	Coeff.	*t*
Female	-0.161	(-32.79)	**Career**		
Level of education			# years of labor market experience	0.004	(14.07)
High school	0.081	(7.00)	# years in firm	-0.001	(-2.19)
Vocational	0.150	(11.21)	# industries worked in	-0.013	(-6.37)
University	0.163	(12.13)	# firms worked at	0.013	(9.53)
Educational specialization			# years of consult. or IB experience	0.002	(2.50)
Law	0.042	(2.07)	# years of non-profit experience	-0.001	(-0.50)
Business and economics	-0.031	(-3.24)	# days unemployed	-0.0002	(-19.10)
Health and medicine	-0.040	(-2.51)	Graduated in recession	-0.012	(-1.75)
Natural science	-0.081	(-5.41)	**Family background**		
Teaching	-0.031	(-1.70)	Birth order	-0.005	(-1.81)
Engineering	-0.069	(-7.33)	Family size	0.001	(0.46)
Social sciences	-0.020	(-1.32)	# male siblings	-0.0004	(-0.09)
Services	-0.008	(-0.42)	Born in top-3 city	0.006	(1.52)
Other specialization	-0.030	(-2.43)	Immigrant	0.080	(12.29)
Career orientation and networks			**Family**		
Top income education track	0.106	(12.14)	Married	0.052	(10.05)
Top CEO education track	0.002	(0.15)	Divorced	0.058	(7.52)
Top CEO high school	0.099	(2.53)	# children	0.006	(2.81)
Same high school as Chair	-0.009	(-1.11)	# children at home	0.015	(7.29)
			Risk tolerance		
			Stock market participant	0.074	(17.16)
Number of observations = 144,709					
Adjusted R^2 = 0.136					

Panel C: Coefficients in regressions of pay					
Independent variable	Coeff.	*t*	Independent variable	Coeff.	*t*
Female	-0.234	(-40.95)	**Family background**		
Level of education			Birth order	0.0001	(0.03)
High school	0.155	(12.89)	Family size	-0.004	(-1.67)
Vocational	0.287	(20.61)	# male siblings	0.003	(0.56)
University	0.351	(24.64)	Born in top-3 city	0.034	(7.91)
Educational specialization			Immigrant	0.150	(20.76)
Law	0.004	(0.19)	**Family**		
Business and economics	-0.031	(-3.28)	Married or cohabitor	0.064	(13.05)
Health and medicine	0.023	(1.12)	Divorced	0.075	(10.00)
Natural science	-0.062	(-4.18)	# children	0.012	(5.71)
Teaching	-0.133	(-6.83)	# children at home	0.014	(7.11)
Engineering	-0.090	(-9.35)	**Risk tolerance**		
Social sciences	-0.055	(-3.58)	Stock market participant	0.095	(22.27)
Services	-0.091	(-4.38)	**Firm's size, age, and profitability**		
Other specialization	-0.100	(-8.21)	Logged total assets	0.133	(46.00)
Career orientation and networks			Age	0.001	(2.53)
Top income education track	0.140	(15.96)	Return on assets	0.033	(3.02)
Top CEO education track	-0.022	(-2.09)	5-year sd of return on assets	0.012	(0.98)
Top CEO high school	0.130	(3.38)	Sales growth	-0.004	(-0.57)
Same high school as Chair	-0.028	(-3.11)	**Firm's female friendliness**		
Career			Fraction of females in firm	0.151	(10.07)
# years of labor market experience	0.005	(17.54)	Fraction of female directors	0.065	(5.59)
# years in firm	0.0001	(0.20)	Chair is female	-0.017	(-2.12)
# industries worked in	-0.016	(-6.28)	Chair has daughter	-0.007	(-1.81)
# firms worked at	0.029	(18.35)	Chair has university education	0.023	(5.47)
# years of consult. or IB experience	0.018	(8.77)	**Firm's group structure**		
# years of non-profit experience	-0.002	(-0.81)	Parent firm	0.026	(2.25)
# days unemployed	-0.0003	(-25.09)	Firm has domestic parent	0.051	(5.97)
Graduated in recession	-0.008	(-1.20)	Firm has foreign parent	0.151	(15.75)
			Firm's ownership structure		
Number of observations = 144,709			Government owned	-0.212	(-16.70)
Adjusted R^2 = 0.452			Listed firm	0.181	(7.92)

