

Gender gap in the market for top managers: The role of firm performance information

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Abstract: This study examines the role of objective indicators of performance in bridging the gender gap in upward mobility and advancement of top managers. The main argument is that visibility and level of organizational performance help female managers get promoted. We document a substantial gender gap in advancement of top managers, and, consistent with the statistical discrimination theory, we find that female executives' mobility rate increases with disclosure and level of firm performance. However, the gender gap in mobility and promotion closes only at the highest levels of disclosed firm performance. That is, only the very top women performers advance at the same rate as their male counterparts. This study is the first to assemble large cross-country data of the 946,172 top managers in 540,608 public and private firms to document and track the mobility of 137,475 female top executives. Results point to important organizational factors that may facilitate career advancement of female top executives.

1. Introduction

Firms increasingly hire outsiders to fill their leadership ranks rather than promote from within: whereas only 15 percent of CEO vacancies in S&P 1,500 firms were taken by outsiders in 1975, by 2005, almost 42 percent of incoming CEOs were hired externally (Murphy and Zabochnik 2007, Falato, Li, and Milbourn 2015). Female executives are increasingly relying on the external managerial labor market for promotions as well. Between 2004 and 2013, almost 35 percent of all incoming women CEOs in the largest 2,500 public firms were outsiders.¹ Although women managers face discrimination in the labor market, much of the literature on gender gap in top management has focused on internal promotion practices (Cohen et al. 1998; Bertrand and Hallock 2001; Smith et al. 2013). Hence, popular metaphors such as “glass ceiling”, “sticky floor”, “glass escalator”, and “glass cliff” refer to barriers for women within firms (Powell and Butterfield

¹ From a survey of 2,500 largest firms by PwC: <http://www.strategyand.pwc.com/global/home/what-we-think/chief-executive-study> (accessed in February 2018)

1994; Booth et al. 2003; Maume 1999; Ryan and Haslam 2007; Fernandez and Abraham 2011). However, not much is known about gender gap in the external managerial labor market.

The literature that examines the gender gap in external executive labor markets is limited, spread across different disciplines, and often contradictory. On one hand, there is evidence of significant gender gap in mobility, promotions, and pay. For example, Dezsó et al. (2016) suggest that firms may impose implicit quotas on the number of women in top management, which can limit their hiring and promotions. And, Quintana-Garcia and Elvira (2017) find that among externally hired executives, women executives get paid significantly less than male executives.

On the other hand, research suggests that women executives may not be as disadvantaged. For instance, theoretical models by Fryer (2007) and Bjerck (2008) predict that female managers may face discrimination at lower levels of organizational hierarchy, but as they progress to executive levels, female top managers may have a higher rate of promotions than men. Empirically, Gayle et al. (2012) find that women executives have similar rates of external promotions as male executives. And, Fernandez-Mateo and Fernandez (2016) find that even though women are less likely to apply for top management jobs, among those who apply, they are equally as likely to get hired as men. Thus, all research taken together does not say much about the prevalence of gender gap in the managerial labor market and the conditions that affect the gender gap.

This study examines the gender gap in the external managerial labor market and asks two key questions. First, what is the extent of the gender gap in the markets for top managers? And, second, what factors decrease the gender gap in managerial markets? To answer the first question, we build and utilize a large, novel dataset of over 131,686 female executives in 320,590 public and private firms in Europe. We track external mobility of managers between 2003 and 2007 to determine the gender gap in external promotions and advancements of top executives. Our data has significant advantages in scale and scope over samples used in previous studies on female executives. Whereas most studies use the data from U.S. public firms, 80 percent of the managers in our data are from private firms. Moreover, these studies tracked around a hundred external moves by female executives over 15 years (e.g., Gayle et al. 2012); we observe over 9,200 female executives moves within 5 years. We document a significant gender gap: female

executives are 40 percent less likely to move externally, and among the managers who move, female executives are almost three times less likely to move with promotions.

To answer the second question, we draw on the statistical discrimination theory to examine conditions under which the gender gap is likely reduced in the labor market. The statistical discrimination theory states that uncertainty about worker quality and lack of clear performance information lead to biases in the labor market (Phelps 1972, Arrow 1973). Employers, without performance information about candidates, base their assessments about candidates on characteristics unrelated to quality, such as gender. Thus, we examine whether information about managerial quality decreases the gender gap in the managerial labor market. Because top management productivity is assessed primarily by the performance of firms they manage (Fama 1980, Holmstrom 1982, Khurana 2002), we ask whether firm performance information can influence labor market outcomes for female top managers. We find that female managers in firms that disclose financial performance move externally at about 46 percent higher rate than female managers from non-disclosing firms. Particularly, the gender gap for external promotions decreases with disclosure of high firm performance.

The patterns documented in this study offer new insights into the gender gap in the external managerial labor market and provide support to the statistical discrimination theory. Results suggest that there is a significant gender gap in the external managerial labor market, and that objective, visible firm-level performance information can facilitate women top managers catching up to their male counterparts. On the flip side, the results suggest that lack of information and visibility may propagate bias and provide conditions conducive to discrimination.

This research contributes to the following literatures. First, we document the gender gap in external promotions in the managerial labor market across firms and industries by utilizing one of the largest data sets of female executives to date. Our findings contribute to the broad discussion of executive gender gap across management, economics, and sociology literatures (e.g., Joshi et al. 2015, Bertrand and Hallock 2001, Fernandez-Mateo and Fernandez 2016). Second, we find evidence consistent with the statistical discrimination in external labor markets, which bears important implications for female executives. Finally,

this study contributes to the strategy and management literature concerned with underrepresentation of women in top management (Helfat et al. 2006; Dezső et al. 2016) by highlighting organizational characteristics that help explain the gender gap in managerial markets.

2. Literature

2.1 Gender Gap in Managerial Markets

Although the persistent underrepresentation of women in top management has become a prominent issue in management literature, most of the research has focused on internal barriers to promotions and has lagged in exploring the extent of the gender gap in external labor markets.

Underrepresentation of women in the upper ranks of management is well documented (e.g., Bertrand and Hallock 2011, Blau and Kahn 2016). In analyzing the supply of U.S. female non-CEO executives in 2000, Helfat et al. (2006) predicted that by 2016 the number of female CEOs in top U.S. firms would reach between 4.9% and 12.8%. As of early 2016, only 20 female CEOs led Fortune 500 firms (4%), a number well below the range estimated 10 years prior. Considering the mismatch between the supply of female CEO candidates and the actual number of female CEOs, one can infer that the promotion rates of female top managers are very low.

At every level of organizational hierarchy, studies document internal barriers to career progression. At lower levels of organizational hierarchy, Blau and Devaro (2007) show that women are less likely to be promoted than men. At the executive level, evidence from Danish microdata suggests that despite decades of progressive, family-friendly policies and greater education levels for women, and despite controlling for salient variables – e.g., maternal leaves, spousal careers, firm characteristics, and gender composition of management boards and boards of directors – there remains a significant gender gap in the promotion of female top executives (Smith et al. 2013).

Most research on gender gap has focused on internal promotion and turnover practices of firms (Cohen et al. 1998; Bertrand and Hallock 2001; Becker-Blease et al. 2010, 2016; Smith et al. 2013; Dezső et al. 2016). Popular metaphors such as “glass ceiling”, “sticky floor”, “glass escalator”, and “glass cliff” refer

to barriers for women within firms (Powell and Butterfield 1994; Booth et al. 2003; Maume 1999; Ryan and Haslam 2007; Fernandez and Abraham 2011). However, understanding the extent of gender gap in the external market is important, because external mobility provides significant career gains to managers (Bidwell and Mollick 2016). Managers receive the highest wage increases and biggest career jumps with external moves (Bidwell 2011).

The literature on the gender gap in external managerial labor markets is limited, spread across different disciplines, and often contradictory. Several studies provide evidence of significant barriers in mobility, promotions, and pay. For example, Dezsó et al. (2016) suggest that firms may impose implicit quotas on the number of women in top management, which can limit their hiring and promotions if firms already have a woman executives. And, Quintana-Garcia and Elvira (2017) find that among externally hired executives in U.S. public firms, the 13 new women executives got paid significantly less than male executives. Further, Matsa and Miller (2011) find that among U.S. public firms, those with lower representation of women on board of directors have significantly lower share of female executives.

In contrast, other research suggests that the gender gap may not be as large as commonly thought. For instance, using data from U.S. public firms, Gayle et al. (2012) find that women executives have similar rates of external promotions as male executives. And, Fernandez-Mateo and Fernandez (2016) use executive search firm data in the U.K. and find that even though women are less likely to apply for top management jobs, among those who apply, they are equally as likely to get hired as men. In sum, all findings taken together do not provide a definite picture of the extent of the gender gap in the managerial labor market.

In this study, we examine the gender gap in the managerial labor market and explore factors that may reduce the gender gap in external mobility and promotions of top managers.

2.2 Factors that Reduce the Gender Gap in Managerial Markets

The current literature points to supply and demand-side factors that may reduce the gender gap in management. Supply-side explanations refer to the gender-specific differences in individual skills and preferences as contributing reasons for the gender gap. These differences include work experience, work

force interruptions (Bertrand et al. 2010; Miller 2011), incentives to invest into firm-specific skills (Bielby and Bielby 1992), geographic immobility (Sorenson and Dahl 2016, Benson 2014), as well as non-cognitive and psychological attributes of women (Adams and Funk 2012, Bertrand 2011, Croson and Gneezy 2009), such as reluctance to compete (Niederle and Vesterlund 2007) and risk averseness. Such differences can lead to segregation of women into a limited number of roles and positions (Barbulescu and Bidwell 2013) and ultimately limit the “pipeline to the top.”

However, recent reviews of supply-side studies do not find conclusive evidence for fundamental differences in leadership-relevant individual attributes between male and female managers, especially at the executive level (Kaplan and Walley 2016, Nelson 2014, 2015). These researchers caution that observed differences may not be gender-specific attributes but rather context-driven behaviors. One of the reasons why the differences may not be gender-specific could be that much of the work examines gender differences for non-executives, such as external directors or women outside of corporate context. At the executive level, the range of skills and motivations should be narrower, and if moving to the very top of the management hierarchy takes an additional set of unique skills, prior work suggests that these skills may not be gender-specific. Thus, the existing evidence suggests that supply-side explanations may not be sufficient to account for the gender gap in executive promotions.

In this study, we do not make assumptions about individual differences between men and women executives, and focus on the demand-side factors of the gender gap. Demand-side analyses imply that employers have biases and prefer male managers. This discrimination is typically thought of as either taste-based or statistical. Prejudiced employers (Becker 1957; Matsa and Miller 2011), stereotypes about gender roles (e.g., the “think manager—think male” hypothesis (Schein 1973)), and implicit quotas by firms for women executives (Dezső et al. 2016) are some proposed explanations that imply various legitimacy-based and preference-based barriers to mobility and advancement. A drawback to the taste-based explanations is that the mechanism offers insufficient levers to reduce the gender gap. Because prejudice can manifest itself subtly, as Stigler and Becker (1977) point out, changing personal tastes and preferences is no small task.

On the other hand, biases resulting from imperfect information—statistical discrimination—can be remedied with more information about manager quality (Phelps 1972, Arrow 1973). When employers do not have information about individual quality, they rely on other indicators of quality, such as gender, which are based on biased beliefs and are not actually related to quality. Consistent with the statistical discrimination theory's predictions, Botelho and Abraham (2017) compare ratings of individual recommendations made by investment professionals and find that gender bias is decreased with availability of objective information about quality. In this study, we ask whether information about managerial quality can decrease gender gap in executive labor markets.

