Leadership and the Single Woman Penalty: A Role Expectations Account of Early Career Barriers to Promotion for Female MBAs

DRAFT - December 2014
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Abstract

We advance scholarship on workplace gender inequality by drawing attention to professional single women. We contend that single non-mother status is inconsistent with the role expectations of both the leadership typically associated with men (agentic) and also women (communal) - resulting in a promotion penalty toward single women being considered for leadership positions. We test our thesis on the early careers of business professionals using a two-study, multi-method approach. Study 1, an experiment using business students, reveals a negative promotion bias against candidates who are single women without children, via an assessment as inferior leaders compared to single men, and men or women with families. Study 2 uses rich data on two cohorts of MBA graduates to test the external validity of the single woman penalty. Again, we find single women the most disadvantaged group, particularly those with exceptional quantitative and analytical abilities. The studies support a discrimination-based penalty where the status and role of professional single womanhood conflicts with that of leadership. Our findings enrich the understanding of workplace gender inequality across disciplines by advancing a better understanding of single women as an understudied group.

Introduction

The study of workplace gender inequality has benefited substantially from attention to the barriers to advancement that women face (Bielby & Bielby, 1996; Blair-Loy, 1999; Blau & Kahn, 2000; Kalev, 2009). A dominant conclusion throughout this literature has been that compared to women, men have mobility and wage advantages (Stroh, Brett & Reilly, 1992; Castilla, 2008; Gorman & Kmec, 2009). Indeed, gender inequality can persist and amplify across women's entire career histories (Gorman & Kmec, 2009) even within the most accomplished professional positions (e.g., Baker, 1996 on physicians; Leahey, 2007 on academics; Hom et al., 2008, professional managers). In describing these barriers women face in the workplace, a common explanation known in scholarly and popular discourse is the "glass ceiling", where women are said to face an upward limit in promotions to leadership positions that carry greater influence and compensation (Hull and Nelson, 2000; Bertrand & Hallock, 2001).

Many reasons account for the "glass ceiling." Some explain it as sex segregation that sorts women into less lucrative careers, where promotion opportunities are limited in general (Reskin, 1993; Cohen & Huffman, 2003; Kalev, 2009). Yet, even when women follow the same career tracks as men, they can confront different promotion standards and subjective performance review processes (Heilman, 2001; Roth, 2003; Castilla and Benard, 2010), different access to networks, resources, and power inside firms (Belliveau, 2005; Ibarra, 1997; Reskin & McBrier, 2000) or, encounter stereotypes that relegate them into relatively low-paying functional jobs and occupations (Budig & England, 2001; Lyness & Heilman, 2006; Correll, Benard, & In Paik, 2007).

Since Becker (1985), a mechanism most commonly invoked for producing this gender inequality is the perceived, anticipated, or actual lower commitment of women to the workforce compared to men. In Becker's formulation, the competing constraints of work and household disproportionately affect women. Firms determine such lower commitment through observations of women dedicating fewer hours to the workplace in order to handle other responsibilities at home

(Bertrand, Goldin & Katz, 2009) or, when women select out of challenging work assignments into less demanding work roles that allow more flexibility (Dwyer, 2004; Barbulescu & Bidwell 2013). To minimize the risk of an employee with low commitment, firms either invest less in female employees compared with men, or place women into inferior jobs inside firms that allow for temporary or permanent exits from the workforce. These jobs typically have reduced wages and limited career advancement (Stroh et al., 1992; Keith & McWilliams, 1999; Gorman and Kmec, 2009). Likewise, when a woman moves across firms to find a job offering a better balance between home and work, those jobs come at a significant discount in compensation (Blau et al., 2002; Dwyer, 2004). Thus, the commitment-based mechanism states that firms rationally pay and invest in women less than men for their (actual or anticipated) reduced commitment to work (Light & Ureta, 1992; Rosenfeld, 1992). Much of the corresponding sociological and management scholarship on this account of gender inequality has been captured under "the motherhood penalty" (Budig & England, 2001).

Notably, sociologists contend that such expectations of women's anticipated commitment are now so rooted in societal gender norms, prescriptions, and roles that employer's tend to discount women based on this, independent of the actions or intention of the woman in question (Correll & Ridgeway, 2004; Correll et al., 2007). In essence, having lower commitment to employment is part of the normative definition and expectation of womanhood, motherhood, and what society deems appropriately feminine (Ridgeway 2001). When women's actions violate this expectation – such as by seeking advancement into key leadership positions alongside their male colleagues professionally - they suffer penalties and sanctions (Rudman, 1998; Rudman & Glick, 2001; Heilman, 2001).

This scholarship has contributed substantially to our understanding of workplace gender inequality. However, an unintended consequence of the emphasis on the motherhood penalty and women's commitment to working is that much of this gender inequality work has focused on a contrast between the fates of married women and their advantaged married male counterparts

(Correll et al., 2007; Jordan & Zitek, 2012; Killewald & Gough, 2013). As such, it is unclear whether these mechanisms apply to other family structures.

Here we begin to address this gap by presenting theory and evidence on the discrimination toward accomplished, professional single women. Our thesis draws upon sociological theory on status expectations (Ridgeway, 2001), and social psychology theory on role incongruity that link gender inequality to the gendered conceptualization of leadership (Heilman, 2001; Eagly & Karau, 2002). We provide a theoretical account based on role expectations where single professional women without children face a promotion penalty due to the incongruence single women face with the perceived role of professional leadership. Moreover, both status expectation and role incongruity suggest that a penalty for professional single women may be especially prominent when women excel in skills that are thought to fall in a masculine domain (as quantitative, analytical skills do – Correll, 2001; Penner, 2008) and to come at the cost of the social skills needed for leadership (Eagly & Karau, 2002; Heilman & Okimoto, 2007).

Single women represent an important group to study. Not until recent years did a large proportion of professional women even have children, and many did not marry at all (Schneer & Reitman, 1993). Moreover, the number of single women earning professional degrees and joining the professions is increasing (see Gorman, 2005 on lawyers; Baker, 1996 on physicians; Catalyst, 2010 on professional managers). Yet despite these trends, single women without children, are under-theorized and under-analyzed, particularly in the inequality literature. Indeed, current research lacks a clear prediction for the level of inequality faced by single women or the mechanisms that would be associated with such inequality (DePaulo & Morris, 2005; Jordan & Zitek, 2012; Killewald & Gough, 2013). This is particularly problematic since in many professional organizations (law firms, investment banks, etc.) junior employees at the start of their careers exhibit a high level of commitment to their employers independent of their gender (Lyness & Judiesch, 2001; Fuller, 2008). That national marriage trends indicate women are both getting married and having children later than

in the past, particularly among the college-educated (Berg-Cross et al., 2004; Barkhorn, 2013), and that the chances of marriage for single women decline as they progress professionally (Berg-Cross et al., 2004: p. 39) raises the question of whether theories where the focus is primarily on motherhood, commitment, and biases against married women with children are appropriate for many professional women. We run the risk of an incomplete understanding of the mechanisms of gender inequality when we lack a theory that encompasses all women with equal robustness.

In this paper, we use a two-study, multi-method approach to demonstrate inequality toward professional single women via their early career promotions. In our first study we use an experimental vignette (cf. Goldberg, 1968) to show that (a) business student participants disproportionately penalize hypothetical single female candidates for a promotion to a leadership position; and (b) respondents reported the least confidence in a candidate's leadership skills when the hypothetical profile they were evaluating was that of a single woman. At the same time, respondents did not report differences in concerns about the level of organizational commitment across candidate profiles.

Our second study uses rich career mobility data on two cohorts of MBA graduates from an elite U.S. business school to show that the promotion penalty for single women without children is systematic and robust, with single women that have very high quantitative/analytical abilities suffering the greatest penalty. The Study 1 and 2 findings are consistent with the argument that being both a single woman and analytically talented leads to a disproportionate degree of tension with the role of leadership. To our knowledge, no other studies of professional careers apply the preciseness of an experimental study with rich data on career trajectories to the question of gender, talent, commitment, and mobility.

Theoretical Background

Gender and Leadership

The viability of women in leadership has gained prominence in recent years with the rise of women into key C-suite executive positions in well-known companies such as Facebook, GM, Hewlett-Packard , IBM, PepsiCo, Yahoo!, and Xerox. However, despite such notable successes of women as leaders in the past decade, scholars continue to identify persistent workplace gender inequality in professional women's attainment compared with men.

Perhaps one of the most significant and studied barriers is women's dual role as worker and mother and how this meshes with the work requirements of an idealized business leader. This emphasis has been particularly salient in the growing set of studies on the motherhood penalty – where married mothers suffer a discount due to their perceived, expected, or actual lack of commitment as employees based on gendered household commitments (Budig & England, 2001; Correll & Ridgeway, 2004; Budig & Hodges, 2014). Although scholarship on women, motherhood, and commitment is rooted in work now decades old (Polachek, 1975; England, 1982; Becker, 1985), studies continue to suggest a commitment difference of mothers in the workplace. For example, examining three cohorts of recent MBA graduates, Barbulescu and Bidwell (2013) found that professional women were more apt to seek jobs that support their desire for greater work-life balance – despite no difference in their ability to receive offers as a whole. In a large-scale study of men and women across Fortune 500 companies, Hom et al. (2008) concluded professional women were "fleeing" corporate America, with higher quit rates for women than men across 9 of the 19 occupations. Further, studying female graduates of a top-ranked business school entering the field of finance, Bertrand, et al. (2009) found wage inequality due to women working fewer hours than men – interpreted as something driven by the need to balance household, non-work commitments.

Beyond measures of commitment differences between men and women, a motherhood bias has also been observed in studies of career outcomes, such as hiring. For example, Correll, et al.

(2007) found that firms were less likely to extend invitations for job interviews to mothers with identical (hypothetical) application data as fathers and that fathers were more likely to receive both interview requests and higher offers of starting salaries than mothers. Similarly, studying managers at a Fortune 100 firm, Hoobler et al. (2009) found that both male and female bosses perceived female employees as experiencing greater work-family conflict than male employees, even after controlling for actual family responsibilities and the employee's own perceptions of their work-family conflict. Creating fictitious Facebook pages that varied the relationship status of male and female candidates, Jordan & Zitek (2012) found that college students evaluated married women as the least committed, least reliable, and first to lay off. More, the assessment of male candidates' reliability increased after marriage, whereas married women were perceived as less dedicated to their work after marriage. An explanation Jordan & Zitek (2012) offered was that for men, marriage was associated with becoming the primary breadwinner – and thus more committed to a job - whereas for women, it was associated with reduced commitment to employers in order to have children. This sentiment of motherhood as a barrier to career success for women is further echoed in the popular business press – as seen in headlines advocating "'Opting out' as the new American dream for women" (Forbes, 2012), or widespread fervor over Sandberg's (2013) *Lean In* and blog (http://leanin.org) where women are advised to "abandon the myth of 'having it all.'"

Ultimately, a lower status expectation of women as ideal workers has taken root as the perception of the lower committed female employee/mother has become more ingrained in the societal perception. As Ridgeway & Correll (2004: 1306) explain: "The cultural norm that mothers should always be on call for their children coexists in problematic proximity with another widely-held normative belief in our society…that the ideal worker be unencumbered by competing demands… the best, most competent worker is the committed worker."