Table 7

Decompositions of gender gap in CEO appointments and executive pay

This table reports results from Oaxaca-Blinder decompositions of the gender gap is CEO appointments and executive pay. Panel A reports results for variable categories that are available for the full sample. Specification 1 decomposes the CEO appointment dummy using the individual characteristics listed in Table 2 Panel A, B, and C. Specification 2 adds firm characteristics listed in Table 4. Specification 3 decomposes the logged labor income of the executive using individual characteristics. Specification 4 adds firm characteristics. Specification 5 further adds CEO position and executive position characteristics. Panel B decomposes the CEO appointment dummy in five subsamples whose characteristics are listed in Table 2 Panel D. The last line shows the explanatory power of the additional characteristics. Panel C decomposes logged labor income in these same five subsamples. Panel D performs the decompositions in Panel A using either males or females as the reference group (other panels pool males and females together). The CEO appointment dummy is decomposed using a linear probability model. Standard errors are clustered at the firm level. The unit of observation is person-year.

Panel A: Full sample										
Dependent variable	CEO dummy				Logged labor income					
Controls	Individual characteristics		+ Firm characteristics		Individual characteristics		+ Firm characteristics		+ CEO position and executive functions	
Specification	1		2		3		4		5	
Men	0.301		0.301		6.515		6.515		6.515	
Women	0.122		0.122		6.244		6.244		6.244	
Men less women	0.178	(40.71)	0.178	(41.45)	0.270	(36.97)	0.270	(36.61)	0.270	(36.56)
Total unexplained	0.161	(32.85)	0.176	(35.92)	0.243	(37.60)	0.234	(41.45)	0.145	(27.73)
Total explained	0.017	(6.32)	0.002	(0.73)	0.027	(5.72)	0.036	(6.11)	0.125	(19.54)
Level of education	-0.008	(-9.43)	-0.010	(-10.26)	-0.030	(-13.72)	-0.020	(-12.95)	-0.015	(-12.58)
Educational specialization	-0.014	(-6.97)	-0.010	(-4.96)	-0.033	(-12.72)	-0.017	(-7.85)	-0.012	(-6.12)
Career orient. and networks	0.008	(8.41)	0.009	(9.01)	0.013	(10.82)	0.009	(9.44)	0.005	(6.27)
Career	0.021	(14.57)	0.023	(15.20)	0.033	(13.61)	0.024	(12.21)	0.013	(8.06)
Family background	0.000	(-0.74)	0.000	(-0.53)	-0.001	(-1.32)	-0.001	(-1.33)	-0.001	(-1.48)
Family	0.007	(7.12)	0.008	(8.12)	0.011	(10.13)	0.009	(9.63)	0.006	(7.38)
Risk tolerance	0.012	(14.42)	0.014	(15.27)	0.022	(18.65)	0.016	(17.09)	0.009	(12.92)
Firm characteristics			-0.023	(-17.66)			0.013	(3.01)	0.025	(5.33)
CEO position and exec. func.									0.090	(33.38)
Number of observations	144,709		144,709		144,709		144,709		144,709	

Panel B: Additional characteristics, CEO appointments										
Dependent variable	CEO dummy									
Controls	Individual and firm characteristics									
Additional characteristics	Personal traits		Parents' socioeconomic status		Partner related variables		Bargaining and risk tolerance		Income	
Specification	1		2		3		4		5	
Difference	0.169	(22.99)	0.167	(25.85)	0.186	(32.54)	0.174	(24.44)	0.178	(40.44)
Total unexplained	0.160	(20.31)	0.162	(22.57)	0.198	(29.68)	0.168	(22.00)	0.197	(39.40)
Total explained	0.009	(1.83)	0.006	(1.29)	-0.012	(-2.94)	0.006	(1.38)	-0.019	(-6.25)
Explained by additional char.	0.001	(1.74)	-0.0002	(-0.54)	-0.005	(-2.44)	-0.001	(-1.90)	-0.003	(-3.14)
Number of observations	53,078		47,425		97,964		56,717		144,709	