2.3 Firm Performance and Managerial Labor Market

Since markets for managers face many information-related frictions and operate under coarse signals of ability (Coase 1937; Williamson 1975), firm performance information has become a key source of information from which to infer the ability of the top managers. Theoretical work has long assumed that labor markets use firm performance as an indicator of managerial ability (Fama 1980; Holmström 1982). Empirical work has also documented this relationship between firm performance and managerial labor market. Fee and Hadlock (2003) find that boards are more likely to hire executives from high-performing firms and their compensation reflects the firm performance. Murphy and Zbojnik (2007) find that managers from top-performing firms receive higher wages, because their ability is reflected in firm performance and expected to be transferred to their new firm. Cazier and McInnis (2010) determine that externally hired executives come predominantly from high-performing firms.

Khurana's (2002) rich field data across many large publicly held corporations further confirm that the defining factor of executive hiring selection primarily reflects candidates' current firm performance. Although the executive selection process is "an information-intensive decision", these decisions are based on limited information, exacerbated by the requirement of confidentiality during the search process (p. 102). Thus, boards rely on readily available and credible information:

"... the typical corporate board engaged in an external CEO search is essentially flying blind...and attempting to adapt to the attendant uncertainty with the only ready means it finds at its disposal" (p. 118).

Such information is predominantly at the firm-level:

"In defining and narrowing the pool of candidates, directors evaluate the prospective CEOs based not on their individual abilities and achievements but according to a set of essentially extraneous criteria..." (p. 118).

Specifically, the board evaluates candidates based on criteria that typically include three metrics: 1. the current position of the candidate---current leadership position as a reliable signal of leadership abilities; 2. the performance of candidate's current firm---an indicator of manager quality; and 3. the reputation of candidate's current firm---a signal of candidate's legitimacy, which is a function of firm performance. As such, a defining factor of executive selection reflects candidate's current firm performance.

While the academic literature is careful about deconstructing the factors contributing to firm performance, in practice, executive hiring committees commonly do not question the link between firm performance and executive ability:

"It is difficult to convey to the reader how deeply rooted this belief in the dependent relationship between CEO quality and firm performance is among members of corporate boards, who hold it with virtually religious conviction. To openly question it is taboo." (p. 110).

There are two main reasons for why external markets use firm performance to gauge managerial ability: information costs and legitimacy. First, readily available firm performance information is less costly to access and is more credible and legitimate than many other sources of information that reveal managerial ability. Firm performance information can reduce search costs and costs associated with uncertainty. Financial statements provide a readily available, credible, and systematic evaluation of a firm's performance and subsequently carry most relevant information about its top management. Uncertainties related to potential adverse selection (Akerlof 1970), moral hazard (Arrow 1963), and agency problems (Jensen and Meckling 1976) can be reduced through greater transparency and access to information.

Second, boards, when selecting top management teams, are concerned not only about the expected productivity and fit of the new managers, but also about the need to justify their selection to the relevant stakeholders for broad external support. Firm performance information is more credible and legitimate than

many other sources of information that reveal managerial ability, which makes for a more defensible criterion in selecting new executives:

"The first hurdle for myself is the laugh test: if we actually named this guy and told the employees and shareholders that he was the new boss, what would they think? ... You start by whacking down the job to a set of alternatives. So you consider things like performance ... the company they are coming from, who they have worked with." (Khurana 2002, p. 104).

Thus, boards often conform to common practices to maintain legitimacy (Suchman 1995) and rely on observable objective performance metrics when making their selection decisions.

2.4 [Alternative Sources of Information](#)

Apart from firm performance information, there are several other ways external markets can obtain information about managerial activity. Managers can release their résumés to recruiting organizations, social media, and professional organizations, or information about managers can circulate through informal networks. Also, firms can release information about their managers through formal press releases on various firm activities and events, such as new product introductions, acquisition announcements, performance announcements, and the like (e.g., Stern and James 2016). Similarly, firms can inadvertently disclose information about managerial value through internal promotions and assignments (Waldman 1984), thus signaling which managers are productive.

These alternative sources of information can play an important role in external labor markets, but the information spread through press releases, social networks, and self-promotions is more sporadic and subjective. Research suggests that informal sources of information may not be as relevant for women executives, because women managers are less connected and have less access to informal networks to benefit from them (Mardsen and Hurlbert 1988; Moss and Tilly 2001; McPherson et al. 2001). For example, Reskin and McBrier (2000) find that reliance on market-based hiring results in a greater share of women in managerial jobs, whereas informal network recruitments increase the male share in managerial jobs. Moreover, unlike selective release of information by firms, financial statements are disclosed regardless whether the information is negative or positive. Therefore, both in theory and practice, executive markets

seem to rely primarily on information from firm financial statements, which provide credible, standardized, and systematic flow of information to the entire market.

This study examines whether firm performance information, released through financial statements, reduces the gender gap in the managerial labor market.

3. Theory and Hypotheses

We propose a theory of the role of information on the gender gap in mobility and promotions in managerial labor markets. We show that strong signals of individual ability reduce the gender gap in external promotions, whereas lack of information propagates biases.

One of these market failures in the labor markets due to asymmetric information is discrimination (Phelps 1972; Spence 1973, Akerlof 1976). Without information about the ability of a potential hire, employers rely on information less related to ability, such as candidates' race, nationality, and gender (Phelps 1972; Altonji and Blank 1999; Rissing and Castilla 2014). If male managers are perceived to be on average more productive than female managers, then lack of information about individual ability can propagate these biases. With more information about individual ability, the market is expected to update its priors and potentially close the gender gap.

We examine external mobility as the main outcome, focusing on external promotions. Managers are more likely to make an external career jump for promotions. Moreover, we recognize that managerial career advancement is dictated by both internal and external labor market dynamics (Doeringer and Piore 1971; Lazear and Rosen 1981; Fee et al. 2006; Bidwell 2011). Therefore, we examine whether the internal labor market dynamics change the main effect of information disclosure on managerial marketability in the external labor market. In the supplemental analyses (in Appendix III), we show that managerial marketability in the external labor market has direct impact on internal dynamics, but internal labor dynamics in either direction should not change the main effect of information disclosure on our main outcomes.

3.1 Theory: The Role of Information on the Gender Gap in Managerial Markets

We develop predictions about the effects of information disclosure on labor market mobility under three conditions: (i) non-disclosure, (ii) disclosure, and (iii) disclosure of high performance. We assume that firm financial disclosure provides information about the potential productivity of individual top managers. In the absence of this information, potential employers rely on general expectations of managerial productivity. If the labor market believes that the average productivity of male managers in the population is higher than that of female managers, then the expectations of managerial productivity will be determined by firm disclosure regime and manager gender. We should expect that disclosure of high performance will result in higher gains in updated productivity beliefs, thus eventually decreasing the gender gap. In contrast, non-disclosure can further limit the mobility of female managers, as bias gets perpetuated with lack of transparency.

The model we present determines the probability of a hiring decision conditional on the information environment and manager gender. The framework assumes that an employer is choosing from a pool of managers willing to take on the job and does not incorporate managerial utility or matching.

In this framework, an employer makes a hiring decision i based on market prior beliefs and expected productivity inferred from disclosed firm performance. The hiring firm receives a utility from hiring a manager that comprises of manager quality: $u_i = \theta_i$, where θ_i is the true quality of a manager i and g_i is the gender of potential hire ($g_i = 1$ if a manager is male and $g_i = 0$ if a manager is female). The prior belief of managerial quality is drawn from a normal distribution $\theta_i \in N(\bar{\theta}_{g_i}, \sigma_\theta^2)$, where $\bar{\theta}_0$ and $\bar{\theta}_1$ are prior beliefs of the gender-group average quality of female and male managers, respectively. The labor market does not observe the true quality of managers, so it uses the signal $\tilde{\theta}_i$ to infer true manager quality θ_i :

$$\tilde{\theta}_i = \theta_i + \varepsilon_i, \tag{1}$$

where $\varepsilon_i \in N(0, \sigma_\varepsilon^2)$ is the noise level of the signal. The signal can be very noisy (σ_ε^2 is large), or signal can be more precise (σ_ε^2 is small).

The hiring decision is denoted by H_i , where $H_i = 1$ means the manager is hired, and $H_i = 0$ means otherwise. The probability of hiring is weighted between the prior belief of the market ($\bar{\theta}_{g_i}$) and an individual signal a manager sends ($\tilde{\theta}_i$):

$$P(H_i = 1|\tilde{\theta}_i) = F\left((1 - \beta)\bar{\theta}_{g_i} + \beta\tilde{\theta}_i\right), \quad (2)$$

where $\beta = \frac{\sigma_{\tilde{\theta}}^2}{\sigma_{\tilde{\theta}}^2 + \sigma_s^2}$ and $0 \leq \beta \leq 1$.² The stronger the signal (the smaller the noise σ_s^2), the more weight is assigned on the individual signal ($\tilde{\theta}_i$) and less on the gender-dependent market prior ($\bar{\theta}_{g_i}$).

Discrimination exists if $P(H_i = 1|\tilde{\theta}, g_i) \neq P(H_j = 1|\tilde{\theta}, g_j)$, when a potential employer is faced with hiring decisions for candidates i and j with identical signals ($\tilde{\theta}_i = \tilde{\theta}_j = \tilde{\theta}$), but of different genders, $g_i = 1$ and $g_j = 0$. Then, the gender gap in hiring managers with identical signals $\tilde{\theta}$ can be defined as:

$$G(\tilde{\theta}) = F\left((1 - \beta)\bar{\theta}_1 + \beta\tilde{\theta}\right) - F\left((1 - \beta)\bar{\theta}_0 + \beta\tilde{\theta}\right). \quad (3)$$

If prior beliefs are not equal for different genders, such that the average productivity of male managers is generally perceived to be higher than that of female managers ($\bar{\theta}_1 > \bar{\theta}_0$), then gender gap is a function of the signal noise. The smaller the noise σ_s^2 , the larger is β , the weight put on the individual signal, and the smaller is $(1 - \beta)$, the weight put on the market prior. Thus, with identical signals $\tilde{\theta}$ and small noise σ_s^2 , the gender gap should tend toward zero.

Let's consider three different cases to determine the size of the gender gap by varying the parameters of the signal.

Case 1. Non-disclosure:

With no performance information, the signal is very noisy (σ_s^2 is very large), so β is very small. The gap is now a function of market priors. If $\bar{\theta}_1 > \bar{\theta}_0$, then as $\beta \rightarrow 0$, the gap is positive:

$$G_{ND}(\tilde{\theta}) \rightarrow F(\bar{\theta}_1) - F(\bar{\theta}_0). \quad (4)$$

² See the proof in Cui, Li and Zhang (2017)

Case 2. Disclosure:

With disclosure, noise σ_s^2 decreases, and β becomes larger. The probability of hiring is now a function of both gender-group priors $\bar{\theta}_{g_i}$ and individual signal $\tilde{\theta}$. As σ_s^2 decreases with disclosure, $(1 - \beta) \rightarrow 0$, thus the gender gap becomes:

$$G_D(\tilde{\theta}) \rightarrow F(\beta\tilde{\theta}) - F(\beta\tilde{\theta}). \quad (5)$$

With an identical signal $\tilde{\theta}$ for men and women, the gap is disappearing. Note that the gap with disclosure is smaller than the gap without disclosure. We extend the following hypothesis:

Hypothesis 1 (H1). *The gender gap in external mobility decreases with disclosure.*

Case 3. Effect of Disclosure by Performance:

Next, we show that conditional on disclosure, the information content of disclosure varies with performance levels and has differential effects on the gender gap. Two features are important to note. First, markets expect that managers coming from a high-performing firm (DHP) are more likely to be better managers and managers coming from a struggling, low-performing firm (DLP) are more likely to be of lower quality than an average manager (AP): $\tilde{\theta}_{HP} > \tilde{\theta}_{AP} > \tilde{\theta}_{LP}$. Then, gender gap by performance is defined as:

$$G(\tilde{\theta}_P) = F\left((1 - \beta)\bar{\theta}_1 + \beta\tilde{\theta}_P\right) - F\left((1 - \beta)\bar{\theta}_0 + \beta\tilde{\theta}_P\right), \quad (6)$$

where $\tilde{\theta}_P$ indicates the signal received by performance level. Further, high and low extremes of performance provide greater accuracy of a signal of managerial quality than average performance. Thus, the signal noise σ_s^2 should decrease with very low or very high performance.³ As β increases, the weights shift more heavily towards the individual performance information $\tilde{\theta}_P$, and away from gender-group averages. Then, we should expect that the probability of hiring increases with high performance but decreases with low performance, and the gender gap decreases with high and low performance, compared to average performance. We extend the following hypotheses:

³ The likelihood function that results in greater impact at largest and lowest signal levels than at medium signal is likely to be non-Gaussian (DeGroot 2005).