Unfortunately, such lower status expectations seep into and shape other beliefs about women as leaders professionally, creating an even stronger barrier to their advancement independent of a

woman's level actual level of commitment. Indeed, theory on role incongruity has asserted that women suffer from an overall lack of fit, or incongruity, that emanates from their gender and the specific traits associated with traditional leadership (Heilman, 2001; Eagly & Karau, 2002). While men benefit from strong associations between masculinity and leadership, traits typically associated with femininity clash with leadership characteristics, placing obstacles in women's rise in firms. As Eagly & Karau (2002: 574) explain: "Communal characteristics, which are ascribed more strongly to women, describe primarily a concern with the welfare of other people….In contrast, agentic characteristics, which are ascribed more strongly to men, describe primarily an assertive, controlling, and confident tendency…prone to act as a leader….A woman who fulfills a leader role may thus elicit negative reactions…"

Such negative reactions toward women who demonstrate agentic versus communal traits have been observed in experimental settings (Heilman & Okimoto, 2007; Elsesser & Lever, 2011). For example, Cuddy, Fiske, & Glick (2004) found that college students evaluating hypothetical married male and female candidates, consistently rated working mothers as warm, but less competent. As a result, working mothers received the lowest ratings in terms of hiring, promotions, and investment in training. In contrast, married fathers were perceived as both warm and competent and, more rewarded. In a series of experiments, Rudman (1998), Rudman & Glick (2001) found the more agentic traits women openly displayed, the more likely they were to face negative "backlash", typically in the form of lost promotions and opportunities in the workplace. As Rudman summarized (2001: 744): "…women who strive for leadership positions are in a double bind: They can enact communal behaviors and be liked but not respected or enact agentic behaviors and be respected but not liked. In either case, they risk being disqualified for leadership roles."

Given such firmly held status expectations around gender, marital status, and motherhood, one way for women to advance as leaders is to be perceived as communal without suffering biases due to their lack commitment (and by extension, their competency). On the one hand, this might

imply that although women would be disadvantaged relative to men, single women without children should fare better than married mothers. After all, single women exhibit fewer commitment constraints associated with motherhood.[1]

However, despite the lower commitment constraints that single women may face, recent studies have shown that married women may be optimal organizational leaders (Killewald and Gough, 2013; Dumas and Stanko, 2014) due to the association between motherhood and a communal style of leadership associated with empowering employees, incorporating alternative views, and generally using a more relational enactment of leadership (Helgesen, 2011). Heilman and Okimoto (2007) found that individuals rated successful female executives negatively in terms of likability, hostility, and boss desirability unless they were informed that the executive was also successful as a married mother. Studying 26,000 managers at a financial service firm, Lyness and Judiesch (2001) found that women were less likely to voluntarily leave than men. In addition, they found women managers with graduate degrees less likely to exit a firm after they received a promotion and more likely to return after a maternity leave than their male colleagues experiencing promotions or paternity. And while Barbulescu & Bidwell (2013) found female MBA graduates to prioritize work-life balance in their job search and selection, they also found married women behaved more similarly to men in terms of their attitudes toward working and the types of jobs that they applied for.

In fact, Ridgeway's (2001) application of status characteristics theory and Eagly & Karau's (2002) theory of role incongruity allow for a conceptualization of a single women that not only sheds light on why a penalty may be greater for single women, but also how this penalty can occur independent of commitment as a mechanism. For one, there is evidence that particularly negative biases against successful single women already persist in the workplace that threaten their ability to

[1] This does not mean that single women are completely exempt from concerns of lower commitment. Turco (2010: 902) describes how a young, single woman faced bias due to her superior's anticipation that she "might have kids some day…". Rather we are suggesting that the literature on gender inequality suggests that this bias is substantially less than the biases and constraints faced by married mothers.

be perceived as communal. DePaulo & Morris (2005) report that single women are more likely to be perceived as unhappy, promiscuous, and to possess negative personality traits compared with married women. Asking college students to describe married versus single people, nearly 50% spontaneously described the married person as "kind, caring, or giving" whereas only 2% used such adjectives when rating singles (DePaulo & Morris, 2005). By choosing not to get married or have children, single women fail to conform to what DePaulo & Morris (2005) describe as the "Ideology of Marriage and Family" – where a married mother is the ideal representation of womanhood.

A single woman's deviance from gender role expectations may be further exacerbated when the skills associated with their employment task are considered masculine – such as finance or another analytically focused job function (Barbulescu & Bidwell, 2013). Indeed, it is argued that women are often socialized away from quantitative academic pursuits in their careers (e.g., Correll, 2001; Penner, 2008) in part because mathematical skill is presented in popular culture as masculine (Mendick et al, 2008).[2] Thus when women do work in fields or demonstrate skills associated with masculinity, they violate role expectations (Ridgeway, 2001). As a result, the single, analytically competent female professional may get coded as a non-communal deviant, subjecting them to "backlash" by employers (Rudman et al., 2012).

In sum, married women may be perceived either as less competent and less committed to their employers and thus marginalized, or alternatively possibly more communal as leaders, and thus, relatively better female candidates for promotions. Yet, perceptions of the lack of communality of single non-mothers along with exhibiting more agentic, masculine behavior via their career focus situate them as violating both the accepted role of womanhood as well as the role of leadership. Notably, this would be intensified in roles (like analytical ones) where women hold a "token" status (Kanter, 1977). Thus, when examining the relationship between the gender and family status of

[2] Specifically, Mendick et al 2008 note that both men and women in their UK study tend to associate mathematics with as old, white, middle-class, and heterosexual men.

professionals, these combinations of challenges will lead single non-mothers to face the greatest barriers to promotion, where the barrier is greatest for single women with the most quantitative and analytic ability. Of course, less contested is the fact that men are advantaged over all women regardless, with married men perceived as most committed and competent leader in business settings. This leads us to propose the following:

> *All else equal, single women face the greatest penalty for promotion to a leadership role, compared to married men in professional, male-stereotypical work settings*.
>
> *All else equal, the promotion penalty faced by single women in professional, male-stereotypical work settings is greater when the single woman demonstrates competence in a stereotypically male skill*.

Data, Methods, Results

Approach

We test our propositions using an experimental vignette (Study 1, in a mid-tier business school), and regression analysis of rich early career data on graduating MBAs (Study 2, in a top tier business school). This approach has several advantages. First, to increase our confidence that we have identified a penalty for single women (non-mothers), we wanted to show the penalty in a way that took advantage of different methods and settings. Strong evidence of a penalty for single women without children would be represented by not only demonstrating the effect more cleanly in a controlled experiment where the hypothetical candidates are otherwise equal, but also with a regression of rich data that account for factors that would mediate the promotion penalty (differences in observable ability, industry, etc.). Second, we can leverage the internal validity of an experimental approach with the external validity of our early career data, and interpret the results knowing whether any effects are robust across members of sociologically and economically distinct business schools. So while presenting two studies results in a lengthier analysis, we felt this rigor to be necessary to

properly test our propositions. We next describe each study in detail, followed by the individual results in succession.

Study One: Vignette Experiment

Sample. In December 2013 and January 2014 we conducted a series of experimental surveys in graduate business school classes of an MBA program located in the southern United States. In total, 205 full-time, part-time, and executive MBA graduate students were targeted across four different core curriculum courses, including Financial Management, Leadership, Practice in Management, and Global Leadership. The courses comprised individuals representative of students enrolled in each program and the school generally. Importantly, sampling students across programs allowed us to capture a range of respondents in different career and life stages that would most reflect the actual workplace where professional women would be employed. The response rate was high in each class – with 195 total respondents (95%) across the four classes (individually, response rates in classes varied from 88% to 100%). Mean descriptive statistics of students is summarized in Table 1.

[Insert Table 1 about here.]

Experiment. Based on pilot testing, we created an IRB approved survey for individual participants to complete. The survey consisted of a short vignette of a hypothetical candidate who was currently working at a firm. The vignette was followed by a table with three different job positions (each job had a brief description) with additional questions about the participant. Participants were instructed to read the paragraph about the candidate and then consider the candidate for each position based on the description of the job. The job positions consisted of a significant promotion (Vice President), a promotion (Assistant Vice President), and a lateral move (Senior Associate) at an investment bank – in that order, with text identifying the type of promotion outcome at the top of each job description. Please see Appendix 1 for the survey.

There were four versions of the survey. We selected these four conditions to best reflect the family structures that are most commonly discussed in the gender inequality literature and that best

allowed us to test our theoretical propositions. Each version was identical with the exception of the vignette describing the hypothetical candidate. In that paragraph, the text contained two manipulations (resulting in a 2x2 design). First, we manipulated gender where, the candidate was either clearly female (name: Ann, pronouns: she/her) or, the candidate was clearly male (name: Tim, pronouns: he/him/his). Second, we manipulated implied family status. In the last sentence of paragraph describing the candidate, we stated either that "In his [her] free time, Tim [Ann] enjoys traveling with his [her] wife [husband] and children…" or, "In his [her] free time, Tim [Ann] enjoys traveling with his [her] friends…" Beyond those manipulations, the text was identical throughout the survey. All subsequent questions used a gender-neutral tone of "the candidate". Both married conditions implied that the individuals had children. We included a recall question at the bottom of the second page of the survey to assess the manipulation of marital status. Participants were more likely to recall the candidate as single for both the single women (1.03, $z=3.18$) and the single men (0.70, $z=2.03$) conditions compared to the married father and mother conditions. In all, we surveyed four possible conditions – single man (without children), single woman (without children), married man (with children), and married woman (with children).

One author administered all surveys in person. After a brief introduction by the course professor, the author communicated a short research statement on the need to learn more about MBA careers post-graduation. The author then asked for assistance in completing the survey, emphasizing that participation was voluntary and no identifying information would be collected or reported to the professor to affect their grade in the course. An IRB approved consent form was also made available for participants for informational purposes, although to preserve anonymity, it did not require a signature and was not collected by the author. The author randomly distributed surveys for participants to complete and return before the start of class. To validate that the author had no knowledge or influence over survey assignment, we ran a logistic regression predicting the likelihood of being assigned to each of the conditions based on participant characteristics outlined in Table 1

(e.g., age, gender, race). No characteristic significantly predicted the likelihood of completing a survey for any of the four conditions.

The author was present during the survey completion in case of questions. Consistent with pilot surveys, total completion time was on average 10 minutes. The author collected all surveys, offering to report findings at a later time for any interested students. Due to possible communication across students, the author was careful not to report any hypotheses or early results from other classes.

We encountered a small number of cases of missing data on questions (e.g., 11 participants did not report their gender). Further, 20 participants did not provide written explanations of their candidate assessment. Adjusting for this left us with 161 participants in our fully specified models.

Measures. To test our propositions, we created a dependent variable to measure the participant's *suitability assessment* of the candidate for the significant promotion to the Vice President position as this was the position described as requiring "long-term leadership potential", with responsibilities to "Mentor and develop staff", "Work on a variety of transactions, e.g., client pitches", "Communicate regulatory, financial information", "Market to internal partners and external clients" – all responsibilities considered typical of vice president positions within investment banks. Participants were asked to provide a suitability assessment, which was a 1 to 6 ordinal rating of the candidate where a "1" indicated "not suitable, do not consider this candidate" to a "6' indicating that the "candidate is over-qualified for this position, do not consider". Ratings 2 to 5 corresponded with incremental levels of candidate suitability for the role – from low to high potential.