Panel C: Additional characteristics, labor income										
Dependent variable	CEO dummy									
Controls	Individual and firm characteristics									
Additional characteristics	Personal traits		Parents' socioeconomic status		Partner related variables		Bargaining and risk tolerance		Income	
Specification	1		2		3		4		5	
Difference	0.258	(23.00)	0.301	(28.09)	0.279	(29.63)	0.270	(24.47)	0.259	(35.01)
Total unexplained	0.232	(26.62)	0.264	(30.06)	0.256	(34.70)	0.237	(27.18)	0.272	(49.71)
Total explained	0.026	(2.95)	0.038	(4.59)	0.022	(3.00)	0.033	(3.90)	-0.013	(-2.18)
Explained by additional char.	0.001	(0.88)	-0.002	(-2.48)	-0.003	(-1.70)	-0.001	(-2.62)	-0.008	(-3.89)
Number of observations	53,078		47,425		97,964		56,717		144,709	

Panel D: Using men or women as reference group										
Dependent variable	CEO dummy				Logged labor income					
Controls	Individual characteristics		+ Firm characteristics		Individual characteristics		+ Firm characteristics		+ CEO position and executive functions	
Specification	1		2		3		4		5	
Men	0.301		0.301		6.515		6.515		6.515	
Women	0.122		0.122		6.244		6.244		6.244	
Difference	0.178	(40.71)	0.178	(41.45)	0.270	(36.97)	0.270	(36.61)	0.270	(36.56)
Men as reference group										
Total unexplained	0.164	(23.66)	0.200	(31.47)	0.214	(22.36)	0.236	(28.21)	0.126	(14.47)
Total explained	0.014	(2.69)	-0.022	(-4.12)	0.057	(6.61)	0.034	(3.83)	0.144	(15.14)
Women as reference group										
Total unexplained	0.158	(31.49)	0.166	(31.06)	0.246	(37.54)	0.228	(38.53)	0.147	(27.19)
Total explained	0.020	(6.50)	0.013	(4.09)	0.025	(4.97)	0.042	(6.92)	0.123	(18.70)
Number of observations	144,709		144,709		144,709		144,709		144,709	

Table 8

Gender gap in CEO appointments and pay by year

This table tabulates the results of the CEO appointment regression reported in the second row of Table 6, and of the pay regression reported in the third row of Table 6, by year. The four leftmost columns report results from linear probability model regressions of CEO dummy on female dummy and controls. The remaining columns report results from OLS regressions of logged labor income on female dummy and controls. The appointment regressions include the individual characteristics listed in Table 2 Panel A, B, and C, and dummies for the number of executives in the firm. The pay regressions additionally include firm characteristics listed in Table 4. Labor income includes all income taxed as labor income in a given year; base salaries, stock option grants, bonus payments, and benefits 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. Observations with zero labor income are excluded from the sample. Labor income is deflated to the 2005 value and is expressed in million SEK (1 SEK ≈ 0.12 USD). Standard errors are clustered at the firm level. The unit of observation is person-year.

Independent variable	Female dummy							
Dependent variable	CEO appointment dummy				Logged labor income			
	Coeff.	*t*	R^2	*N*	Coeff.	*t*	R^2	*N*
2004	-0.160	(-21.86)	0.138	20,116	-0.236	(-22.58)	0.447	20,116
2005	-0.163	(-22.37)	0.141	19,214	-0.244	(-23.83)	0.453	19,214
2006	-0.157	(-21.38)	0.134	18,377	-0.255	(-21.94)	0.449	18,377
2007	-0.162	(-24.09)	0.132	21,522	-0.245	(-27.18)	0.453	21,522
2008	-0.161	(-24.21)	0.134	21,778	-0.234	(-26.23)	0.451	21,778
2009	-0.161	(-24.31)	0.133	21,487	-0.223	(-26.91)	0.463	21,487
2010	-0.164	(-25.75)	0.137	22,215	-0.224	(-27.18)	0.466	22,215