Hypothesis 2 (H2). *The probability of external mobility increases with high performance.*

Hypothesis 3 (H3). *The gender gap in external mobility decreases with high performance.*

From combining the different updating effects of information by gender with market dynamics framework just outlined, we can see that availability of a strong positive signal increases the prospects of female managers. In the absence of such information, the bias may be propagated even further, as markets rely on biased gender averages without an opportunity to update the priors with individual-specific information. Thus, discrimination against female managers can perpetuate in one side of the market while decreasing in the other.

4. Data

4.1 Empirical Context: Firm Financial Disclosure in the EU

We measure the level of information available to the labor market through disclosure of performance information through firm's filings of its financial statements with regulatory bodies in compliance with country disclosure regulations. Financial statements report the economic position of a firm at the end of an accounting period and changes in that position over the previous period. Firm financial information is useful to many stakeholders, such as investors, creditors, government officials, employees, and competitors, as they use the information to evaluate the firm's economic position, performance, and its prospects.

Due to wide variation in disclosure regulations across European countries, the type of firms that disclose and do not disclose also vary. Factors, such as firm size, type, ownership structure, industry, and country enforcement strength determine to a large extent the disclosure of financial information (Street and Bryant 2000). For example, in some countries, size cutoff thresholds for disclosure may relate to either employment size or sales volume in a given year. Also, in Germany, if the ultimate owner consolidates affiliated firm financials into group financials, then the affiliated firm is not obligated to release its individual financial statements regardless of its size or type (Benston et al. 2006). In other countries, such as Portugal and Germany, under certain conditions firms find it more advantageous to pay penalties than file financial statements (Benston et al. 2006). For example, in Germany, the estimated compliance rate in 2007 was at 16 percent (Laschewski and Nasev 2017).

Disclosure of financial statements is a good measure for the degree of information available to the market because of three main reasons. First, financial statements provide a credible, standardized, and recurrent source of firm performance information to the entire market. Corporate financial statements are prepared in accordance with general rules, known as the generally accepted accounting principles (GAAP), and are frequently verified by third party independent audits in order to facilitate meaningful evaluation of the information (Bromwich 1992). Although diverse users of firm financial information may need the information for different reasons, financial statements provide a common benefit--numbers they can trust.

Second, there is wide variation in disclosure across and within countries and industries in our sample. Firms disclose financial statements in response to exogenous country-level disclosure regulations and in response to stakeholders, such as investors. Because country-level financial disclosure regimes have developed in the context of different regulatory governance systems, legal institutions, national culture, economic history and characters of financial markets, there is a marked diversity in financial reporting regulations across countries (Botzem 2012).⁴ Further, differences in disclosure regulations relate to factors such as listing status, size, legal form, ownership structure, industry, and enforcement strength of regulations.

Third, disclosure status of firms does not change significantly over time in our sample. Once a firm commits to disclosing financial statements, it is highly likely it will keep disclosing in the following years, while firms that do not disclose are likely to remain non-disclosing. Over 81 percent of all firms in our sample either disclose or do not disclose financial performance for all five years; 14 percent start disclosing, and 5 percent stop disclosing. This largely time-invariant pattern of disclosure alleviates concerns over whether managers may be changing firm disclosure status to advance their careers. If any such changes were to occur, once a firm is disclosing and self-interested managers have moved on, the remaining effect for subsequent managers should be due to information.

⁴ Please see Appendix I for details on disclosure regulations in Europe.

One of the key questions about using firm performance disclosure in this study is whether disclosure is exogenous, i.e., if disclosure is in any way related to labor market outcomes such as external promotions. The vast literature in accounting and finance determines that financial disclosure are decisions with primarily capital market objectives (see Healy and Palepu 2001 and Beyer et al. 2010 for review). Nonetheless, to address the selection issues, we utilize an exogenous change in disclosure regulations to show robustness of the main results.

4.2 Estimation Sample

The data for this study are from the Bureau van Dijk (BvD), a comprehensive provider of administrative data on public and private firms worldwide. The BvD collects ownership, financial and management data from each country's regulatory agencies and various private data companies. We use firm-level data for nine Western European countries between 2003 and 2007.⁵

This data offers several advantages. First, the data is very large and comprehensive. Countries in our sample require all firms—regardless of size, ownership and age—to register with local regulatory agencies and report their current management. So, the data include information on management leadership teams for almost all firms, both public and private. Whereas most studies on female executives use the data from U.S. public firms, 80 percent of the managers in our data are from private firms.

Second, the sheer size of the data is unprecedented to date. Our sample increases the number of female top managers from hundreds in previous studies (e.g., Helfat et al. 2006, Dezső et al. 2016) to over 130,000, which allows significant gains in statistical power and range to examine a variety of relationships across private and public firms. This advantage is especially prominent for studying external promotions. For example, in Quintana-Garcia and Elvira's (2017) study, only 13 women executives were observed promoted externally among U.S. public firms. And, Gayle et al. (2012) find 107 external moves by women executives in the span of 15 years. In contrast, we observe 9,200 external moves by women executives within 5 years.

⁵ The countries are: Austria, Denmark, Finland, France, Germany, Greece, Norway, Portugal, and Spain. Observations from other countries in Western Europe were excluded due to various data limitations related to determining gender of managers, such as insufficient availability of full names.

Third, although firm registration coverage is ubiquitous, countries vary in their financial disclosure requirements. This variation allows me to examine the relationship between availability of performance information and top management mobility. Fourth, the narrow range of economic development within the sample European Union countries, similar level of underrepresentation of women in management positions, and comparable gender wage gap to U.S. firms (e.g., Arulampalam et al. 2007) improve the generalizability of our findings.

We select managers for whom there is a complete employment history between 2003 and 2007. Year 2003 is the first year the BvD dataset has sufficient coverage across countries that stays consistent through the sample years. We end the sample data on year 2007 because the five-year period allows enough time for career moves to be completed and for the data provider records to be updated (new entries registered and old entries removed). We remove external board directors and various listed external agents, and select top managers in the C-suite with position titles such as CEO, CFO, COO, Vice President, President, Director, etc. For each manager, we observe whether he or she works for a firm that discloses its financial performance information, and whether the manager observed in 2003 moves to another position or firm by 2007. The final sample consists of 870,642 top managers in 320,590 firms. We track a manager for the duration of the time period, so a manager is counted once in the data. Of these managers, 131,686 (15.1%) are female. Given that this sample includes both public and private firms of all sizes, the share of female top managers is close to what has been reported in previous work. For example, a study by Helfat et al. (2006) determined that 8.25% of top managers in Fortune 1000 companies in the U.S. were female; moreover, Fernandez-Mateo and Fernandez (2016), using UK-based top executive search firm data, found that 11.09% of top managers in that setting were female.

4.3 Main variables

Manager Gender. One challenge in constructing the final sample from the BvD data is that the gender variable does not have a comprehensive coverage and has values for a very small number of managers. We assign each manager a gender using their full names using a sophisticated onomastic big data algorithm (NamSor Gender API tool) that relies on last name language of origin, observable naming

trends and comprehensive name lists for each country. Based on this tool, we determine a score on a probability scale (from 0 to 1) that a given name belongs to either the *Male* or *Female* gender category. Names that are androgynous or otherwise difficult to classify are assigned to the “Unknown” category (3.1% of matches). Details on the methodology, matching rates, and robustness checks are reported in Appendix II.

External Mobility. The main dependent variable is external mobility and advancement of top managers. We track each manager observed in 2003 to their firm and position in 2007. The coverage of management data in the BvD is annual, and, unlike with firms, the dataset does not assign the managers unique identifiers during this period. We utilize name-matching methodology to assign a unique identifier to each individual (details on the methodology are outlined in Appendix II).

External Mobility. A manager *Moves Externally*, if by 2007 he or she is working for another, unaffiliated firm. About 14% of managers move externally.

External Promotions. A manager is *Promoted Externally* if he or she moves to an unaffiliated firm with a higher rank title (CEO) or moves to a larger (employment size and assets) unaffiliated firm with the same rank title (non-CEO). Title ranks are classified as CEO and non-CEO, with CEO-equivalent titles outranking non-CEO titles. Of all managers who move externally, about 10% move with a promotion.

Firm Performance Information. *Disclosure of Financial Performance.* We use firm financial performance information to distinguish between disclosing and non-disclosing firms. Financial statements relay objective, standardized and credible information about firm performance to various stakeholders. A *Disclosing Firm* indicator equals 1 if a firm reports financial performance information (sales) at any one time between 2003 and 2007; the indicator equals 0 if there is no performance information recorded in the same time period. Most firms have continuous reporting regimes—they are either reporting or not disclosing for the entire time period. An extensive discussion with the BvD data specialists confirmed that missing sales information is primarily due to non-reporting rather than other reasons for which data may be missing. About 16% of the firms (142,977) in the sample are non-disclosing.

Firm Financial Performance. We further distinguish the content of disclosure by firm performance levels. We use firm sales growth as our primary performance measure, because growth measures are most related to executive labor market outcomes than accounting ratios (Puffer and Weintrop 1991; Khurana 2002). We calculate the average firm-level sales growth for a firm in the three-year pre-mobility period (pre-2003). Then, we calculate a disclosing firm's relative *Sales Growth* by subtracting the industry-country mean sales growth from the firm's absolute sales growth figure. The resulting continuous measure indicates whether a firm overperforms (if positive) or underperforms (if negative) its industry peers. Although absolute sales growth figures are informative, the executive labor markets react more strongly to relative performance measures (Holmström 1979, Gibbons and Murphy 1990). Robustness checks with absolute sales growth numbers produce similar results. The final measure is winsorized at the 99 percentile to tame in the outliers. We also use alternative performance measures, such as profitability and return on assets (ROA), which produce similar, but statistically weaker results. This may be because sales growth is a primary indicator used in executive labor markets in measuring performance of top managers (Puffer and Weintrop 1991; Khurana 2002).

4.4 Control Variables

Each specification includes controls for a number of firm-level characteristics that might determine and influence the propensity of mobility and initial configuration of gender balance in firms. The total number of top managers in the firm may influence the level of stability of the top management team; this number may also increase the likelihood that a female manager may be present in the team. We calculate the share of female top managers in the firm, which may be correlated with internal firm policies or organizational culture that may be more open to female leadership. We also include an indicator variable of whether the firm's CEO is female. The presence of a female CEO may affect opportunities for other female executives getting promoted if there are firm-level quotas (e.g., Dezsó et al. 2016), or may influence the likelihood that male managers stay or leave (Eagly and Carli 2007).

We include variables for firm age, indicators for family ownership, affiliation with a corporate group and whether a firm is a multinational. Past work has shown that mobility of top managers may stabilize

with firm age (e.g., Wagner et al. 1984). We control for firm size for the estimations of the disclosing firm sample using the reported number of employees. Our data is consistent with previous work which shows that female executives are more likely to work for smaller firms than male executives (Bertrand and Hallock 2001). Female managers in family firms may have different career opportunities if they are related to the controlling owners. We only control for these factors without exploring the family dynamics of ownership in this study, because establishing family relationships for female individuals is more challenging due to fairly male-centered naming traditions for married women. We also control for whether a firm is affiliated with a corporate group, which may provide different internal career opportunities compared to standalone, unaffiliated firms (Tsolmon 2018). Corporate groups, collections of affiliated firms under a common ownership and control, are common organizational structures in Europe and Asia (Chang and Hong 2000, Khanna and Rivkin 2001, Belenzon and Berkovitz 2010). The structure is representative of a large multi-unit firm, with its headquarters (the ultimate owner firm) making strategic and resource allocation decisions for the affiliated firms. About 59% of our sample firms are affiliates of a corporate group. We also control for multinational activities of a firm to account for the possibility that geographic and cultural constraints may affect male and female executives differently (Bielby and Bielby 1992, Wright et al. 1995). Industry indicators are constructed using firms' primary 3-digit SIC affiliation. Country dummies indicate activity by firms in each country and control for any country-specific labor market variations.