The key explanatory variables are the condition assignments, specifically to *single woman*, *married woman,* and *single man* conditions. In line with our research question on ideal leaders and leadership potential, the omitted, referent category is the *married man* condition. We controlled for participant characteristics, which the participant self-identified with nine multiple choice and one fill-in response on the last page of the survey. These included participant gender (*female*), age (*over 40*)

race (*other than Caucasian*), citizenship status (*non-US citizen*), marital status (*married*, where omitted categories were single, divorced or widowed) and whether they had *children* (yes). We controlled for the specific graduate business school program that participants were enrolled in (*full-time*, where part-time and executive-MBA were omitted). We asked participants to describe their work experience to control for their own knowledge and experience with promotions and evaluating employees, specifically whether they had *previous managerial responsibility* and the largest number of direct reports they had in that job (*>26 subordinates*). Finally, we asked the participant to write in the industry of their most recent job in the event that the types of work experiences they held influenced their beliefs about promotions and evaluations of others. From this list, we created indicator variables of the common industry experiences in these programs, *finance* (n=21) and *energy* (n=31). Description and correlation statistics appear in Table 2 below.

[Insert Table 2 about here.]

Method. To test the relationship between assignment to a condition and the suitability of the candidate for the leadership position of Vice President, we used an ordered probit model. The dependent variable of the suitability assessment of the candidate ranged from one to six, with a mean of 2.8. An ordinal probit allows us to estimate the promotion assessment without requiring equal intervals between each assessment, which was appropriate based on the distribution of the dependent variable. In other words, an ordered probit allows us to relax the assumption that going from a rating of "not suitable" to "low potential" is equivalent to going from "low potential" to "neutral", or "high potential" to "over-qualified". Rather, we only wish to assume that a higher assessment is better than a lower one and allow for the estimation to derive the relationships between the counts of assessments.

Results. Model 1 simply estimates condition assignment (Model 1, Table 3) followed by the full model with all controls (Model 2, Table 3). Both show support for a negative promotion bias toward single women relative to married men. Namely, participants had lower odds (-0.556, z=-2.32

for Model 1; -0.504, z=-2.05 for Model 2) of assessing a single woman candidate as suitable compared with those assessing married male candidates. Further, although, the single and married woman conditions did not statistically differ from one another in how participants rated their candidate assessment[3], single women significantly differed from the single man condition (.01 level). Thus, single women statistically differed from both male conditions in how participants rated their suitability for a promotion to leadership, supporting our first proposition. Of the controls, no participant measures proved significant, including participant gender.

[Insert Table 3 about here.]

We also evaluated the written text provided by participants in explaining their assessment of the candidate (see Appendix 1, Q3). Specifically, we wanted to understand if participants were using different logics in assessing leadership potential across the conditions. On average, respondents provided 30 word explanations. 20 (10%) of the 195 participants did not offer a written explanation. For representativeness, we analyzed the likelihood to not offer a written explanation across the conditions as well as participant characteristics and found no significant predictor of not offering an explanation.

We then reviewed the 175 written responses for key themes in the text consonant with leadership assessment. For example, one recurring theme we found was that participants framed their considerations around assessments of analytical skills versus management or, leadership ability. In some cases, being coded as "analytical" was detrimental to perceived leadership competency and, the candidate was seen as requiring more managerial experience before consideration of a promotion to a leadership position. For example (underlines added by authors for emphasis):

> *"VP requires high level management skills which is not clear Ann has (she is analytical which indicates quantitative skills). The Assistant position is more promising because she can get a taste*

[3] Note: In December 2014, we re-ran the experiment using 120 undergraduate business students. Our findings are not only robust to the addition of these data to our analysis, but support for our hypothesis is now stronger due to greater statistical power: single women are now statistically less likely to be recommended for promotion to VP than married women.

> *of management without having direct employees. If Ann can navigate a new, lateral position successfully then she may be able to manage at a higher level."*
> ***Single Woman condition - rated VP position "1: not suitable, do not consider this candidate"***

> *"The candidate does not have experience leading a team/mentoring staff, so VP would be too large of a promotion. VP may set Ann up to fail because she hasn't developed all of the necessary skills. Asst. VP could be an option, although Ann still does not have all of the necessary skills. This position would be a challenge, but Ann seems to be up for the task. Senior Associate may be viewed negatively by Ann, but additional responsibilities are included in the lateral move that Ann needs for her long term career growth. This move is the most risk averse."*
> ***Single Woman condition - rated VP position "1: not suitable, do not consider this candidate"***

Comparatively, in other cases analytical skills and no clear leadership ability was acknowledged, but given more latitude, instead seeing this as an opportunity to develop the candidate's leadership potential further. Qualitatively, it appeared that participants gave more latitude to men when it came to leadership potential, although we also found cases where it applied to married mothers. For example:

> *"He has shown that he is a hard worker and has stellar analytical skills, but we were not told about his leadership skills yet. Many times hard workers do turn out to be good leaders…An MBA may give him more of an edge to be considered."*
> ***Married Man condition – rated VP position "4: some potential, consider this candidate"***

> *"The candidate is clearly devoted to his work, but seeing as his experience is in analysis, I'm not sure he's best suited for all the managerial/HR aspects of the VP position. Perhaps he would get a chance to climb there with new experiences in the AVP position"*
> ***Single Man condition – rated VP position "4: some potential, consider this candidate"***

> *"Ann seems to have potential, but most of her experience is from an analytical standpoint. The move to VP would require much more external interaction with clients and partners. While it seems as though Ann is over-qualified (has grown out of) her current position, she is not yet prepared to be a representative of the bank. The position of AVP will give her hands-on leadership experience and will expand her potential."*
> ***Married Woman condition – rated "2: low potential, only consider if no other candidate"***

To assess these patterns more systematically, we evaluated the text in the explanations. First, we removed all gender identifying information from the text explanations. For example, where the participant used the candidate's name (Ann or Tim) or gender identifying pronouns (he, his, her, etc.) in the explanation, we replaced this with "the candidate". Based on our close reading of the participant explanations we then generated eight themes to classify the participant's rationale: (1)

development: participant explains the promotion due to the ability to develop the candidate further; (2) *retention*: explains the promotion as necessary to retain the candidate at the firm; (3) *reward:* explains the promotion as a reward to the candidate (for any number of reasons) and/or as not to insult the candidate, or as a sign of respect for the candidate; (4) *prestige*: explains the promotion as prestigious, due to status reasons; (5) *analytical ability*: describes the candidate as analytical, detail-oriented, quantitative – may be framed positively or negatively; (6) *lack of management or leadership ability:* describes the candidate as not having management/leadership/ability to oversee people; (7) *commitment*: describes the candidate as hard-working, mentions hours worked as demonstrating commitment/dedication – this may or may not be specifically related to explanation of promotion; and (8) *lack of commitment*: describes the candidate as not effective in time management (codes long work hours as negative) and/or questions commitment to the firm.

One author evaluated the gender-blinded responses and rated each response to ensure the coding was logical and easy to follow. Then, we asked two independent raters to do the same. Both raters were native English speaking graduate students, with at least one year of professional work experience. One was male and one was female. We did not inform the raters about our hypotheses or any aspect of our study beyond the basic outline of the survey. We did not provide raters with a copy of our experimental survey, only an excel file with the randomly assigned participant ID number, the participant's ranking of the three positions (VP, AVP, and SA), and the text explanation.

After the raters coded the 175 explanations, we calculated a kappa statistic to assess inter-rater reliability across all three raters (author and two raters). Kappa statistics are commonly relied upon by researchers to assess inter-rater reliability (Viera & Garrett, 2005) and also have been used in comparable studies on professional careers (Barbulescu & Bidwell, 2013). Across each dimension, we reached a kappa statistic considered "in substantial agreement" (Viera & Garrett, 2005) across the three raters (mean across ratings = 0.64, significant at .001 level). For each of the eight items, we then created separate indicator variables that equaled "1" if at least two of the three

raters agreed. For example, in 35 (20%) explanations two of the three raters agreed the theme of the participant's explanation was "analytical" whereas 46 (26%) indicated consensus around "no management ability".

To analyze patterns of correlation across the eight themes in participant explanations to a common underlying variable, we performed a factor analysis. In particular, two factors proved relevant, one of which could explain 68% of the variance predicted by the eight variables and the other, 59% of the variance. Additionally, "analytical" and "no management ability" loaded similarly and negatively on the first factor, whereas "commitment" and "reward" loaded similarly and positively onto the second factor. Using the Varimax rotation function (Stata, v12) we found that the first factor most strongly captured a lack of leadership ability, management experience, and being "analytical" and the second factor seemed to most strongly capture commitment.

Using the two factors as dependent variables, we then regressed the condition assignments and controls as we used in Table 3 to test the relationship between the condition assignment and participants' explanations. Model 1 (Table 4) uses whether there is a description of being analytical and having no leadership competency (first factor). Model 2 (Table 4) captures whether the explanation indicates the candidate as being committed and worthy of a reward (second factor). We also included additional controls for the *number of words* used in the explanation as well as whether the participant rated *Vice President as first choic*e or, *Assistant Vice President as first choice*. These latter two controls were important to observe the effect of assignment to a condition controlling for the participant's assessment of the candidate for a promotion in the first place.

We present the results in Table 4. Specifically, in Model 1, we find that participants assigned to the single woman condition were more likely to explain their assessment and ranking of the candidate in terms of being "analytical" and not having enough "management or leadership ability" (0.276, t=1.99). Further this effect was statistically different from the other two conditions: married woman (.10 level) and single man (.10 level). A few participant characteristics proved significant,

including a positive effect of non-U.S. citizen, a positive effect of being over 40 years old, and a negative effect of recently working in finance. There was also a positive effect of number of words used (.009, t=2.76) and negative effects for rating the VP (t=-3.50) or AVP (-2.36) as first choice. In other words, participants who assessed that the candidate should be promoted – to VP or AVP – were less likely to explain their decision in terms of that candidate's analytical nature and a lack of leadership ability.

[Insert Table 4 about here.]

Participants did not significantly differ in how committed or worthy of a reward they believed the candidate was across the conditions (Model 2, Table 4). The only significant variables in predicting commitment were a negative effect for race (non-white participants were less likely to suggest that the candidate was committed or worthy of a reward), a positive effect for number of words used, and a positive effect for ranking the AVP position first.

In examining the explanations for the assessments, we were able to gain additional insight about the lower promotion of single women. Namely, single women were more likely to be coded "analytical" and lacking managerial experience or ability – speaking to their incongruence with the role of leadership. No condition was considered more or less committed, a finding not surprising since in our vignette we described the candidate as hard-working ("clocking over 110 hour weeks").

Study 1 Discussion. Study 1 provided evidence consistent with a role incongruity explanation, where single women faced the greatest penalty for promotion to a leadership position. Study 1 also validated the relevance of analytic aptitude for professional single women in business. Participants paid attention to the descriptive word "analytical", associated it with a lack of leadership potential, especially when the candidate was a single woman. However, there are components of the study constructed to produce identical candidates that require clarification that is more appropriate for a regression analysis on rich data. For example, since all of the hypothetical candidates were analytically strong and working in the financial sector, it is not clear how much these characteristics

fed into the penalty for single women as both are traditionally associated with masculinity. Thus, in addition to testing for the external validity of our Study 1 findings, Study 2 allows us to investigate the existence of key mediators of the single women penalty that would support role expectations as a key mechanism.