Due to very limited coverage of individual-level variables in the data, such as age, education, and tenure, we are not able to control for individual characteristics. We run the models for a small sample of managers for whom the age variable is available (the only individual-level variable with enough coverage to run regressions) and obtain qualitatively similar results.

4.5 [Descriptive statistics](#)

The final sample includes 870,642 top managers in 320,590 firms. Table 1 reports summary statistics and correlations for key variables. 15% of all top managers in the sample are female. About 37% of the sample managers are CEOs. 80% of the managers in our sample are from private firms, and 39% are from family firms. In Table 2, Panel A reports firm characteristics and Panel B reports mobility rates. The

reported summary statistics are split by gender, and column 9 reports the comparison of means test results. Male top managers seem to be more likely to work for disclosing firms, but the difference is not very large (84% of men vs. 80% of women). Male top managers are more likely to lead larger and faster growing firms with greater labor productivity and capital intensity. Female top managers are more likely to lead older, private, domestic, family-owned, and firms that are not affiliated with corporate groups and are less diversified. A female top manager is much more likely to be the CEO or work for a firm with a female CEO or a firm in which a larger share of other top management are also female.

Panel B in Table 2 reports the differences in mobility between male and female top managers. It is clear that on average male managers have greater external and internal mobility than female top managers. All differences are statistically significant. Between 2003 and 2007, about 15% of male managers moved externally compared to only 7% of female managers. Male managers also move internally slightly more frequently than female managers (7% vs. 6%). Male top managers are also almost 3 times more likely to be promoted externally than their female counterparts (11% vs. 4%), and more than twice as likely to be promoted internally compared to female top managers (5% vs. 2%).

Next, Table 3 breaks down the summary statistics of mobility variables by disclosing and non-disclosing firms. Panel A reports the summary figures for mobility variables for all top managers in the sample. Panels B and C report the same analysis for male and female top managers, respectively. Panel D reports summary statistics for firm characteristics by disclosing and non-disclosing firms. Column 7 reports the difference of means in managerial mobility rates and firm characteristics between disclosing and non-disclosing firms. On average, disclosing firms are older, public, non-family owned, affiliated with a corporate group, multinational and more diversified. Disclosing firms employ smaller percentage of women managers in top management teams, but women are more likely to be in a CEO position than in a non-disclosing firm. The difference in means results for mobility show the patterns of the main results and indicate that, on average, both male and female managers experience greater likelihood of external mobility and promotions in disclosing firms than in non-disclosing firms. These descriptive statistics provide support for the argument that disclosure plays an important role in mobility of top managers.

Table 4 reports summary statistics for the distribution of female leadership and mobility rates by country. Countries differ by the share of managers who are female and by the share of CEOs who are female. The figures are quite similar and in some cases are identical to the country-level statistics reported by Christiansen et al. (2016), which uses the same data source from 2013 and limits the firms to those with non-missing information on revenue and assets, which effectively excludes all non-disclosing firms.

5. Econometric Specifications

Disclosure of Financial Performance. To test the hypotheses about information availability (disclosure), we estimate the following linear probability model specification:

$$\begin{aligned}
 Mobility_i = & \alpha + \beta DisclosureFemale_i + \delta NonDisclosureMale_i + \gamma DisclosureMale_i + \\
 & \varphi Firm_{ij} + \theta Industry_{ij} + \rho Country_{ij} + \varepsilon_i, \quad (1)
 \end{aligned}$$

where *Mobility* is a dummy variable for mobility of manager *i*. We create four interaction dummy variables using firm disclosure and manager gender indicator variables: *Disclosure*, a dummy variable for firm-level disclosure of financial performance information in firm *j*; *Non-Disclosure*, a firm-level dummy that equals 1 if a firm *j* does not disclose financial performance information; *Female*, a dummy variable for a female manager *i*; and *Male*, a dummy variable for a male manager *i*. We include the following three variables in the equation: Female Manager in Disclosing Firm (*DisclosureFemale*), Male Manager in Non-Disclosing Firm (*NonDisclosureMale*), and Male Manager in Disclosing Firm (*DisclosureMale*). Female Manager in Non-Disclosing Firm (*NonDisclosureFemale*) is the excluded, base group. These indicator variables equal 1 if a manager belongs in a given category and equal 0 otherwise. A manager can belong to only one of these four categories. *Firm* is a vector of firm-level controls. *Industry* and *Country* dummies indicate activity by firms in each three-digit SIC industry and country.

Recall we predicted that disclosure should increase mobility for men and women and decrease the gender gap in mobility (Hypothesis 1). Positive and statistically significant coefficients on *Disclosure* variables ($\beta, \gamma - \delta > 0$) support the prediction of increase in mobility due to disclosure. Further, if disclosure decreases the gender gap in mobility, then we should see that the difference in estimated

coefficients on indicators for disclosing and non-disclosing variables decreases between male and female managers ($\delta > \gamma - \beta$).

Firm Performance. Next, we estimate the following linear probability model specification to determine the effects of firm performance levels on mobility of male and female managers, conditional on disclosure of financial performance:

$$Mobility_i = \alpha + \beta FirmPerformance_{ij} * Female_i + \delta FirmPerformance_{ij} + \gamma Female_i + \varphi Firm_{ij} + \theta Industry_{ij} + \rho Country_{ij} + \varepsilon_i, \quad (2)$$

where *Mobility* is a dummy variable for mobility of manager *i*. *FirmPerformance* is a firm-level continuous variable for average firm-level sales growth for firm *j* in the three-year pre-mobility period. *Female* is a dummy variable for gender of manager *i*. *Firm* is a vector of firm-level controls which include the firm size (size by total number of employees)⁶ and other firm-level controls described in the previous section, which are available for disclosing firms. Industry and Country dummies indicate activity by firms in each three-digit SIC industry and country.

Hypothesis 2 predicts that firm performance and mobility are positively correlated. We should expect that the estimated coefficient on *FirmPerformance* is positive and significant ($\delta > 0$). Then, if firm performance and gender gap in mobility are negatively correlated as Hypothesis 3 predicts, then the coefficient on the interaction term should be positive and significant ($\beta > 0$).

In order to estimate the relative magnitude of gender gap by firm performance levels, we estimate a fuller model to test Hypotheses 2 and 3:

$$Mobility_i = \alpha + \beta HPFemale_{ij} + \delta HPMale_{ij} + \gamma APFemale_{ij} + \mu APMale_{ij} + \tau LPMale_{ij} + \varphi Firm_{ij} + \theta Industry_{ij} + \rho Country_{ij} + \varepsilon_i, \quad (3)$$

where *HPFemale* is an indicator variable that equals one if a manager is female and is in a high-performing firm, and equals zero otherwise. Analogously, *HPMale* variable equals one if a manager is male and is in a high-performing firm, and equals zero otherwise. *APFemale* and *APMale* variables are defined

⁶ Measure of size by total assets produces the same results but reduces the number of total observations.

accordingly for managers in average-performing firms. *LPMale* is a variable indicating a male manager in a low-performing firm. The base (excluded) group in this specification is *LPFemale*, which indicates a female manager in a low-performing firm. Firm performance indicators are constructed by defining a high-performing firm (HP) if a firm's average sales growth in the three -year pre-mobility period is in the fourth quartile of the growth distribution. Low-performing firms (LP) are in the first quartile, and average-performing firms (AP) are in the middle two quartiles of the growth distribution.

If the gender gap decreases with high performance, we should see that the difference in coefficients on Male and Female variables should get smaller with high performance: $\tau > (\mu - \gamma) > (\delta - \beta)$.

6. Estimation Results

6.1 Disclosure and Gender Gap in Mobility

External Mobility and Promotions. Table 5 presents the results from the linear probability analyses of the relationship between firm-level disclosure of financial performance and external mobility of its male and female managers.⁷ The unit of analysis is a manager, and the dependent variables are external mobility and external promotions.

To build the final model, we include the main variables of interest one by one. The estimated coefficient on *Disclosing Firm* in Model 1 is positive and significant, which suggests that managers are more likely to move externally if a firm is disclosing. In Model 2, we only include the indicator variable for gender, *Female*, and get negative and significant coefficient, which mirrors the evidence seen in the descriptive statistics that female managers are, on average, less likely to move externally than male managers. In Model 3, we include both *Disclosing Firm* and *Female* variables and report no change from the coefficients we determined from independent estimations in Models 1 and 2—both coefficients are of the same magnitude and statistical significance in the combined model. This stability in the estimated results suggests that disclosure and gender have strong independent effects on external mobility. The estimated coefficient on

⁷ The table reports linear probability model results due to ease of interpreting the coefficients. More complex models, such as probit, were run with similar results to estimate marginal probabilities of mobility.

Disclosing Firm is 0.020 (with a standard error of 0.002), which corresponds to a 14% increase in external mobility over a sample average rate. This result provides strong evidence that managers are more likely to move externally in disclosing firms.

Finally, we run the full specification in Model 4 by including all the interaction dummies between disclosure and gender, leaving the *Female in Non-Disclosing Firm* group as the base category. The rank and the ordering of the coefficients are clear and significant in this richer model, which provides strong evidence that disclosure has differential effects for male and female managers. The coefficient on the *Female Manager in Disclosing Firm* variable is 0.027 and statistically significant (at $p < 0.001$), which means that compared to female managers in non-disclosing firms, female managers in disclosing firms have a 46% greater probability of moving externally. Next, a much larger and statistically significant coefficient on the *Male in Non-Disclosing Firm* variable implies that male managers in non-disclosing firms move externally at a higher rate than female managers in non-disclosing firms, thus providing further support for gender differential in external mobility. The estimated coefficient on the *Male Manager in Disclosing Firm* is the largest in magnitude and statistically significant and different from the other two coefficients. This result suggests that male managers in disclosing firms have the highest rate of external mobility than any other group of managers. The difference in mobility between male and female managers decreases with performance: 0.081 for non-disclosing compared to 0.073 ($0.100 - 0.027$) for disclosing managers; this difference is statistically significant. This result supports Hypothesis 1, which predicts that disclosure would decrease the gender gap in external mobility. Taken together, these results provide strong evidence for the role that disclosure plays in external mobility of male and female managers, especially for male managers.

Next, we examine the relationship between disclosure and external promotions. The estimated coefficient on *Disclosure* in Model 5 is positive and significant, which means that managers in disclosing firms are 7% more likely to move externally to a different firm with a promotion. Model 6 includes a full set of interactions between disclosure and gender dummy variables, and the estimated results show that male managers in disclosing firms have the highest probability of external promotion of all managers. Notably, the estimated coefficient on *Female in Disclosing Firm* is very small and nearly equal to zero.

This suggests that disclosure has no effect on external promotion rates for female managers. Overall for external promotions, gender difference is very large, and disclosure seems to matter more for male managers—there is a statistically significant difference in external promotion rates between male and female managers, and between male managers in disclosing and non-disclosing firms. The gender gap does not seem to decrease for external promotions with disclosure. External markets seem to be more responsive to disclosure information for male managers and quite rigid toward female candidates for promotions.

These results taken together suggest that disclosure increases mobility of all managers, but it is especially helpful to male managers and for external promotions. Female managers in disclosing firms are 46% more likely to have external lateral moves compared to female managers in non-disclosing firms, but disclosure is not enough to increase the rate of external promotions for female managers. In the next set of estimations, we explore whether a firm's high performance may send more positive information about female managers and help reduce the gender gap.