Study Two: Early MBA Career Paths

Sample. The second study comes from a larger project of detailed data on two cohorts of full-time MBA students graduating in 2008 and 2009 from a different U.S. graduate business program. We collected data from two sources: school records and online *LinkedIn* profiles. We targeted 1,103 full-time students, 550 (2008 cohort) and 553 (2009)[4]. Of these, 616 students provided consent to participate: 297 in 2008 (54% response) and 319 in 2009 (58%). Of those participating, 70% also released their grades. As evidence of the representativeness of our sample, only minimal statistical differences existed from the overall 1,103 full-time MBA population. Our sample also did not vary from the overall class composition in terms of job functional preferences for full-time employment. (See Author and Author, 2014 for additional details on the study)[5].

In the summers of 2010 and 2012, we also manually extracted data from online career profiles that these individuals created on *Linked In*, a more than 200 million user-based website for professionals to connect and post individual career data (www.linkedin.com, 2013). Of the 616 individuals, 562 (91%) maintained *Linked In* profiles. For the (n=54) individuals without *Linked In* profiles, all but twelve we were able to access through the school alumni directory. With these sources – school records and *Linked In* - we constructed detailed career profiles of each individual including mobility and promotion measures.

[4] All aspects of gaining consent were approved by the IRB.
[5] Due to confidentiality, we are unable to provide the overall class descriptive statistics as a basis of comparison, although note that none of those shown varied by more than a few percentage points.

We encountered missing data due to the differences in record keeping and our use of self-report data from disparate sources across the school and *Linked In*. Our final sample for our fully specified models consisted of 457 individuals.

Measures. To understand the relationship between gender, marital status and promotions, we created a dependent variable to capture promotion rates within firms. To determine what constituted a promotion, we examined each individual's career history chronologically and compared job titles across each job move for each individual, only considering a promotion if there was a distinct title change that indicated a clear, higher step in the job hierarchy (e.g., a move from Associate to Senior Associate). We did not impute different rules for mobility decisions across firms that varied in size or any other dimension.[6]

Based on this careful reading of each line of resume data, we created an indicator variable that equaled "1" when the move was a considered a promotion and within a firm (*internal promotion*). Additionally, we created indicators for a move across firms resulting in a promotion (*external promotion*), for *lateral* moves within and across firms as well as *demotions*[7]. Just under half of the sample experienced at least one within firm promotion (range 0 to 3) and 30% experienced at least one across firm promotion (range 0 to 3). Correspondingly, 63% of our sample experienced at least one lateral within firm move. We also created a count variable of the number of internal and external moves that were promotions, job function changes, and organization changes. We did this from the known start of each individual's career through their last reported job, but also created a "post-graduation" clock– the focus for this analysis – starting at the point of summer

[6] We also compared titles sequentially in time where each title was compared to the immediately preceding title. We made an exception if an individual returned to a place of prior employment at a higher title at a later time. For instance, in a few cases individuals worked at a firm prior to graduate school, did an internship in another firm, and then returned back to this place of employment at a higher title post-graduation. Sometimes, these individuals were sponsored by these firms but still allowed an internship elsewhere (we had data on sponsored jobs). Wherever we saw a clear upward title change in the same firm, even if there was a gap, we considered it a promotion.

[7] Demotions were few: 48 external demotions and 5 internal demotions were recorded in the sample.

internship to the first full-time accepted job after graduation as the first potential move and then proceeding across all known data for each individual through 2012.

The key explanatory covariates in the analysis are gender by marital status, a measure of talent in analytical and quantitative skills, and an interaction between these. Specifically, we include indicators for *single man, single woman, married woman*, and *married man*. 26% of our sample reported as married and 1% reported as having children during graduate school. Consistent with study one, we selected *married man* as the omitted category for our analysis.

To capture analytical talent, we selected a measure of demonstrated strength in quantitative skills on the Graduate Management Admission Test (GMAT).[8] Individuals in our sample scored on average in the 89th percentile for verbal and 82nd percentile for quantitative. To capture those that excelled quantitatively, we created a measure that equaled "1" if the individual scored in the *95th percentile or above on the quantitative* component of the GMAT (21% of sample: 18% of the women and 23% of the men). We then interacted each gender by marital group with having a quantitative score in the 95th percentile or higher. In particular, we were interested in *single women high in quantitative skills,* which became our main explanatory variable in the mobility models. Our omitted (comparison) group was *married men high in quantitative skills*. The other interactions were also included in the fully specified models.

Many other factors explain promotions, so we use a saturated model that includes multiple controls – to address individual, organizational, and industry differences. At the individual level we include gender by *marital status*, race (*non-Caucasian*), *matriculation age*, and citizenship (*non-U.S.*) known to be important to career outcomes (Catalyst, 2010; Dreher & Cox, 2000; Kalev, 2009).

[8] The GMAT is a nationally administered standardized test required as part of a graduate business school admission (see www.mba.com, 2013). To compute a quantitative assessment, the GMAT requires individuals to answer almost 40 questions on "data sufficiency" and "problem solving" in 75 minutes. The entire GMAT test takes 3.5 hours and also has a verbal test portion of reading comprehension, critical reasoning, and sentence correction and a writing analysis section. Test takers receive a total score, a verbal score and a quantitative score. Each score is determined by number of questions answered, how many questions were answered correctly, the difficulty level of the questions, and other statistics on each question. The test begins with easier questions and if the individual gets those correct, s/he is given increasingly more difficult questions to answer.

Age allowed us to control for differences due to life stage, human capital from more time to accumulate experience, and any difficult to observe promotion penalty or rewards based on this (e.g., desire to travel). Citizenship allowed us to control for different concerns non-citizens may have for the type of position and employer, and also the decisions of the employer, which can be influenced by citizenship status.

School records indicated the highest level of education achieved by the parents of the student, which consisted of six levels ranging from not completing high school to having doctoral education. As parental education is known to be important – particularly for women in math and science (Zeldin & Pajares, 2000) – in affecting the future achievement of the children, we created measures for both the *mother* (33% of the sample) and also the *father* (48%) having *graduate education or higher.*

We included measures of prior work experience to address sorting and selection (Correll, 2001; Lee and Mitchell, 1994). Here, we used two measures: a duration measure that counted the number of months of *work experience* upon entry into the program and, a count measure of the *number of firms* that individual worked at prior to the program. While graduates are typically hired into "post-graduation MBA starting positions", those with longer work histories may garner better opportunities within the firm or, "fast track" onto an expedited promotion path.

Other individual measures included: reputation of the undergraduate institution attended to capture the human and social capital advantages associated with attending an elite undergraduate institution (Rivera, 2011). We constructed this metric using *U.S. News & World Report* rankings in 2002 for the class of 2008 and 2003 for the class of 2009 based on the mean student age to determine the mean year of attending undergraduate school. We found *top-20 undergraduate institution* to be the most robust and inclusive across gender. We also included a measure of acceptance in *first round* of admission to this MBA program and whether the individual held a *graduate degree* in another area. Both provided measures of a demonstrated history of prior accomplishments as well as a "profile" the school – and likely employers - deemed attractive. We also included controls for

scoring in the *95th percentile or above on the verbal* component and scoring in *95th percentile or higher in quantitative* portion of the GMAT.

We included measures of activities during the MBA program that could indicate individual differences in aptitude, sociability and involvement with others, networking engagement, or other demonstrations of leadership. For instance, we controlled for GPA upon graduation, which we split into three segments reflecting evidence that the effect of GPA in our models was non-linear: having a *GPA less than a 3.0*, GPA between 3.0 and 3.8 (omitted), and *GPA greater than 3.8*. We included a control for those who did not consent to provide their GPA, *GPA missing*. We provided the *number of concentrations* that the individual choose to study during school (e.g., Finance, Accounting, Strategy, etc.) to capture specialization versus diversification in skills and training, which may affect future promotions. Through qualitative interviews with school personnel, we learned the importance of extra-curricular clubs for recruiting, network contacts, and job advice. Membership also demonstrated a level of sociability and initiative that could carry over into employment. We included the *number of clubs* that an individual participated and whether an individual served as a *club leader* in the event that this indicated an aptitude for leadership in other contexts. We also included an indicator of membership in the *charity club* that was popular and selective at the school as this may also capture sociability and an individual proclivity to help others.

We controlled for industry of the first full-time job accepted out of graduate school: *investment banking"* and *marketing* which we selected because they reflected sizable career tracks that graduates selected into from the MBA program (40% of the graduates entered these two fields), but also because they represented industries that Career Services informed us had very different promotion ladders. Further, they were associated with different "gendered" industries (Bielby & Baron, 1986; Petersen & Morgan, 1995; Barbulescu & Bidwell, 2013), which may affect a preference for a particular type of leader. The comparative group included jobs in management consulting, general management, strategy and business development, and IT among others.

Additionally, we controlled for individuals who worked at or founded *an entrepreneurial venture* after graduation since entrepreneurs follow different, atypical mobility patterns and often come with upgraded titles such as president or chief executive.

To capture differences in economic climates and time in the labor market, we include a measure for the *graduating in 2008* (versus 2009). We also included measures of the initial job offer post-graduation such as *total compensation*, whether the individual *negotiated* their accepted offer, the *number of offers* received, whether the job offer accepted represented the individual's *first choice* of jobs, the *source* of the job, and stated *reason* for choosing that particular job. Initial compensation captures unobserved heterogeneity in the mobility process and/or the individual, such as the possibility that quantitatively strong women in our sample disproportionately sort into jobs that may pay more but promote at a lower rate or, if compensation indicates overall candidate quality. Compensation is self-reported data entered by the student into the school's database upon receiving an offer. We do not have data on compensation after the first job. Total compensation consisted of a base salary plus bonus compensation. Due to the skewed distribution, we used the natural log of the total compensation. *Negotiation* may indicate a level of dissatisfaction with the offer that might compel individuals toward external mobility or, personal influence skills that could spill over into subsequent promotion decisions. Controlling for *first choice* of job allows us to account for the possibility that lower promotion likelihood is warranted based on quality and match differences from the start. In addition to picking up unobserved heterogeneity in labor market attractiveness, *number of offers* could capture the alternative that some individuals become coveted by many firms which could later be used as leverage to secure a promotion. *Returning to internship firm* could account for individuals who received a promotion in doing so or, gained important human and social capital that could be parlayed into a faster future promotion. Or, it may capture risk aversion of someone who selected to *return to their internship employer* without exploiting the job market that may similarly play out in future mobility decisions.

We controlled for how the individual found their job. To control for both differing influences of the job search source that affects matching or "fit" on the job, we used two measures. First, it could be that the firm was good at selecting individuals who would be successful, so we controlled for sourcing one's job by being *invited by the employer* to interview. On the other hand, the individual himself may be the best judge of determining strong employment options, which we controlled for as finding the job *individually* without assistance from the school.

Finally, Career Services asked individuals to select and rank 3 reasons for why they accepted the job from a number of possible pre-set choices, including for money, reputation of the firm, and having no alternative. Of these, we included a control for those individuals who selected "*due to spouse*" as the number one reason for accepting the job (5% of the sample). By controlling for individuals who selected spousal constraints as their primary reason for their job acceptance, we included a control for commitment differences and also potentially sub-optimal job choices. Correlation and descriptive statistics appear in Table 5.

[Insert Table 5 about here.]

Method. As our dependent variable is an indicator variable, we use a probit model to test the odds of receiving a promotion within the same firm, where the outcome varies between 0 and 1. Specifically, we predict the odds of single women strong in quantitative skills receiving a promotion (within firm) controlling for demographic and human capital, pre- and post-graduation career history, school activities, and job offer and search covariates.

Results. In the Model 1 (Table 6), we analyze the odds of receiving a within firm promotion without including the interactions of talent and gender by marital status. Only a handful of measures are significantly associated with the likelihood of receiving a promotion within a firm in this early career period. Importantly, none of the main effects of gender by marital status are significant. Neither single nor married women are less likely to receive a within firm promotion than married men (our omitted category). Married men also do not statistically differ from single men. Other

demographic categories, such as age, race, or citizenship are not significantly associated with the likelihood of internal promotions. Prior experience or knowledge does not seem to be a differentiating factor – tenure at earlier jobs, attending a top undergraduate institution, or specialized math or verbal aptitude do not affect within firm promotions.

Looking toward academic experience, one measure proves positive and significant in affecting internal promotions: membership in the charity club (0.456, z=2.55). Additionally, a few of the initial job characteristics are significant. Individuals entering careers in investment banking have lower odds (-0.563) of promotion compared to individuals in other careers such as consulting, business development or, general management positions. This is unsurprising considering investment banking firms often rely on set promotion times that require an initial period of more than three years at a firm (ZoomInterviews, 2010). As expected, those entering into entrepreneurial ventures were less likely to experience an internal promotion in these first few years of employment (-0.657). Having the additional year of work coupled with the difference in economic climate in 2008 versus 2009 improved one's odds of within firm promotion (0.452). And, finding a job on own produced a positive internal promotion effect (0.476). None of the other search and offer characteristics – initial compensation, returning to internship firm, first choice, or the number of offers - significantly predicted within firm promotions.

[Insert Table 6 about here.]

In Model 2 (Table 6), we next add the quantitative skills interaction with gender by marital status to directly test our second proposition that the promotion outcome is associated with those most skilled analytically. The effect is negative and significant for single women with strong quantitative skills (-1.003, z=-2.05). All of the controls remain unchanged as in Model 1 except for a main positive significant effect of quantitative GMAT scores (0.570). Single women with high quant scores were not statistically different than married women with high quant scores, although

marginally different than single men (0.13 level). However, compared to married men, only single, quantitative women had statistically lower odds of promotion in the first few years post-graduation.

To put the magnitude of differences in effects in perspective, we generated (marginal) probabilities, with mean level control variables across the four groups (Figure 1). Figure 1 reveals that a single woman with strong math skills has lowest probability of receiving a within firm promotion (0.14 versus 0.25 for married women, 0.32 for single men, and 0.53 for married men)[9]. Married men have the best chances of internal promotions. Overall, we find support for our second proposition that quantitatively strong single women have lower chances of promotion compared to married men in male-stereotypical professional business settings.

[Insert Figure 1 about here.]

Robustness Checks

We performed several checks to test and validate our findings. For example, we tested other interactions with gender by marital status to understand whether this result was specific to this type of talent (analytical) or, emerged across different subsets of talented women. Specifically, we tested the mobility models with experienced single women, single women talented in verbal skills, single women with high GPAs, single women selecting into specific job functions, single women with more job offers, and single women who attended top undergraduate institutions. None of these specifications emerged as significant. We also changed the dependent variable to test the likelihood of different mobility outcomes including the likelihood to move across firms, to move at all, to drop out of the workforce, to change job functions, to move laterally within or across firms, and to only

[9] We also tested models for each interaction individually and only single women strong in quant was significant. The individual interactions revealed that single women have a 0.20 marginal probability of receiving a within firm promotion compared to all other groups with this talent; single men 0.45 probability; married women 0.37 probability; and, married men 0.59 probability. We also tested the full model using single men high in quant skills as the omitted category. The effect for single high quant women remained negative but marginally significant (-0.662 z=-1.51). The other interactions are negative but not significant.

experience within or across firm mobility. Again, none proved significant: single women talented in math did not differ on any of other type of mobility except for internal promotions[10].

We also discussed our results with various industry and academic experts and recruiters. From these conversations, a common reaction kept emerging: women strong in quant must have personality or social deficiencies, which explain the lack of confidence the market has in their ability to lead. However, it was unclear to us was why strong quantitative skills would be unique in affecting single women's social aptitude more than any of the other groups with similar talents. Moreover, our statistical model considered social skills through our measures of club membership and leadership, engagement in the charity club, willingness to use personal skills to negotiate an offer, and even the number of offers and compensation an individual received – which indicated at a minimum, a level of success in the interviewing process. Yet, the penalty for quantitatively strong single women remained robust to these controls. As popular as this reaction was, we had little empirical support that the poor social skills of single women explained our outcome.

That said, we wondered whether there was something particular about this social expectation of "hardcore nerds" that made single high quant women averse toward selecting into careers that highlighted these skills, even though these would generate better promotion opportunities for these women. Or, whether firms were less apt to hire such women in the first place. Akin to other studies of women in math and science careers (Zeldin & Pajares, 2000; Correll, 2001), the women in our sample could have self-efficacy beliefs when it came to evaluating their own analytical abilities that downgraded their own beliefs in their ability. Applying this logic, the observed lack of promotion could be self-induced by these analytically talented, single women, if they were sorting themselves – based on their lower self-perceptions of their ability – into lower fitting jobs that did not value the their analytical talent, which ultimately would lead to a worse chance of promotion.

[10] Notably, for across firm mobility, we found a negative, significant effect for single women talented in math (-1.004, z=-2.08) when all other interactions were excluded from the analysis.

Accordingly, we tested whether these analytical, single women were more or less likely to sort into a career that valued quantitative skills. Of course, these are all business fields, which makes testing this naturally skewed toward careers that value quantitative skills. However, we knew that certain career functions – such as finance, investment banking, or IT/engineering regularly relied on stronger math-oriented skills than a career in general management, consulting, or human resources for example. We analyzed factors predicting job function selection after graduation across functional areas: investment banking, consulting, corporate finance, etc. We did not find single women strong in quantitative skills any more or less likely to select into any particular career function. We further tested whether interactions between single women and a career in finance, investment banking, or marketing was related to a promotion rate. Again, there was no significant effect for single women in finance, investment banking, or marketing on promotion likelihood.

Taken together, our evidence is most broadly consistent with an argument that women who are single and quantitatively strong are treated as "incongruent" employees, or possibly as threatening to schemas.

Discussion and Conclusion

We began by noting the substantial evidence on the barriers to women's workplace advancement into leadership positions that is often represented by a "glass ceiling" that women face throughout their careers. To date, a dominant framework for studying this inequality has been anchored in theories related to women's commitment, motherhood penalties, and comparisons of married men and women with children. While these theories have contributed substantially to our understanding of workplace gender inequality, the breadth of the research's impact is limited in that it has unclear predictions for professional single women. This is an important oversight to address as single women have had increasing graduate school enrollments in the professions of business, law, and medicine and represent a sizable portion of the professional workforce.

Drawing from expectation states and role congruity theories, we argue that – rather than the commitment mechanism associated with married women – that single women without children are at a higher risk of being viewed as incongruent with the role of leadership. In particular, single women who are also analytically talented present a case of multiple incongruities. Not only is single womanhood incongruent with a masculine (agentic) leadership role, but the feminine (communal) leadership roles are incongruent when single women lack evidence of caring that being a mother and wife may convey, work in a masculine domain (e.g., investment banking), and are strong in a skill regarded as masculine (analytical/quantitative skills).

Empirically, we used a two-study, multi-method approach where we first established the presence of a single woman penalty in an experimental vignette study, followed by an analysis of actual early career promotions of business professionals. Across these studies, we found single women without children to be the most disadvantaged group. Further, we found this penalty embedded in differences in perceptions of leadership competency uniquely ascribed to single women even when given identical qualifications in our experiment. At the same time, participants assessed no differences in perceived commitment across candidate profiles.

Study 2 showed the single woman penalty in the early career patterns of graduates from a top-tier graduate business school where we found single women with the highest analytical aptitude to have the lowest promotion rates. This finding is robust to a variety of specifications and controls for individual ability, social aptitude, functional job sorting, human and social capital, and job matching.

Theoretically, our study suggests that workplace gender inequality is likely to persist even in contexts where the commitment mechanism is not invoked. Indeed, it is possible that a better unifying theory is one of role expectations and congruity, where gender inequality is generated whenever some aspect of their social identity has expectations that conflict with that of leadership.

In this light, married women are seen as insufficiently committed to occupy a leadership role, while single women with strong analytical skills are regarded as insufficiently communal or socially astute.

Our findings also have clear implications for single professional women. Much of the emphasis on what it takes for early career success is hard work, long hours, and "face time". This would seem to clearly advantage people who are single who would arguably have more "free" time to invest in such strategies. Yet, what we found is that for single women, such acts of commitment matter far less than congruity with the gendered role of the leader. Worse, such acts are associated with masculinity whereby demonstrating commitment or mastering analytical/quantitative may be interpreted as agentic behavior, and result in further sanctions. The end result is a paradox: single women, as the subgroup of women most associated with the necessary skills for success in business and financial services, are more likely to be penalized in promotions for being the most incongruous with respect to the role of leader.

While our study benefitted from a multi-method approach, there are limitations to our analysis worth noting. For example, this study is of professional, high achieving women and thus may be less generalizable to single women working in non-professional fields, especially fields that are not considered as masculine as business and finance. The benefit of our approach is that we could observe inequality even among well-educated single women with the best career opportunities. Future research should continue to study how comparisons by gender, marital status, and talent affect different demographic segments of the workforce.

Further, we should be clear that our theory and evidence points to outcomes that happen once women are working. We are not making predictions on how single women may fare in a job search or getting hired. While we can account for some of the differences that could affect promotions (such as individual quality and match differences in the job search), our studies focus on individuals who already make it past the threshold of being hired (which may disproportionately disadvantage married women) into what happens once these women are in the firm.

While our data is unique in the breadth of controls and dual-methods employed, we were unable to parse the data into additional categories of family structure, such as married without children, divorced, widowed, single with children, and cohabitation. For instance, although we find penalties toward single women with strong analytical skills independent of whether they had children, we did not have measures of family status after graduation. It would be particularly interesting to see for example if married women without children would be penalized by commitment expectations and how this would compare to single women with children. A popular perspective (Sandberg, 2013) is that women fail to craft a job and career that they want to return to after having children, making "opting out" a more preferable option. Finding that single women (without children) are blocked from such exciting career opportunities makes additional fine-grained analyses across gender and marital categories a fruitful avenue for future research.

Finally, we believe that one advantage that comes from this study is our unique ability to test alternative explanations related to gender inequality and early careers. More, we were able to use a comprehensive comparison that took into account both men and women across marital statuses and specific skill. We see this as an important step, which we hope will continue into future research on gender inequality and women's ascent into leadership.

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Table 1. Snapshot of Participant Characteristics from Study One (means in percentages).

	Full-Time	Part-Time	Executive
Gender (Female)	35%	48%	34%
Aged 20-30	80%	68%	14%
Aged 31-40	20%	16%	66%
Aged >40	0%	16%	20%
Caucasian	58%	80%	46%
U.S. Citizen	65%	84%	55%
Married	16%	44%	61%
Children	12%	24%	51%
Prior Mgmt Experience	70%	76%	91%

Table 2. Descriptive and Correlation Statistics (Study One).