6.2 Firm Performance and Gender Gap in Mobility

This section reports the results of the linear probability models testing the relationship between managerial mobility and firm performance levels. The main question we seek to answer is whether conditional on disclosure, superior performance affects the gender gap in mobility and promotions.

External Mobility and Promotions. Hypothesis 2 predicts that external mobility increases with firm performance. Table 6 reports the results for external mobility and promotions. In Models 1-3, the dependent variable is external mobility. The estimated coefficient on *Sales Growth* variable is positive and statistically significant, which, consistent with H2, indicates that with better firm performance, the likelihood that a manager will exit increases (Model 1). Next, we estimate the coefficient on the interaction term, *Female*SalesGrowth*, between manager gender and sales growth (Model 2), and find support for Hypothesis 2—the coefficient is positive and significant, indicating that higher performance increases external mobility and the gender gap decreases with higher firm performance. To test the prediction that the gender gap decreases with high performance (Hypothesis 3), we estimate a model with the full set of interactions between gender and performance variables in Model 3. The base (omitted) group is *Female*

Manager in Low-Performing Firm. The gender gap indeed decreases with higher performance: 0.081 for managers in low-performing firms, 0.069 for managers in average-performing firms, and 0.055 for managers in high-performing firms. The differences between performance groups are statistically significant. Hypothesis 3 is supported.

In Models 4-6, we estimate the model with external promotions as the dependent variable. The results suggest that external promotions increase with firm performance, but the gender gap is not affected (Models 4 and 5). The estimated coefficient on the interaction term is positive but not statistically significant. In Model 6, we estimate the specification with the full set of interactions and find similar results. The gender gap for managers in low-performing firms is 0.071, 0.056 for managers in average-performing firms, and 0.063 for managers in high-performing firms. The differences are statistically significant between low-performing and average-performing groups, but not statistically significant between average- and high-performing groups.

In order to further examine a possible non-linear relationship between performance and gender gap, we estimate a probit model with the same specifications (results not reported in the tables). Then, we estimate and plot marginal predicted probabilities of external mobility and promotions for different levels of firm sales growth. Figure 1 demonstrates mobility probabilities for male and female managers at different levels of firm performance. The graphs show that in general there is a significant gender gap in external mobility and promotion rates. In the external mobility graph, the probability line for female managers is more responsive to higher performance than for male managers (slope is steeper compared to the line for male managers), and the probabilities for male and female managers do not intersect until the very top quartile of firm performance distribution. For external promotions, the lines never intersect, although the confidence intervals start to overlap in the top quartile, making the difference statistically less meaningful. These results suggest that positive firm performance helps with external lateral mobility, but may still not be enough for female managers to bridge the external promotions gap with male managers.

All the results taken together demonstrate a novel and interesting pattern. Information increases mobility of female managers, but closing the gender gap is challenging. With disclosure of firm

performance, female managers can close the gender gap for external lateral moves but not for external promotions; likewise, female managers can close the gender gap for external moves with superior performance, but not for external promotions.

6.3 Robustness Checks: Endogeneity of Disclosure, Reverse Causality, and Selection Bias

In this section, we address the robustness of our findings. Endogeneity of disclosure to executive labor market outcomes, reverse causality, and selection bias are potential concerns. Finance and accounting literature has focused primarily on various capital market related reasons for why firms decide to disclose (Bromwich 1992, Healy and Palepu 2001). Because the literature on financial disclosure does not provide much guidance on the relationship between disclosure and executive mobility, we take an empirical approach to address these concerns. First, we use instrumental variables approach to deal with potential endogeneity of financial disclosure.

Second, use exogenous change in disclosure regulations to alleviate reverse causality and selection bias concerns. Selection bias (Heckman 1979) is a common issue that arises in gender gap research, because most work relies on observed wages or mobility, which can be influenced by individuals' decisions to take or reject offers. Even when controlling for observed factors, selection on unobserved factors can bias the estimated coefficients. Although researchers have offered few adequate solutions to the problem, Blau and Kahn's (2016) review of methodologies for correction for selection bias in gender gap studies suggests that the bias should be smaller for a sample of managers within the same occupation and with similar-level education and experience. Because the top managers in our sample are in the C-suite, it is reasonable to assume that the variation in their educational level and degree of experience is much lower than in other settings. Nevertheless, to address the issue of whether different types of male and female managers are distributed unequally between disclosing and non-disclosing firms, we utilize an exogenous change in policy that increased disclosure for select firms.

6.3.1 Instrumental Variable

We construct and use a firm-level measure of legal requirement to disclose as an instrument for disclosure to address concerns about unobservable factors that might be driving both disclosure and

mobility patterns. We exploit the wide variation in the EU-wide and country-level disclosure regulations to determine a driver of disclosure that is exogenous to managerial turnover.

For every affiliate in our sample, we determine whether it is subject to financial disclosure regulation and whether it discloses financial information. In constructing these variables, we used EU-wide and country-specific regulations to file P&L (profit and loss) statements with local regulatory agencies based on entity's legal form and size, and determined any exemptions afforded by local regulations. In determining exemptions, we first utilized the BvD's flag for any financial reporting exemptions a firm might be subject to. Then, in order to capture any missed exemptions, we identified and applied any exemptions afforded by local regulations based on national legal form, size, type of entity, group consolidation status. Group consolidation status can exempt certain groups from reporting affiliate-level financial information if affiliate financials are included in group's consolidated statements. Thus, the instrument varies by country, industry, and size. Most of the variation in the IV is within-country and within-industry—the variance decomposition shows that 84.8 percent of variance in the IV is within-country and 93.8 percent is within-industry.

We estimate the local average treatment effect (LATE), which is the effect of treatment (requirement to disclose) on the treated (disclosing firms) for those whose treatment status can be changed by the instrument. The IV methodology is capturing the effect of disclosure on mobility of “marginal” movers—top managers whose moves have been enabled by disclosure—and does not estimate those managers who would have moved or stayed regardless of disclosure.

Models 1 and 2 in Table 7 summarize the results from estimating the IV specification. The estimated coefficient on the interaction term *Female Manager*Disclosing Firm* is positive and significant. The results support the main findings of this study that disclosure of financial performance increases external mobility and promotions of female executives.

6.3.2 Change in Regulation

Next, we utilize an exogenous change in disclosure regulations by the European Union in 2005—International Financial Reporting Standards (IFRS)—that required some firms to adopt more stringent

disclosure requirements. This regulation essentially standardized and increased the level and degree of disclosure across different economies in the EU. The shift to compliance was gradual from 2004-2009 (Christensen et al. 2013), which allows us to compare exit rates between firms that disclosed as usual and firms that adopted the new standards and thus disclosed more. Many studies have utilized this policy change to measure the effects of increased disclosure on various firm outcomes (see De George et al. 2016 for a review).

Models 3 and 4 in Table 7 report the results. The estimated coefficients on the *Change to IFRS* indicator variables in Model 3 shows that compared to female managers in regular disclosure firms, female and male managers in IFRS-adopting firms move and are promoted externally at a much higher rate. The estimated coefficients on the interaction term between gender and change in disclosure variable in Model 4 are positive and significant (at $p < 0.001$), which suggests that the gender gap in external mobility and promotions is closing in firms that adopted IFRS. This pattern provides a strong robustness check of the main results that increased disclosure has a positive effect on reducing gender gap in manager mobility and promotion.

6.4 [Alternative Explanations](#)

In this section, we discuss alternative explanations for observing the reported patterns in mobility. Our theoretical argument is economic; and a sociological explanation for why we may see higher rates of female external mobility and promotions from disclosing and high-performing firms may be ascribed to status (e.g., Podolny 1993; Rider and Tan 2014; Bidwell et al. 2015). If disclosing firms are consistently higher status than non-disclosing firms, then these firms may have higher mobility than lesser-status non-disclosing firms. Our results for firm performance levels show patterns that alleviate this alternative mechanism. Because we measure high firm performance as outperformance over industry peers, it is difficult to ascribe a status rank to firms whose above-average performance fluctuates. Not many firms can sustain such performance over period of time and therefore be high-status for an extended period of time. Because performance naturally fluctuates, we are less concerned that mobility is explained primarily by relative status.

Next, in this study, we made no assumptions about differences between male and female executives. Although one can assume that the degree of career motivation and ambition is likely to be similarly high among male and female top executives, there may be unobservable (at least to the researcher) attributes that contribute to the differential rates of mobility between men and women managers in different types of firms. We check a few possibilities to rule out.

First, women are constrained geographically to move for promotions. Women may be tied down to a location due to family circumstances (Benson 2014). For example, economic prospects of other family members may play a larger role in women's willingness to relocate despite better opportunities elsewhere. To examine this issue, we look at the patterns of within-unit mobility and find the same results. Within-unit promotions of C-suite executives do not typically necessitate change of geographic location, as most of the top management is located in the headquarters. Thus, if women are offered internal opportunities at an equal rate as men, then we should not see the gender gap pattern for within-unit promotions. We find patterns for internal promotions similar to those of external promotions. The gender gap does not seem to be alleviated for female managers moving and advancing internally.

A second explanation is also possible: women do not value work as much as men. In this case, the probabilities of promotions and exits would not converge at the top quartile of performance distribution. The gap would persist throughout, because arguably, competition for promotions increases in high-growth firms. Moreover, unobservable differences in career commitment should be minimized for women in top management positions, in which both men and women should share a high level of career ambition and commitment. Taken together, results do not appear to support the argument that the gender gap in mobility is due to lower levels of ambition among female top managers.

Third, psychological attitudes and non-cognitive skills in women may drive the difference in propensity to move and take promotions. Previous work has found that women differ in non-cognitive skills from men—women are more risk averse, less willing to compete, and less likely to negotiate (e.g., Adams and Funk 2012, Bertrand 2011, Croson and Gneezy 2009). Although the net evidence is still ambiguous (e.g., Kaplan and Walley 2016), these arguments imply suboptimal behaviors on the part of women, but do not

account for the possibility that women might be, in fact, responding optimally to the set of circumstances with certain reward and penalty structures specific to gender-group expectations, which may or may not have roots in gender differences and may in fact be the result of gender bias.

The flatter slope of returns from investment in human capital for women may explain why women may not be eager to seek challenging tasks and assignments and thus appear less competitive and more risk averse. If the women's returns on investment approaches men's only at the highest investment levels, then the price is too steep to pay and women won't invest. Such a decision would have little to do with differences in preferences, psychological attitudes and non-cognitive skills. Kaplan and Walley (2016) review the assumptions of female risk-aversion from over 100 reports and the inconclusive empirical evidence on female risk aversion including Nelson's (2014, 2015) meta-reviews. The researchers caution that the apparent risk-averse behavior may be a context-driven reaction rather than a gender-specific attribute. This is also consistent with the "anticipatory sorting" argument (Fernandez-Mateo and King 2011), which states that anticipated treatment of women in the labor markets may affect their decisions and aspirations. Most of the work on gender differences in attitudes and preferences is done in laboratory settings; there is almost no empirical evidence of impact of these psychological and non-cognitive factors for actual outcomes (Bertrand 2011). So it is important to continue exploring the fundamental difference in the explanations for why the gender gap exists—how much of it is due to women's unique behavioral and psychological profiles and how much is due to implicit bias and misperceptions of women's productivity in the labor markets, and how organizational factors may help mitigate these biases.

7. Discussion and Conclusion

This study proposes that firm-level disclosure of performance can determine female top managers' visibility and drive the external mobility of these managers. We document large gender gap in external mobility of top managers and find that disclosure of performance increases mobility and advancement of female top managers. Although female managers are promoted at a greater rate in firms with good performance than other female managers, the mobility gap between male and female managers does not close unless firm performance is at the very top quartile of the distribution. This study not only documents

mobility patterns of female executives on an unprecedented to-date scale, but also points to firm-level factors that can influence opportunities for female top managers in the managerial labor markets. Moreover, the relative “invisibility” of female top managers in non-disclosing firms can perpetuate biases that contribute to the underrepresentation of women in top management.