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
Mean	2.79	-0	0.25	0.25	0.25	0.25	0.43	0.36	0.44	0.37
Std. Deviation	1.31	0.68	0.43	0.43	0.43	0.43	0.5	0.48	0.5	0.48
Min	1	-1.3	0	0	0	0	0	0	0	0
Max	6	1.68	1	1	1	1	1	1	1	1
Observations	195	176	195	195	195	195	195	184	192	193
V1 Q1 - Suitability Assessment VP Rating	1									
V2 Factor - No Leadership, Analytical	-0.18 *	1								
V3 Single Woman	-0.16	0.10	1							
V4 Single Man	0.15 *	-0.07	-0.34 *	1						
V5 Married Woman	-0.11	0.02	-0.34 *	-0.34 *	1					
V6 Married Man	0.12	-0.04	-0.33 *	-0.33 *	-0.33 *	1				
V7 Full-Time MBA Program	-0.02	0.15 *	0.00	-0.02	0.00	0.01	1			
V8 Participant Gender (Female)	-0.13	0.11	0.06	0.02	-0.01	-0.07	-0.02	1		
V9 Participant Race (Non-Caucasian)	0.02	0.04	-0.04	-0.03	0.05	0.02	-0.04	-0.04	1	
V10 Participant Citizenship (Non-US)	0.03	0.08	-0.08	-0.10	0.10	0.08	-0.02	-0.07	0.64 *	1
V11 Participant Age > 40	0.07	0.04	0.03	-0.05	-0.05	0.07	-0.30 *	0.05	0.17 *	-0.13
V12 Participant Marital Status (Married)	0.02	-0.19 *	-0.01	-0.07	0.00	0.08	-0.42 *	-0.18 *	0.11	0.08
V13 Participant Children (Yes)	-0.06	-0.11	0.03	-0.07	-0.02	0.06	-0.35 *	-0.17 *	0.09	0.09
V14 Participant Prior Mgmt Experience (Yes)	0.02	0.08	0.00	-0.04	-0.07	0.11	-0.21 *	0.00	0.06	0.04
V15 Participant Managed >26 Reports (Yes)	0.02	-0.02	0.00	0.00	-0.09	0.09	-0.11	-0.02	-0.08	-0.12
V16 Participant Most Recent Job - Energy	-0.11	0.07	-0.06	-0.02	0.17 *	-0.09	-0.15 *	-0.04	0.02	-0.04
V17 Participant Most Recent Job - Finance	-0.03	-0.12	0.07	-0.05	-0.09	0.07	0.07	-0.02	0.16 *	0.29
V18 Number of Words in Explanation	-0.20 *	0.23 *	0.07	0.03	-0.06	-0.04	0.26 *	0.02	-0.32 *	-0.29
V19 Ranked VP as First for Candidate	0.26 *	-0.22 *	0.00	0.08	-0.04	-0.04	0.02	0.01	0.06	-0.07
V20 Ranked AVP as First for Candidate	0.12	-0.07	0.11	-0.05	-0.10	0.04	0.01	-0.05	-0.16 *	-0.03
	V11	**V12**	**V13**	**V14**	**V15**	**V16**	**V17**	**V18**	**V19**	**V20**
Mean	0.11	0.39	0.31	0.8	0.08	0.16	0.11	27.2	0.1	0.59
Std. Deviation	0.31	0.49	0.46	0.4	0.28	0.37	0.32	19	0.3	0.49
Min	0	0	0	0	0	0	0	0	0	0
Max	1	1	1	1	1	1	1	100	1	1
Observations	193	193	193	193	193	189	189	195	194	194
V11 Participant Age > 40	1									
V12 Participant Marital Status (Married)	0.20 *	1								
V13 Participant Children (Yes)	0.35 *	0.69 *	1							
V14 Participant Prior Mgmt Experience (Yes)	0.13	0.17 *	0.22 *	1						
V15 Participant Managed >26 Reports (Yes)	0.08	0.14 *	0.17 *	0.15 *	1					
V16 Participant Most Recent Job - Energy	-0.02	0.05	0.11	-0.03	-0.08	1				
V17 Participant Most Recent Job - Finance	-0.07	0.06	0.06	0.01	-0.05	-0.16 *	1			
V18 Number of Words in Explanation	-0.16 *	-0.23 *	-0.22 *	-0.13	0.04	-0.02	0.00	1		
V19 Ranked VP as First for Candidate	0.00	-0.05	-0.11	0.04	0.03	-0.10	-0.06	-0.20 *	1	
V20 Ranked AVP as First for Candidate	0.05	0.03	-0.01	-0.07	-0.06	-0.08	0.08	0.17 *	-0.41 *	1

Note: * significant at .05

Table 3. Ordered Probit Predicting the Suitability Assessment of the Candidate for Promotion to Vice President Position.

	Model 1		**Model 2**	
	Ordered Probit - Suitability Rating for VP Position (Q1)		**Ordered Probit - Suitability Rating for VP Position (Q1)**	
	Beta	*SE*	*Beta*	*SE*
Condition				
Single Woman	-0.556	0.240 *	-0.504	0.246 *
Single Man	0.194	0.232	0.225	0.242
Married Woman	-0.297	0.237	-0.267	0.245
Participant Characteristics				
Full-time MBA program			-0.182	0.201
Female			-0.231	0.180
Non-Caucasian			0.094	0.224
Non-U.S. Citizen			0.087	0.245
Age > 40			0.289	0.328
Married			0.054	0.236
Has Children			-0.332	0.263
Has Previous Management Experience			-0.031	0.215
Has Managed > 26 Employees			-0.177	0.335
Most Recent Job - Energy/Oil & Gas			-0.340	0.250
Most Recent Job - Finance			-0.160	0.276
Constant				
Cut Point 1	-1.068	0.191	-1.309	0.333
Cut Point 2	-0.184	0.178	-0.394	0.323
Cut Point 3	0.251	0.176	0.048	0.320
Cut Point 4	1.290	0.202	1.104	0.335
Cut Point 5	2.431	0.397	2.282	0.487
Observations	161		161	
Likelihood	-243.76		-240.01	
Pseudo R2	0.02		0.04	

Note: *** significant at .001, ** significant at .01, *significant at .05, † significant at .10.

Table 4. OLS Regression Model Predicting Factor Analysis of Candidate Assessment Explained as due to "No Management/Leadership Ability/Analytical" and "Committed/Worthy of a Reward".

	Model 1 **OLS Regression of Factor= No Mgmt Ability, Analytical**		**Model 2** **OLS Regression of Factor= Committed, Worthy of Reward**	
	Beta	*SE*	*Beta*	*SE*
Condition				
Single Woman	0.276	0.138 *	-0.060	0.147
Single Man	0.036	0.138	-0.093	0.146
Married Woman	0.041	0.139	-0.176	0.148
Participant Characteristics				
Full-time MBA program	0.111	0.116	0.078	0.123
Female	0.067	0.101	-0.149	0.108
Non-Caucasian	0.114	0.132	-0.290	0.140 *
Non-U.S. Citizen	0.246	0.142 †	0.123	0.150
Age > 40	0.400	0.187 *	0.010	0.198
Married	-0.193	0.136	0.034	0.144
Has Children	-0.130	0.150	-0.177	0.159
Has Previous Management Experience	0.166	0.122	0.203	0.130
Has Managed > 26 Employees	-0.096	0.193	-0.185	0.205
Most Recent Job - Energy/Oil & Gas	0.140	0.142	-0.208	0.151
Most Recent Job - Finance	-0.320	0.156 *	0.027	0.165
Other Survey Responses				
# of Words used in Explaining Assessment	0.009	0.003 **	0.006	0.003 †
Ranked VP as First Choice for Candidate	-0.657	0.187 ***	0.280	0.199
Ranked AVP as First Choice for Candidate	-0.262	0.111 *	0.374	0.118 **
Constant	-0.373	0.227 †	-0.328	0.241
Observations	161		161	
R2	0.27		0.23	

Note: *** significant at .001, ** significant at .01, *significant at .05, † significant at .10.

Table 5. Descriptive and Correlation Statistics (Study Two).

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
	Mean	0.40	0.24	0.49	0.06	0.18	27.97	0.51	0.31	0.33	0.49	58.17	2.37	0.23	0.33	0.20
	Std. Dev	0.49	0.42	0.50	0.24	0.39	2.23	0.50	0.46	0.47	0.50	23.72	1.26	0.42	0.47	0.47
	Min	0	0	0	0	0	21.92	0	0	0	0	4	0	0	0	0
	Max	1	1	1	1	1	36.58	1	1	1	1	170	10	10	1	1
	Observations	612	616	616	596	602	613	595	616	612	612	593	616	616	613	613
V1	Within Firm Promotion Post-Graduation (Yes)	1														
Individual Characteristics																
V2	Single Woman	0.03	1													
V3	Single Man	-0.06	-0.55 *	1												
V4	Married Woman	0.03	-0.15 *	-0.26 *	1											
V5	Married Man	0.00	-0.27 *	-0.48 *	-0.12 *	1										
V6	Age at Graduation	-0.06	-0.27 *	-0.09 *	0.15 *	0.32 *	1									
V7	Not Caucasian	-0.10 *	0.06	-0.07	0.06	-0.02	0.09 *	1								
V8	Not a US Citizen	-0.07	-0.08 *	-0.03	-0.01	0.14 *	0.25 *	0.30 *	1							
V9	Mother's Graduate Education or Higher (Yes)	0.06	0.01	0.03	0.08 *	-0.09 *	-0.06	-0.09 *	-0.11 *	1						
V10	Father's Graduate Education or Higher (Yes)	0.01	-0.03	0.04	0.06	-0.05	-0.14 *	-0.11 *	-0.12 *	0.34 *	1					
Pre-MBA Experience & History																
V11	Prior Work Experience (months)	-0.03	-0.18 *	-0.05	0.13 *	0.19 *	0.81 *	0.07	0.17 *	-0.04	-0.09 *	1				
V12	# of Prior Firms Worked For	-0.05	0.02	-0.06	0.01	0.06	0.19 *	0.03	0.00	0.01	-0.08	0.16 *	1			
V13	Attended Top 20 Undergraduate School	0.02	0.07	0.12 *	-0.10 *	-0.15 *	-0.17 *	-0.08	-0.33 *	0.06	0.07	-0.08	0.03	1		
V14	Accepted in First Round Admissions	0.01	-0.04	0.00	-0.01	0.03	-0.07	-0.09 *	0.02	-0.02	0.03	-0.08	-0.02	0.01	1	
V15	Has Add'l Grad Degree	-0.10 *	-0.13 *	-0.05	0.03	0.18 *	0.28 *	0.17 *	0.15 *	0.03	-0.07	0.06	0.03	-0.11 *	-0.01	1
During MBA Experience & History																
V16	GMAT Quant >=95th percentile	-0.05	-0.08	-0.05	0.05	0.11 *	0.09 *	0.25 *	0.38 *	-0.03	-0.02	0.03	0.03	-0.15 *	0.06	0.17 *
V17	GMAT Verb >=95th percentile	0.07	-0.07	0.06	0.01	-0.02	-0.06 *	-0.16 *	-0.11 *	0.10 *	0.08 *	-0.03	0.04	0.14 *	0.01	0.07
V18	GPA<=3.0	-0.04	0.14 *	-0.04	-0.02	-0.08 *	0.02	0.09 *	0.04	-0.04	-0.01	-0.02	0.06	-0.07	-0.04	0.00
V19	GPA>=3.8	0.04	-0.06	0.01	-0.01	0.03	0.02	-0.11 *	0.03	0.05	0.04	-0.01	0.00	0.03	0.03	0.06
V20	Indicator for GPA data missing	-0.08 *	0.02	-0.07	0.04	0.01	-0.02	0.04	-0.03	0.02	-0.03	0.02	0.02	0.00	-0.05	0.02
V21	# of Concentrations	0.03	0.01	-0.02	0.01	-0.02	0.11 *	0.10 *	0.04	0.04	-0.08	0.09 *	0.12 *	-0.03	-0.01	0.02
V22	Number of Clubs	0.00	0.14 *	0.11 *	0.08	-0.08	0.00	0.12 *	0.00	0.01	0.08	0.01	0.17 *	0.01	0.02	0.00
V23	Club Leader	0.01	0.03	-0.05	0.05	0.01	0.00	0.04	-0.01	-0.02	0.01	0.00	0.07	-0.02	-0.04	0.01
V24	Member of Charity Club	0.12 *	0.07	-0.01	-0.01	-0.03	-0.10 *	0.00	-0.03	-0.01	0.04	-0.10 *	-0.07	0.01	0.06	-0.08 *

Note: *significant at .05

Table 5. Descriptive and Correlation Statistics (Study Two – *continued*)

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
First Job upon Graduation - Characteristics																
V25	Accepted Full time Inv Bank Job	-0.15 *	-0.19 *	0.15 *	-0.10 *	0.05	0.04	0.03	0.08 *	-0.03	-0.05	-0.02	-0.06	-0.03	0.08	0.05
V26	Accepted Full time Marketing Job	0.05	0.18 *	-0.13 *	0.05	-0.07	-0.06	0.00	-0.16 *	0.07	0.06	-0.01	0.00	0.02	-0.02	-0.08
V27	Accepted Full time Job in Entrepreneurial Venture	-0.10 *	0.00	0.01	0.00	0.01	0.08 *	-0.05	-0.01	-0.02	-0.08	0.02	0.21 *	0.04	-0.07	0.04
V28	Graduated in 2008	0.13 *	-0.02	-0.01	-0.02	0.04	0.08	-0.04	-0.07	-0.01	-0.01	0.03	-0.04	0.02	0.02	-0.02
V29	Ln (Total Compensation)	0.02	-0.11 *	0.02	-0.06	0.14 *	0.10 *	-0.04	0.01	-0.01	-0.03	0.10 *	0.01	0.00	0.05	0.06
V30	Negotiated with Employer	0.03	-0.05	-0.06	0.06	0.10 *	0.00	0.03	0.01	-0.05	-0.02	0.02	0.12 *	-0.11 *	-0.01	-0.02
V31	Number of Job Offers	0.09 *	0.00	-0.03	-0.05	0.08 *	0.02	-0.03	0.02	-0.07	-0.03	0.06	0.03	-0.02	0.01	0.02
V32	Full time Job was First Choice	0.04	-0.03	0.01	0.04	0.02	-0.01	-0.22 *	-0.16 *	0.00	0.00	-0.02	-0.12 *	0.07	0.09 *	-0.06
V33	Accepted Job with Internship Employer	0.00	-0.08 *	0.00	0.10 *	0.00	-0.01	-0.05	0.02	0.06	0.08	0.01	-0.38 *	-0.10 *	0.09 *	0.01
V34	Sourced Job by Employer Invitation	0.08	0.02	0.01	-0.04	0.01	-0.02	-0.01	-0.07	0.03	-0.01	-0.02	0.17 *	0.05	-0.09 *	0.02
V35	Sourced Job on Own	0.05	-0.03	0.03	-0.01	-0.01	-0.05	-0.07	0.04	-0.08	-0.02	-0.01	0.02	0.04	-0.03	-0.05
V36	First Reason for Accepting Job: Spouse	0.05	-0.02	0.01	0.11 *	-0.08 *	0.07	0.00	0.06	-0.06	-0.12 *	0.03	0.00	-0.03	0.05	-0.01
Interactions																
V37	Single Woman * GMAT Quant>95th Percentile	-0.07	0.35 *	-0.19 *	-0.05	-0.09 *	-0.13 *	0.13 *	0.22 *	-0.03	0.00	-0.09 *	-0.02	-0.11 *	-0.03	-0.05
V38	Single Man * GMAT Quant>95th Percentile	-0.03	-0.18 *	0.33 *	-0.09 *	-0.16 *	-0.04	0.12 *	0.17 *	0.00	-0.03	-0.04	0.01	-0.01	0.04	0.10 *
V39	Married Woman * GMAT Quant>95th Percentile	-0.01	-0.08	-0.14 *	0.53 *	-0.07	0.11 *	0.11 *	0.09 *	0.06	0.02	0.03	0.02	-0.08	0.01	0.06
V40	Married Man * GMAT Quant>95th Percentile	0.03	-0.14 *	-0.25 *	-0.07	0.52 *	0.24 *	0.10 *	0.20 *	-0.07	0.00	0.16 *	0.05	-0.11 *	0.07	0.15 *

	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30
Mean	0.22	0.38	0.10	0.07	0.30	2.66	3.52	0.47	0.14	0.34	0.10	0.10	0.48	11.95	0.13
Std. Dev	0.41	0.48	0.29	0.25	0.46	0.81	1.38	0.50	0.35	0.47	0.30	0.30	0.50	0.33	0.34
Max	0	0	0	0	0	0	0	0	0	0	0	0	0		0
Min	1	1	1	1	1	4	5	1	1	1	1	1	1		1
Observations	616	616	616	616	616	610	613	608	616	614	613	616	616	521	542

		V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30
During MBA Experience & History																
V16	GMAT Quant >=95th percentile	1														
V17	GMAT Verb >=95th percentile	0.02	1													
V18	GPA<=3.0	0.00	-0.16 *	1												
V19	GPA>=3.8	0.10 *	0.10 *	-0.09 *	1											
V20	Indicator for GPA data missing	0.00	-0.11 *	-0.21 *	-0.17 *	1										
V21	# of Concentrations	0.02	0.03	-0.02	-0.06	-0.04	1									
V22	Number of Clubs	-0.03	0.04	0.07	-0.01	-0.04	0.22 *	1								
V23	Club Leader	-0.04	-0.02	0.04	-0.06	-0.01	0.06	0.26 *	1							
V24	Member of Charity Club	-0.05	0.01	0.00	0.01	-0.01	0.05	0.18 *	0.05	1						
First Job upon Graduation - Characteristics																
V25	Accepted Full time Inv Bank Job	0.09 *	-0.02	-0.03	0.00	0.03	-0.07	-0.13 *	-0.1	-0.06	1					
V26	Accepted Full time Marketing Job	-0.10 *	-0.05	0.04	-0.04	-0.02	0.05	0.03	0.03	0.09 *	-0.23 *	1				
V27	Accepted Full time Job in Entrepreneurial Venture	0.08 *	-0.03	-0.03	-0.02	0.04	0.05	0.03	-0.04	-0.02	-0.01	-0.05	1			
V28	Graduated in 2008	-0.01	-0.07	0.05	0.07	-0.12 *	0.05	0.00	0.02	-0.03	-0.16 *	-0.04	0.00	1		
V29	Ln (Total Compensation)	-0.02	0.10 *	-0.05	0.01	-0.09 *	0.07	0.01	-0.02	-0.09 *	0.20 *	-0.19 *	0.03	0.18 *	1	
V30	Negotiated with Employer	-0.02	-0.01	0.02	-0.02	-0.07	0.02	0.08	0.08	-0.01	-0.16 *	0.07	0.01	-0.08	-0.11 *	1
V31	Number of Job Offers	0.00	0.06	-0.03	0.03	-0.08 *	0.06	0.06	0.08 *	0.02	-0.12 *	-0.05	-0.10 *	0.27 *	0.17 *	0.14 *
V32	Full time Job was First Choice	-0.06	0.10 *	-0.01	0.05	-0.08	-0.05	-0.09 *	0.01	-0.02	0.10 *	-0.04	-0.06	0.20 *	0.22 *	-0.03

Note: *significant at .05

Table 5. Descriptive and Correlation Statistics (Study Two – *continued*)

		V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30
First Job upon Graduation - Characteristics																
V33	Accepted Job with Internship Employer	-0.03	0.01	-0.02	0.06	-0.10 *	-0.02	-0.05	-0.03	0.03	0.18 *	0.04	-0.10 *	0.04	0.02	-0.09 *
V34	Sourced Job by Employer Invitation	-0.01	0.08	0.01	-0.03	0.05	0.05	0.10 *	0.08	0.03	-0.20 *	0.02	0.03	0.09 *	0.00	-0.06
V35	Sourced Job on Own	-0.10 *	-0.06	-0.02	0.00	-0.02	-0.01	0.03	0.08	0.02	-0.03	-0.08	0.01	-0.08 *	-0.01	0.21 *
V36	First Reason for Accepting Job: Spouse	0.01	-0.09 *	0.06	0.00	-0.04	-0.02	-0.03	-0.02	0.00	0.05	0.06	0.00	-0.03	-0.07	0.07
Interactions																
V37	Single Woman * GMAT Quant>95th Percentile	0.38 *	-0.03	0.05	-0.02	0.04	-0.01	0.05	-0.06	0.05	0.00	-0.04	0.08 *	-0.04	-0.07	-0.05
V38	Single Man * GMAT Quant>95th Percentile	0.62 *	0.07	0.01	0.05	-0.05	0.04	-0.03	0.00	-0.03	0.05	-0.09	0.02	-0.01	0.01	-0.01
V39	Married Woman * GMAT Quant>95th Percentile	0.26 *	-0.05	0.04	0.02	0.02	0.00	-0.01	0.05	-0.06	0.01	0.00	0.00	-0.03	-0.04	0.03
V40	Married Man * GMAT Quant>95th Percentile	0.48 *	-0.02	-0.06	0.08 *	0.01	-0.04	-0.07	-0.02	-0.04	0.07	-0.03	0.06	0.04	0.05	0.02

	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40
Mean	1.22	0.79	0.45	0.18	0.13	0.05	0.04	0.10	0.02	0.06
Std. Dev	0.80	0.41	0.50	0.39	0.34	0.21	0.19	0.29	0.13	0.24
Max	0	0	0	0	0	0	0	0	0	0
Min	6	1	1	1	1	1	1	1	1	1
Observations	614	542	616	542	542	615	616	616	596	596

		V31	V32	V33	V34	V35	V36	V37	V38	V39	V40
First Job upon Graduation - Characteristics											
V31	Number of Job Offers	1									
V32	Full time Job was First Choice	0.03	1								
V33	Accepted Job with Internship Employer	-0.16 *	0.18 *	1							
V34	Sourced Job by Employer Invitation	0.21 *	-0.05	-0.43 *	1						
V35	Sourced Job on Own	0.13 *	-0.06	-0.26 *	-0.18 *	1					
V36	First Reason for Accepting Job: Spouse	-0.11 *	-0.06	0.01	0.01	-0.02	1				
Interactions											
V37	Single Woman * GMAT Quant>95th Percentile	-0.05	0.03	-0.12 *	-0.04	-0.05	-0.05	0.00	1		
V38	Single Man * GMAT Quant>95th Percentile	-0.01	0.00	0.02	-0.02	0.02	-0.07	-0.02	-0.06	1	
V39	Married Woman * GMAT Quant>95th Percentile	0.03	-0.05	0.00	0.05	0.04	-0.05	0.21 *	-0.03	1	1
V40	Married Man * GMAT Quant>95th Percentile	0.02	0.00	-0.01	-0.04	-0.01	0.00	-0.05	-0.05	-0.08 *	-0.03 1