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Table 1. Summary Statistics

	Mean	Std. Dev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 <i>Firm is Disclosing</i>	0.84	0.37	1																
2 <i>Female</i>	0.15	0.36	-0.037	1															
3 <i>External Mobility</i>	0.14	0.35	0.017	-0.090	1														
4 <i>External Promotions</i>	0.10	0.30	0.033	-0.091	0.570	1													
5 <i>Firm Age</i>	30.1	21.2	0.023	0.062	0.005	-0.100	1												
6 <i>Sales Growth</i>	0.17	0.37	.	-0.018	-0.007	0.012	-0.163	1											
7 <i>Number of Employees</i>	161.8	2,400	.	-0.011	0.034	0.006	0.039	0.0079	1										
8 <i>Total Assets '000</i>	57,721	2,988,298	.	-0.005	0.013	0.006	0.011	0.003	0.309	1									
9 <i>Labor Productivity</i>	4.88	1.06	.	-0.038	0.064	0.004	0.060	-0.025	0.011	0.040	1								
10 <i>Capital Intensity</i>	3.32	1.87	.	-0.037	0.086	0.040	0.098	0.002	0.025	0.071	0.307	1							
11 <i>Manager is CEO</i>	0.37	0.48	0.085	0.017	-0.307	-0.240	-0.006	0.023	-0.027	-0.006	-0.081	-0.135	1						
12 <i>Shares of Female Top Managers</i>	0.10	0.21	-0.065	0.559	-0.033	-0.055	0.091	-0.031	-0.005	-0.004	-0.023	0.010	-0.176	1					
13 <i>CEO is Female</i>	0.12	0.33	0.014	0.416	-0.068	-0.069	0.055	-0.010	-0.013	-0.004	-0.035	-0.072	0.243	0.001	1				
14 <i>Family Firm</i>	0.39	0.49	-0.006	0.056	-0.042	-0.073	0.077	-0.035	-0.022	-0.010	-0.096	-0.091	0.116	0.043	0.028	1			
15 <i>Affiliated with Corporate Group</i>	0.59	0.49	0.180	-0.072	0.116	0.067	0.026	0.015	0.042	0.013	0.143	0.197	-0.169	-0.103	-0.029	0.074	1		
16 <i>Multinational</i>	0.05	0.21	0.092	-0.046	0.020	0.001	0.014	0.022	0.070	0.026	0.138	0.093	-0.061	-0.053	-0.036	-0.103	0.149	1	
17 <i>Diversified</i>	0.11	0.31	0.142	-0.049	0.035	0.034	-0.010	0.021	0.050	0.018	0.122	0.117	-0.054	-0.047	-0.042	-0.066	0.203	0.592	1

Notes: This table reports summary statistics and correlations for the main firm and manager mobility variables. Statistically significant correlations at the 5% level are bolded. Non-disclosing firms do not have values for Sales Growth, Number of Employees, Total Assets, Labor Productivity and Capital Intensity.

Table 2. Summary Statistics by Gender

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Male Managers				Female Managers				Difference (Male-Female)
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	
Panel A. Firm Characteristics									
<i>Firm is Disclosing</i>	738,956	0.84	1	0.37	131,686	0.80	1	0.40	0.04**
<i>Firm Age</i>	738,956	29.5	23	20.65	131,686	33.2	24	23.94	-3.7**
<i>Sales Growth</i>	411,869	0.17	0.11	0.37	65,191	0.15	0.11	0.33	0.02**
<i>Number of Employees</i>	398,462	172.3	24	2,516.8	66,244	98.8	19	1,513.4	73.5**
<i>Total Assets `000</i>	567,243	63,303	2,462	3,220,768	94,932	24,364	1,773	551,212	38,939**
<i>Labor Productivity</i>	383,007	4.90	4.81	1.07	61,847	4.78	4.71	0.96	0.12**
<i>Capital Intensity</i>	354,881	3.34	3.37	1.88	57,296	3.14	3.22	1.80	0.20**
<i>Manager is CEO</i>	738,956	0.36	0	0.48	131,686	0.39	0	0.49	-0.02**
<i>Shares of Female Top Managers</i>	738,956	0.05	0	0.12	131,686	0.37	0.33	0.34	-0.33**
<i>CEO is Female</i>	738,956	0.07	0	0.25	131,686	0.45	0	0.50	-0.38**
<i>Public Firm</i>	738,956	0.20	0	0.40	131,686	0.17	0	0.37	0.04**
<i>Family Firm</i>	738,956	0.38	0	0.48	131,686	0.45	0	0.50	-0.08**
<i>Affiliated with Corporate Group</i>	738,956	0.61	1	0.49	131,686	0.51	1	0.50	0.10**
<i>Multinational</i>	738,956	0.05	0	0.22	131,686	0.02	0	0.15	0.03**
<i>Diversified</i>	738,956	0.12	0	0.32	131,686	0.07	0	0.26	0.04**
Panel B. Mobility									
<i>External Mobility</i>	738,956	0.15	0	0.36	131,686	0.07	0	0.25	0.09**
<i>External Promotions</i>	394,023	0.11	0	0.32	73,505	0.04	0	0.19	0.08**

Notes: This table reports summary statistics for the main firm and manager mobility variables by gender and mean comparison tests for male and female managers. The unit of observation is a manager. ** implies the difference in means between male and female managers is significant at the 1% level.

Table 3. Summary Statistics by Firm Disclosure

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Disclosing Firms			Non-Disclosing Firms			Difference (Disclosing-Non-Disclosing)
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	
Panel A. All Managers							
<i>External Mobility</i>	727,665	0.14	0.35	142,977	0.13	0.33	0.01**
<i>External Promotions</i>	391,701	0.11	0.31	75,827	0.08	0.27	0.03**
Panel B. Female Managers							
<i>External Mobility</i>	105,740	0.07	0.25	25,946	0.06	0.24	0.01**
<i>External Promotions</i>	57,663	0.04	0.20	15,842	0.02	0.15	0.02**
Panel C. Male Managers							
<i>External Mobility</i>	621,925	0.15	0.36	117,031	0.14	0.35	0.01**
<i>External Promotions</i>	334,038	0.12	0.32	59,985	0.09	0.29	0.03**
Panel D. Firm Characteristics							
<i>Firm Age</i>	727,665	30.3	21.0	142,977	29.0	22.5	1.3**
<i>Shares of Female Top Managers</i>	727,665	0.09	0.20	142,977	0.13	0.26	-0.04**
<i>CEO is Female</i>	727,665	0.13	0.33	142,977	0.11	0.32	0.02**
<i>Family Firm</i>	727,665	0.39	0.49	142,977	0.40	0.49	-0.01**
<i>Affiliated with Corporate Group</i>	727,665	0.63	0.48	142,977	0.39	0.49	0.24**
<i>Multinational</i>	727,665	0.05	0.22	142,977	0.00	0.04	0.05**
<i>Diversified</i>	727,665	0.13	0.34	142,977	0.01	0.10	0.12**

Notes: This table reports summary statistics for the main mobility and firm characteristics variables and mean comparison tests for disclosing and non-disclosing groups by manager gender and firm characteristics. The unit of observation is a manager. ** implies the difference in means between disclosing and non-disclosing firms is significant at the 1% level.

Table 4. Summary Statistics by Country

Country	(1)	(2)	(3)		(4)	(5)		(6)
	Share of managers who are female	Share of CEOs who are female	External Mobility		Female	External Promotions		Female
			Male	Female		Male	Female	
Austria	17.9%	9.4%	14.3%	5.7%	4.2%	1.1%		
Denmark	11.3%	3.1%	16.5%	4.4%	27.9%	11.0%		
Finland	11.1%	5.1%	10.2%	6.9%	12.6%	8.2%		
France	10.9%	4.6%	28.4%	16.9%	17.5%	8.9%		
Germany	17.5%	5.7%	18.4%	8.1%	5.6%	1.9%		
Greece	16.1%	8.2%	13.5%	3.3%	11.0%	4.1%		
Norway	11.6%	4.3%	19.0%	4.9%	32.4%	10.5%		
Portugal	20.7%	16.0%	5.4%	1.2%	9.1%	2.0%		
Spain	12.6%	6.8%	7.3%	5.6%	13.3%	10.4%		

Notes: This table reports summary statistics for the main manager and mobility variables by country. *Share of Managers who are Female* variable reports the share of women in the top management of the firm. *The Share of CEOs who are Female* variable calculates the share of female CEOs out of all CEOs in the country. *External Exits* is the share of managers in a firm who exited to a different firm by 2007. *External Promotions* is the share of managers who exited to a different firms with a promotion.

Table 5. The Relationship between Firm-level Disclosure and External Mobility and Advancement of Female Top Managers

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	External Mobility (Lateral and Promotions)				External Promotions	
Indicator for:						
Female Manager in Disclosing Firm				0.027*** (0.002)		-0.004* (0.002)
Male Manager in Non-Disclosing Firm				0.081*** (0.002)		0.035*** (0.002)
Male Manager in Disclosing Firm				0.100*** (0.002)		0.044*** (0.002)
Disclosing Firm	0.020*** (0.002)		0.020*** (0.002)		0.007*** (0.001)	
Female Manager		-0.075*** (0.002)	-0.075*** (0.002)		-0.046*** (0.001)	
Total Number of Top Managers in the Firm	0.016*** (0.000)	0.016*** (0.000)	0.016*** (0.000)	0.016*** (0.000)	0.003*** (0.000)	0.003*** (0.000)
Share of Female Top Managers in the Firm	-0.076*** (0.002)	-0.003 (0.002)	-0.002 (0.002)	-0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
CEO is Female	-0.007*** (0.002)	-0.006*** (0.002)	-0.007*** (0.002)	-0.007*** (0.002)	-0.011*** (0.001)	-0.011*** (0.001)
ln(Firm Age)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
Family Firm	-0.024*** (0.001)	-0.025*** (0.001)	-0.024*** (0.001)	-0.024*** (0.001)	-0.016*** (0.001)	-0.016*** (0.001)
Business Group	0.059*** (0.001)	0.062*** (0.001)	0.059*** (0.001)	0.059*** (0.001)	0.026*** (0.001)	0.026*** (0.001)
Multinational Firm	-0.028*** (0.003)	-0.027*** (0.003)	-0.028*** (0.003)	-0.028*** (0.003)	-0.056*** (0.003)	-0.056*** (0.003)
Firm type controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.062	0.064	0.065	0.065	0.086	0.086
Observations	870,642	870,642	870,642	870,642	467,528	467,528
Sample average	0.139	0.139	0.139	0.059	0.102	0.024

Notes: This table reports the results of the linear probability model estimation of the relation between firm disclosure of performance information and external mobility of top managers by gender. The estimation is at the manager level. The base comparison group and its corresponding sample averages in Models 4 and 6 are for *Female Managers in Non-Disclosing Firms*. Robust standard errors in parentheses are clustered by firm. ** significant at 1%; * significant at 5%.

Implications:

Models 1-3 show that disclosure increases external mobility, but female managers are less likely to exit than male managers. Model 4 supports H1 and shows the ordering of exit rates by gender and firm disclosure status: female top managers in non-disclosing firms exit at the lowest rate then followed by female top managers in disclosing firms, then by male managers in non-disclosing firms. Male managers in disclosing firms exhibit highest rates of exit. The gender gap decreases with disclosure. Models 5 and 6 show that male managers in disclosing firms exit at highest rates for external promotions, followed by male managers in non-disclosing firms. The gender gap in external promotions does not seem to close with disclosure of performance. H1 does not hold for external promotions.