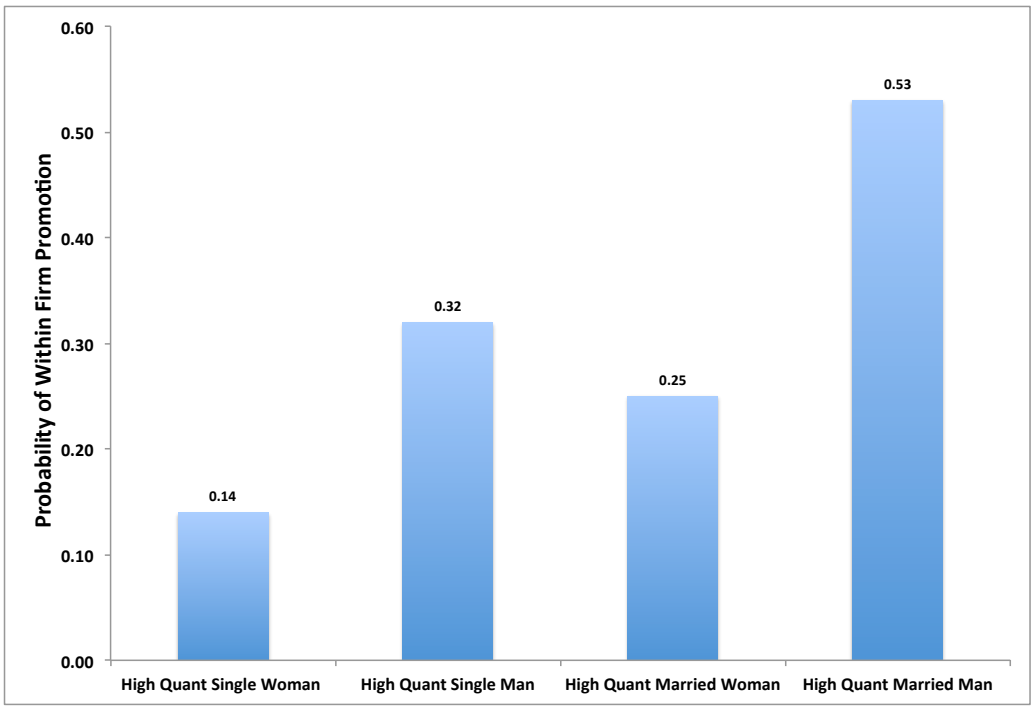
Note: *significant at .05

Table 6. Probit Model Predicting the Effects of Covariates on Likelihood of Within Firm Promotion after MBA Graduation.

	Model 1			Model 2		
	Odds of Internal Promotion (After Graduation)			Odds of Internal Promotion (After Graduation)		
	Beta	*SE*		*Beta*	*SE*	
Individual Characteristics						
Single Woman	0.020	0.223		0.208	0.243	
Single Man	-0.150	0.186		-0.059	0.210	
Married Woman	0.129	0.291		0.287	0.354	
Age at Graduation	-0.020	0.057		-0.027	0.057	
Non-white	-0.134	0.144		-0.146	0.145	
Non-citizen	-0.121	0.165		-0.084	0.167	
Mother - graduate education or higher	0.100	0.144		0.097	0.144	
Father - graduate education or higher	-0.019	0.137		-0.027	0.138	
Pre-MBA Experience & History						
Work Experience (in Months)	0.000	0.005		0.000	0.005	
# of Orgs Worked For	0.001	0.063		-0.004	0.063	
Attended Top 20 Undergraduate School	-0.186	0.163		-0.202	0.164	
Accepted in First Round (MBA program)	-0.073	0.137		-0.089	0.138	
Holds Another Grad Degree	-0.154	0.186		-0.180	0.187	
GMAT Quant >= 95 pctile	0.176	0.173		0.570	0.326	†
GMAT Verbal >= 95 pctile	0.191	0.138		0.196	0.139	
During MBA Experience & History						
GPA <=3.0	-0.145	0.222		-0.127	0.224	
GPA >=3.80	0.180	0.265		0.161	0.267	
GPA not provided	-0.178	0.153		-0.159	0.155	
Number of Concentrations	0.099	0.081		0.097	0.081	
Number of Extra-curricular Clubs	-0.056	0.052		-0.052	0.052	
Leader of Extra-curricular Club	-0.055	0.130		-0.075	0.132	
Member of Charity Club	0.456	0.179	**	0.477	0.180	**
First Job upon Graduation - Characteristics						
Accepted Job in I-Banking	-0.563	0.160	***	-0.556	0.161	***
Accepted Job in Marketing	0.034	0.223		-0.004	0.225	
Accepted/Founded Job in Entrepreneurial Venture	-0.657	0.270	*	-0.629	0.274	*
Graduated in 2008	0.452	0.140	***	0.448	0.141	***
Ln (Total Compensation) of Accepted Job	0.283	0.219		0.274	0.218	
Negotiated Offer with Employer of Accepted Job	-0.062	0.198		-0.074	0.198	
Number of Offers Received upon Graduation	-0.111	0.095		-0.096	0.096	
Accepted Offer Reported as First Choice	-0.098	0.176		-0.121	0.176	
Accepted Offer with Internship Firm	-0.068	0.170		-0.073	0.171	
Source of Job = Invited by Employer	0.157	0.195		0.146	0.197	
Source of Job = Found on Own	0.476	0.229	*	0.443	0.230	*
Listed First Reason for Accepting Job: Due to Spouse	0.370	0.347		0.427	0.360	
Interactions						
Single Woman*Quant GMAT >=95th pctle				-1.003	0.489	*
Single Man*Quant GMAT>=95th pctle				-0.340	0.392	
Married Woman*Quant GMAT>=95th pctle				-0.528	0.619	
Constant	-2.839	2.991		-2.601	3.007	
Observations	457			457		
Log Likelihood	-281.32			-279.10		
Pseudo R2	0.09			0.10		

Note: *** significant at .001, ** significant at .01, *significant at .05, † significant at .10

Figure 1: The Penalty for Quantitatively Strong Single Women: Odds of Within Firm Promotion (High Quant, Married Men are the referent category)



Appendix 1: Vignette Survey from Study 1

Instructions: Please read and answer the questions that follow.

ABC Bank, a large investment-banking firm, needs to hire for three positions. They are considering this candidate who is currently employed at ABC Bank.

Candidate
Background Information Three years ago, Ann graduated in the top of her class with an MBA from a prestigious business program. Before this, Ann worked at a well-known firm in their corporate finance department. The company was impressed with her analytic skills and offered her a job after her MBA, even agreeing to pay for her tuition. Ann instead accepted a *Senior Associate* position at ABC Bank, a coveted job among her classmates. Since starting at ABC Bank, Ann has worked on a number of projects, clocking over 110-hour weeks. She is known in her firm for her sharp analytical skills, attention to detail and commitment to projects. In her free time, Ann enjoys traveling with her friends, exercising, and going to the theatre.

Q1: Please review the positions available at ABC Bank in the table below.

After reading the positions, please rate from 1 to 6 for the candidate for each position, where:

- **1=not suitable**, do not consider this candidate
- **2=low potential**; only consider if no other candidate
- **3=neutral** – neither likely, nor unlikely to consider
- **4=some potential**; consider this candidate
- **5=high potential**; highly consider this candidate
- **6**=candidate is **over-qualified** for this position, do not consider

Position Title and Career Track Information	**Position Description**	**Rate (1 to 6)**
Vice President o Considered a significant promotion o Typical hire: candidates certain to have long-term leadership potential	• Responsibilities include: o Mentor and develop staff o Work on a variety of transactions, e.g., client pitches o Communicate regulatory, financial information o Market to internal partners and external clients	
Assistant Vice President o Considered a promotion o Typical hire: candidates believed to have long-term leadership potential	• Responsibilities include: o Market the firm's investment strategy to potential clients o Perform industry, company and financial due diligence and research o Construct detailed financial models and analyses	
Senior Associate o Considered neither a promotion or demotion; but a lateral move	• Responsibilities include: o High level of responsibility; access to senior management, clients o Involved in transactions including financings o Handle daily activities & oversee analyst work	

Q2: If you had to rank the positions for this same candidate from a first to third place (with first being the best), how would you rank these positions – please write your ranking next to the title (taken from the table in Q1) below:

_____ Vice President

_____ Assistant Vice President

_____ Senior Associate

Q3: Please describe why you selected this ranking for this candidate?

Q4: On a scale of 1 to 5, please circle how difficult it was to evaluate this candidate for these positions:

1	2	3	4	5
Difficult	**Somewhat Difficult**	**Neither Easy Or Difficult**	**Somewhat Easy**	**Easy**

Q5: To check what you recall about the candidate, check any of the following you believe to be true.

The candidate is:

a) ____ An MBA graduate
b) ____ Hard-working
c) ____ Lives in Chicago
d) ____ Single
e) ____ Analytically skilled

ONE MORE PAGE TO GO!

Q6: Please describe yourself, circling the correct response:

a) Marital Status:
    a. Single
    b. Married
    c. Divorced or Widowed
b) Do you have children?
    a. Yes
    b. No
c) Have you ever worked full-time?
    a. Y
    b. N
d) Have you ever had any managerial responsibility?
    a. Y
    b. N
e) Circle the number of people that have directly reported to you in your job with the largest management responsibility?
    a. I have not yet had a job with subordinates.
    b. 1-5
    c. 6-10
    d. 11-25
    e. 26-50
    f. 50+
f) Please write in the industry of your most recent job: _____
g) What is your age:
    a. 20-30
    b. 31-40
    c. 41-50
    d. 51+
h) Are you a U.S. citizen?
    a. Yes
    b. No
i) Please circle all ethnicities that apply:
    - Caucasian
    - Asian
    - Hispanic
    - African-American
    - Other
j) Gender:
    - Female
    - Male

Thank you for your time!

Married Woman Condition:

Candidate
Background Information Three years ago, Ann graduated in the top of her class with an MBA from a prestigious business program. Before this, Ann worked at a well-known firm in their corporate finance department. The company was impressed with her analytic skills and offered her a job after her MBA, even agreeing to pay for her tuition. Ann instead accepted a Senior Associate position at ABC Bank, a coveted job among her classmates. Since starting at ABC Bank, Ann has worked on a number of projects, clocking over 110-hour weeks. She is known in her firm for her sharp analytical skills, attention to detail and commitment to projects. In her free time, Ann enjoys traveling with her husband and children, exercising, and going to the theatre.

Single Man Condition:

Candidate
Background Information Three years ago, Tim graduated in the top of his class with an MBA from a prestigious business program. Before this, Tim worked at a well-known firm in their corporate finance department. The company was impressed with his analytic skills and offered him a job after his MBA, even agreeing to pay for his tuition. Tim instead accepted a Senior Associate position at ABC Bank, a coveted job among his classmates. Since starting at ABC Bank, Tim has worked on a number of projects, clocking over 110-hour weeks. He is known in his firm for his sharp analytical skills, attention to detail and commitment to projects. In his free time, Tim enjoys traveling with his friends, exercising, and going to the theatre.

Married Man Condition:

Candidate
Background Information Three years ago, Tim graduated in the top of his class with an MBA from a prestigious business program. Before this, Tim worked at a well-known firm in their corporate finance department. The company was impressed with his analytic skills and offered him a job after his MBA, even agreeing to pay for his tuition. Tim instead accepted a Senior Associate position at ABC Bank, a coveted job among his classmates. Since starting at ABC Bank, Tim has worked on a number of projects, clocking over 110-hour weeks. He is known in his firm for his sharp analytical skills, attention to detail and commitment to projects. In his free time, Tim enjoys traveling with his wife and children, exercising, and going to the theatre.