Table 6. The Relationship between Firm-level Performance and Mobility of Female Top Managers

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	External Mobility (Lateral and Promotions)			External Promotions		
Female Manager X Firm Sales Growth		0.033*** (0.007)			0.009 (0.009)	
Firm Sales Growth	0.016*** (0.003)	0.012*** (0.003)		0.011** (0.004)	0.010** (0.004)	
Female Manager	-0.069*** (0.003)	-0.074*** (0.003)		-0.061*** (0.004)	-0.062*** (0.004)	
Indicator for:						
Female Manager in Average-Performing Firm			0.006 (0.004)			0.014* (0.006)
Female Manager in High-Performing Firm			0.031*** (0.005)			0.018* (0.007)
Male Manager in Low-Performing Firm			0.081*** (0.004)			0.071*** (0.006)
Male Manager in Average-Performing Firm			0.075*** (0.004)			0.070*** (0.006)
Male Manager in High-Performing Firm			0.086*** (0.005)			0.081*** (0.006)
Total Number of Top Managers in the Firm	0.017*** (0.001)	0.017*** (0.001)	0.017*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Share of Female Top Managers in the Firm	0.004 (0.005)	0.003 (0.005)	0.003 (0.005)	0.003 (0.007)	0.003 (0.007)	0.003 (0.007)
CEO is Female	-0.003 (0.003)	-0.003 (0.003)	-0.003 (0.003)	-0.012** (0.004)	-0.012** (0.004)	-0.013** (0.004)
ln(Firm Age)	-0.008*** (0.002)	-0.008*** (0.002)	-0.008*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)	-0.009*** (0.002)
ln(Number of Employees)	0.020*** (0.001)	0.020*** (0.001)	0.020*** (0.001)	0.004** (0.001)	0.004** (0.001)	0.004** (0.001)
Family Firm	-0.006** (0.002)	-0.006** (0.002)	-0.006** (0.002)	-0.012*** (0.003)	-0.012*** (0.003)	-0.012*** (0.003)
Business Group	0.052*** (0.002)	0.052*** (0.002)	0.052*** (0.002)	0.036*** (0.003)	0.036*** (0.003)	0.036*** (0.003)
Multinational Firm	-0.045*** (0.004)	-0.045*** (0.004)	-0.045*** (0.004)	-0.067*** (0.004)	-0.067*** (0.004)	-0.068*** (0.004)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.095	0.095	0.095	0.062	0.062	0.062
Observations	255,316	255,316	255,316	118,495	118,495	118,495
Sample average	0.142	0.142	0.073	0.129	0.129	0.060

Notes: This table reports the results of OLS estimation of the relation between levels of firm performance and mobility of top managers by gender. The estimation is at the manager level. Sales Growth is a continuous variable measured as the average firm-level sales growth in three-year pre-mobility period. Low-performing firms are in the lowest quartile of sales growth. High-performing firms are in the top quartile of sales growth. Average-performing firms are in the middle two quartiles of sales growth distribution. The base comparison group and its corresponding sample averages in Models 3 and 6 are *Female Managers in Low-Performing Firms*. Robust standard errors in parentheses are clustered by firm. ** significant at 1%; * significant at 5%.

Implications:

Models 1 and 4 indicate that sales growth increases external mobility and promotions.

Model 2 shows that female managers are more likely to move externally in high-performing firms than in low-performing firms.

Model 3 shows that external exits increase with higher performance, and gender gap decreases with high firm performance. The gender difference (male-female) in external mobility for managers in low-performing firms is 0.081, for managers in average-performing firms is 0.069 (0.075-0.006), and 0.055 (0.086-0.031) for managers in high-performing firms. The differences in the gender gap across performance tiers are statistically significant.

Model 5 shows that there is no statistically significant difference in external promotion rates for female managers in high-performing firms from female managers in lower-performing firms.

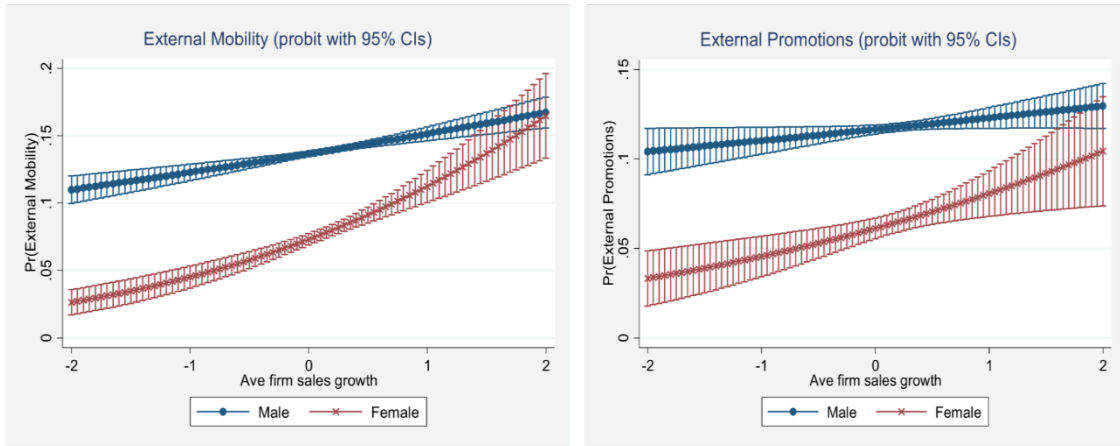
Model 6 shows that higher performance increase external promotions rates for both male and female top managers, but the gender gap does not decrease with higher performance--the differences are not statistically significant.

Table 7. Robustness Checks: Instrumental Variable and Change to Disclosure of Firm-level Performance

Dependent variable:	(1)	(2)	(3)	(4)
	IV: Requirement to Disclose		Change to IFRS	
	External Promotions		External Promotions	
Female Manager X Disclosing Firm		0.148*** (0.025)		
Indicator for:				
Female Manager in Change Firm				0.031*** (0.007)
Male Manager in No-Change Firm				0.054*** (0.003)
Male Manager in Change Firm				0.072*** (0.005)
Disclosing Firm	0.052*** (0.006)	0.027** (0.009)		
Change to IFRS			0.019*** (0.004)	
Female Manager	-0.050*** (0.002)	-0.170*** (0.020)	-0.052*** (0.003)	
ln(Firm Age)	-0.047*** (0.001)	-0.047*** (0.001)	-0.011*** (0.002)	-0.011*** (0.002)
ln(Number of Employees)			0.001 (0.001)	0.001 (0.001)
Total Number of Top Managers in the Firm	-0.001*** (0.000)	-0.001*** (0.000)	0.006*** (0.001)	0.006*** (0.001)
Share of Female Top Managers in the Firm	0.000 (0.003)	0.006* (0.003)	-0.001 (0.006)	-0.001 (0.006)
CEO is Female	-0.024*** (0.002)	-0.026*** (0.002)	-0.012*** (0.003)	-0.013*** (0.003)
Family Firm	-0.040*** (0.001)	-0.039*** (0.001)	-0.013*** (0.002)	-0.013*** (0.002)
Business Group	0.033*** (0.002)	0.033*** (0.002)	0.029*** (0.002)	0.029*** (0.002)
Multinational Firm	-0.034*** (0.003)	-0.032*** (0.003)	-0.058*** (0.003)	-0.058*** (0.003)
Industry controls	Yes	Yes	Yes	Yes
Country controls	Yes	Yes	Yes	Yes
R ²	0.024	0.018	0.078	0.078
Observations	467,528	467,528	141,361	141,361
Sample average	0.086	0.086	0.109	0.021

Notes: This table reports the results of IV and OLS estimations of the relation between disclosure of firm performance and external mobility of top managers by gender. The instrument in the IV regressions is a firm's *Legal Requirement to Disclose*. *Change to IFRS* is an indicator variable for firms that are subject to and complied with increased disclosure regulations (IFRS) of 2005. Four indicator variables--*Female Manager in No-Change Firm*, *Female Manager in Change Firm*, *Male Manager in No-Change Firm*, *Male Manager in Change Firm*-- are constructed by interacting managerial gender variable with *Change to IFRS*. The base comparison group and its corresponding sample averages in Models 3 and 4 are *Female Managers in Non-Disclosing Firms*. Robust standard errors in parentheses are clustered by firm. ** significant at 1%; * significant at 5%.

Figure 1. Predicted Probabilities of External Mobility and External Promotions by Gender.



Appendix I: Financial Disclosure Requirements in Europe

This section provides an overview of financial reporting regulations in European Union and its individual member states. Appropriate accounting and financial information is critical for successful management of an enterprise. Accounting information is an important source of information for owners, investors, managers and other stakeholders of a firm. Financial disclosure of firms in Europe is governed by diverse set of national and EU-wide reporting regulations. For member states, firm financial reporting regulations in the European Union are comprised of complex medley of legislation at the EU and national levels. Financial reporting legislation is aimed at establishing high levels of transparency and comparability of financial reporting for better functioning of capital markets and protection of investors. At the EU-level, the International Accounting Standards (IAS)/International Financial Reporting Standards (IFRS) regulate financial reporting of listed companies since 2005. The Fourth Directive (78/660/EEC) and the Seventh Directive (83/349/EEC) are applied by member states into their national accounting legislation. Member states may also provide exemptions to firms of certain size and legal form from reporting financials statements or allow them to report simplified financial statements.

Even though the European Commission has strived to harmonize the financial disclosure standards for firms across the EU member states, the country-level regulations remain differentiated due to persisting national regulatory structures. The EU Directives that govern the financial disclosure regulations provide a general framework with a set of minimum requirements that member states should comply with. The most important EU Directives governing the financial disclosure of firms are: the Fourth (Company Law) Directive of 1978, which regulates the accounts of limited liability companies; the Seventh Directive of 1983, which specifies rules for consolidated statements; and other directives aimed at banks, insurance companies, and small and medium-sized enterprises (SMEs). The goal of the Directives is to facilitate compatibility of rules across member states rather than to imposition of the same set of rules. Hence, country-level regulations dictate the specific rules, such as disclosure requirements and exemptions, and thus, regulations vary widely across member states. Importantly, the EU does not have any rules specified regarding the enforcement of accounting and disclosure regulations, which makes enforcement of disclosure regulations a national matter (Benston et al. 2006). That countries vary in enforcement provides further variation in disclosure.

Firms may not report their financials either because they are exempt or because they decide not to disclose regardless of requirements. Non-compliance with reporting requirements is not uncommon and may not be necessarily a result of lack of enforcement. For example, in Portugal, many firms decide to pay a fine rather than file reports. In Germany, affiliated firms are exempt from filing financial reports if the group's ultimate owner (apex firm) includes individual affiliate statements in the group's consolidated statements. A notice of exemption page from Saltzgitter AG Group's 2012 Annual Report, which lists affiliates that take advantage of this exemption reads: "The following fully consolidated domestic subsidiaries have fulfilled the conditions required under Section 264 para.3 or Section 264 b, German Commercial Code (HGB), and are therefore exempted from disclosure of their financial statements and from the obligation to prepare a management report". Further, Laschewski and Nasev (2017) find that around 2006, 16% of German companies did not comply with disclosure requirements in 2006 due to lax enforcement.

The variation in disclosure regulations and the complex interplay of national and industry factors result in large variation in disclosure both within and across countries, industries and firms. In our sample, disclosing firms are reporting firm performance (P&L accounts), and non-reporting firms have missing firm performance (P&L) accounts in 2003-2007.

We also determine at the affiliate-level whether a company is subject to filing requirements by applying EU- and country-level regulations and exemptions based on firm legal form, type, size, and industry. We consulted with financial audit professionals in several of our sample countries to confirm the accuracy of our coding. Although our final measure may not capture with all the legal nuances of disclosure regulations, it provides an alternate and exogenous way to measure disclosure.

References:

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Council Directive 96/71/EC of the European Parliament and of the Council of 16 December 1996 concerning the posting of workers in the framework of the provision of services. *Official Journal of the European Union*. L 018, 01/21/1997:1--6.

Seventh Council Directive 83/349/EEC of 13 June 1983 based on the Article 54 (3) (g) of the Treaty on consolidated accounts. *Official Journal of the European Union*. L 193, 07/18/1983:1.

Appendix II: Data Construction

A. Assigning Gender

We use an onomastic algorithm, NamSor Gender API tool, to assign gender to each individual name. The algorithm uses observable trends in naming in each country to predict an individual's gender. The algorithm has been used in various academic and policy studies on gender.⁸ The tool is developed for all countries, but it is especially highly calibrated and accurate for European countries in our sample. The algorithm takes into account the country a person resides in, ethnic origin of the last name, and the characteristics of a first name to calculate the estimate that a name belongs to a male or female individual. For example, the name “Andrea Rossini” (Italian origin last name) is assigned to a male category with a probability of 1, whereas “Andrea Parker” (Anglican origin last name) is assigned to a female category with a probability of 1. Names that are androgynous or otherwise difficult to classify into genders are assigned to the “Unknown” category. From 1,245,063 manager names, 201,063 (16.2%) were classified as “Female”, 1,005,428 (80.8%) names were classified as “Male”, and 38,752 (3.1%) were “Unknown”.

All reported estimations exclude the “Unknown” category. We supplement extensive manual checks with the strictest threshold for female and male names (when the probability of an estimate is equal to 1), confirm the robustness of the estimation results to slightly less rigorous thresholds (down to 0.8) and to inclusion and exclusion of the “Unknown” category to the “Male” or “Female” category.

B. Name Matching Methodology

The data for individual managers is from annual publications of Orbis database from the Bureau van Dijk that identifies top management team and board members for each firm. To construct mobility variables for each manager, we combine annual data from 2003 to 2007. The firms in the sample operate in the following countries: Austria, Denmark, Finland, France, Germany, Greece, Norway, Portugal, and Spain. Because the BvD does not assign identifiers to individuals for those years, we assign unique identifiers to all individual managers in the data. We use position title information to remove all individuals who are not in the management team, categorize titles into CEO and non-CEO rank positions, and standardize individuals' first and last names. In order to match individuals across years, we use fuzzy matching algorithm on standardized names. The matching algorithm uses bigram comparison methodology (Frakes and Baeza-Yates 1992, Blasnik 2010) to calculate proximity scores for each pair of string comparisons. We improve the matching accuracy through the reiterative process of manual inspections of matches, adjustment of the algorithm for matching precision, and probabilistic matching methodology for multiple matches for popular names that uses supplementary information for each individual, such as date of birth, home address, education and others.

References:

Blasnik M (2010) Reclink: Stata module to probabilistically match records. <http://ideas.repec.org/c/boc/bocode/s456876.html>.

Frakes WB, Baeza-Yates R (1992) *Information retrieval: Data structures and algorithms*. (Prentice-Hall, Englewood Cliffs, NJ).

⁸ <https://blog.namsor.com/tag/gender-studies>, as of October 2016

Appendix III. Information Asymmetry and Segmented Managerial Labor Market

In this section, we describe how differences in information availability about managerial ability can result in a segmented labor market.

We start with a simplified outline of a managerial labor market. There are managers and firms that employ them. There are two types of firms in this market: firms that disclose their performance information and firms that do not disclose their performance. Firm performance can be high or low. Managers can be inherently of high quality or low quality. Both managers and their employers learn of their true quality after a production period. External market infers managerial quality from disclosed firm performance, and updates their prior beliefs about managerial quality. Re-matching of managers and firms will occur before a new production period begins.

We make three assumptions. 1. *Information symmetry inside a firm.* Firms gain full information about the quality of the managers they employ after a production period. Having had the opportunity to observe and assess the quality of their managers, firms know which managers are worth keeping and which ones are not. Firms want to retain good managers and let go of (fire) the underperforming managers. 2. *Information asymmetry outside the firm.* The labor market does not have full information about individual managers. External market infers managerial quality from disclosed firm performance. High performance sends a strong signal of managerial high quality, low performance sends a strong signal of lower quality, and market does not update their prior beliefs if there is no disclosure. Performance disclosure reduces the noise level of individual productivity signals. Managers in disclosing firms have lower variance in productivity information compared to managers in non-disclosing firms. 3. *Labor market, on average, has a higher preference for male managers over female managers.* The market believes that the average productivity of female managers is lower than the average productivity of a male manager. The market updates this prior belief from disclosed performance information.

Once a production period ends, market re-matching should occur. A firm's goal is to obtain the best managers at lowest cost and risk and retain them at lowest wages. A manager's goal is to work for highest wages and seek career progression. Wages in this simplified setting incorporate both monetary and non-monetary incentives.

Each agent's available set of strategies varies depending on firm performance and managerial quality. Firms, upon learning of true quality of their own managers, can decide to either retain a manager (at the same position or promote within), or let them go (fire). Managers, on the other hand, can choose to stay with the same firm if they are not fired (at the same position or get promoted internally), or move out (as a result of either getting fired or poached). The external market updates their prior beliefs about manager quality from disclosed firm performance and seeks to obtain best matches between firms and managers (assortative matching).

Post-Disclosure Dynamics: Firm and Manager Strategies

In this section we describe the post-disclosure market mobility dynamics by outlining firm and manager strategies and determining the net effect of disclosure on manager mobility. Table A1 summarizes the following discussion.

Disclosing, high performing (DHP) firms and their managers

Signal. Disclosure of high performance provides a strong and less noisy signal of high managerial quality to the labor market. *High-quality managers.* For the managers the firm wants to retain, the firm now has to

pay higher wages to match external offers or offer promotions. These managers are in a better position to garner external offers with higher pay and status, because they have a credible threat of leaving and can bargain for higher wages and internal promotions. These high-quality managers will stay if the firm matches the external offers and will leave if external offer dominates what the current employer is willing to pay. *Low-quality managers.* The disclosing firm can fire and replace a manager if he or she is truly of low quality. These managers are willing to accept lower wages because they have no option to stay with the firm. In DHP firms, both good and low-quality managers will turn over. *Market efficiency.* The market cannot distinguish between high and low-quality managers coming from disclosing high-performing firms. Thus, managers coming from a high-performing disclosing firm will receive high wage offers regardless of their true quality. Re-matching can be inefficient if a low-quality manager gets matched with a high quality firm.

Both high and low-quality managers from DHP firms prefer to join a disclosing firm, because it affords them visibility. Since firm performance is a function of many different variables, and if firm performance is stochastic, then even if firm performance declines in the future, each type of manager has a better future option than in a ND firm. Good-quality managers will be retained regardless of firm performance, because firms learn of their true quality. Low-quality managers, even if they are fired from each firm, they still prefer a disclosing firm. In DHP firm, they can benefit from the good signal, and in DLP firm, they can benefit from the probability of a high firm performance in the subsequent DLP firms. A disclosing firm provides an opportunity that at some point, a good signal will be attached to them and they can benefit from it by matching with a better firm at higher pay. No such opportunity exists in ND firms.

Hiring options. The DHP firm will need to pay higher wages to retain good managers. High-quality managers in DHP firms have a very high bargaining power and can more effectively influence internal promotions and pay. DHP firms will have more active internal markets because it may utilize internal markets to retain the good managers and because it needs to fill greater number of vacancies—both good and low-quality managers need replacements. Also, higher wages in DHP firms make it easier to attract the best managers. DHP firms will prefer to hire from DHP firms, and managers from DHP firms are likely to prefer DHP firms. This is because if good managers cannot be distinguished by their ability, then each manager receives an offer reflecting the average marginal productivity of the entire workforce of managers. Then, high-quality managers will lose while low-quality managers gain. The incentive of high-quality managers is to be identifiable from low-quality managers, thus they will seek to sort into disclosing high-performing firms. This logic is consistent with the findings of a recent study by Tan and Rider (2017), which shows that employee exits as promotions can increase employer competitiveness in the labor market because external promotions from DHP firms can signal greater career opportunities in DHP firms to potential hires. Rider and Tan (2014) also find that high-performing firms are more likely to attract employees, even from higher-status competitors.

Propositions: DHP firms are more likely to lose more managers, have higher wages, have more active internal promotions market designed to retain managers, and are better able to attract new high-quality managers.

Disclosing, low-performing (DLP) firms and their managers

Signal. Disclosure of low performance also provides a strong signal about managerial quality, but in this case, markets infer lower quality of managers. *High-quality managers.* Firms will want to retain the managers that are good. Because of the low-quality signal, the good-quality managers in DLP firms will have lower rates of external offers that dominate their current wages, and thus are more likely to stay with

their existing firm. DLP firms will not have to pay higher wages to retain their good managers. *Low-quality managers.* Firms fire and let go managers that are truly underperforming. Low-quality managers who get fired will be looking for a job and will get matched with a low-quality firm, with likely a lower pay.

Market efficiency. The market re-matching of low-quality managers in this case is efficient, but good managers are not able to bargain for higher value in exchange for their services. DLP firms benefit from being able to retain their good managers at lower cost than market value.

Hiring. DLP firms will have lower rates of internal promotions and lower pay, because their managers have lower bargaining power. DLP firms only need to replace low-quality managers they let go. DLP firms have more options in external markets than ND firms, so they need not to rely on internal market to a large extent. To replace the fired managers, a DLP firm will prefer to hire from DHP firms to get highest quality, but DHP managers won't be too keen on joining DLP firms. DHP managers will prefer DLP firms over ND firms due to visibility of performance. The remaining choice is to hire managers from other DLP or ND firms. In accordance with assortative matching, DLP firms are likely to get matched with DLP managers coming from better or larger DLP firms if lower variance in signal noise (uncertainty) is preferable over signal of quality.

Propositions: DLP firms can retain their quality managers at lower cost, and managers leaving DLP firms are mostly low-quality managers that have been fired. It is harder for DLP firms to recruit new high-quality managers; and they may have to pay a premium to attract managers from DHP firms.

Non-disclosing (ND) firms and their managers

Signal. High or low-performing firms that do not disclose performance information do not provide useful signals to the labor market about their managers. Markets do not update their priors but perceive managers from non-disclosing firms as having a higher variance in quality than from disclosing firms.

High-quality managers. ND firms will want to keep their high-quality managers. High-quality managers are more likely to stay with these firms and at relatively lower wages because these managers are less likely to get external offers that dominate their existing wages and thus have lower bargaining power. ND firms are isolated from the market, so they have lower turnover and are less likely to raise wages. Low turnover can result in more static rates of internal promotions. *Low-quality managers.* Firms will fire low performing managers. These managers will likely to be hired by a lower quality ND firm, because DHP and DLP firms will prefer managers from DHP and DLP firms.

Market efficiency. In this case, market re-matching is inefficient because high-quality managers are underutilized and immobile. ND firms can retain their good managers at lower cost. Managers leaving non-disclosing high performing firms are more likely to be low-quality managers.

Hiring. ND firms prefer managers from DHP firms, but DHP managers prefer not to go to a ND firm. These firms would need to offer a high premium to entice DHP managers. So, ND firms are more likely to replace bad performers from within, because their external recruiting for good managers is more limited. Good managers prefer disclosing firms, and hiring externally is more risky from ND firms, as most of the managers willing to move at risk-adjusted wages are low-quality managers who have been fired.

Propositions: ND firms will retain their best managers at lower cost, but have difficulty in attracting new quality managers. They are likely to hire from other ND firms.

Segmented labor market: Net effect on mobility

The dynamics of re-matching due to new information in managerial labor markets results in rapid turnover and re-matching among D firms, whereas labor market for managers in ND firms is more self-contained and less mobile. The only high-quality managers on the move will be from DHP firms. High-quality managers from other firms will likely stay because the market won't offer dominating wages due to the lack of strong signal of quality. High-quality managers in ND firms are less likely to move across firm boundaries. The crossovers between two markets are possible for low-quality managers from lower-quality DLP firms moving to ND firms (the remainder low-quality managers from the assortative matching among DLP firms). Thus, most cross-firm managerial moves will be within the disclosing and non-disclosing types of firms. Managers in DHP firms will have the highest bargaining power, which will result in higher pay and greater career opportunities.