

(Managerial) Style over Substance: Determinants of Devaluation for Female Supervisors in an Indian Garment Factory

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July 1, 2016

Abstract

Despite the rising representation of women in management, female managers continue to be devalued compared to male managers, presenting a challenge for gender inequality in organizations. This study helps address a significant gap in the literature by investigating if the devaluation of female managers can be explained by their lower effectiveness in motivating worker performance. We investigate this question by leveraging unique personnel records, ethnographic and field-experimental data in the context of a large Indian garment factory where female supervisors are devalued and paid 15% less than their male counterparts to manage a female workforce. First, we demonstrate that the devaluation of female supervisors cannot be explained by their lower managerial effectiveness. By exploiting within-worker changes in supervisor gender in the personnel data, we find that female supervisors elicit 5% higher worker performance than male supervisors. Second, we ethnographically and experimentally show that female supervisors outperform their male counterparts by adopting a “non-authoritative managerial style,” and further suggest that this style could lead to devaluation by upper management. Combined, these results rule out managerial substance as an explanation for the devaluation of female managers, pointing instead to managerial style as a novel determinant of gender inequality in the workplace.

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Introduction

Women are increasingly occupying management positions in firms around the world (Blum et al., 1994; Cohen and Huffman, 2007; Kalev, 2009). For instance, women now account for nearly half of U.S. and U.K. managers overall (Dobbin, 2009; ATKearney, 2012; BLS, 2014). This trend is not restricted to developed economies alone. In 80 of the 108 countries for which ILO data is available, the proportion of female managers has increased dramatically over the last twenty years (ILO, 2015). However, despite the rising representation of women in management, female managers continue to be devalued in their organizations (Reskin and Ross, 1992; Jacobs, 1992). In particular, measuring devaluation through economic compensation, researchers have found that work done by female managers is compensated significantly less than work done by male managers (Bridges and Nelson, 1989; Baron and Newman, 1990; England, 1992; Tomaskovic-Devey, 1993; Petersen and Morgan, 1995; Huffman and Velasco, 1997; Cohen and Huffman, 2003b).

A prominent explanation for the persistent devaluation of women in management is that female managers might be less effective at motivating worker performance as compared to male managers (Ridgeway, 2001; Ridgeway and Correll, 2004; Ridgeway, 2011). However, causal, field-based empirical tests of this explanation are scant and lab-based tests offer mixed evidence for the effectiveness of male versus female managers (for an overview, see Doering and Thebaud (2015) and Eagly et al. (1995)). In this paper, leveraging unrestricted access to a large garment factory in India where female supervisors earn 15% less than their male counterparts to manage a female workforce, we capitalize on a rare opportunity to make progress on this question. In particular, using a combination of personnel records, ethnographic and field-experimental data, we causally test the effectiveness of male and female supervisors in motivating worker performance and explore mechanisms for the same. This paper is thus able to advance our understanding of performance-based theories used to explain the devaluation of women in management.

To our knowledge, no prior field-based studies have empirically investigated if female managers

are less effective at motivating worker performance than male managers, and if so, why or why not. This is likely due to the challenges associated with studying this question. First, male and female managers are typically segregated into different managerial occupations, making it difficult to compare their effectiveness (Cohen et al., 2009). Second, workers could be differentially allocated to male and female managers such that higher quality workers could systematically be assigned to male managers (Srivastava and Sherman, 2015). Finally, quantitative data on individual worker performance is incredibly hard to secure, making measurement of managerial effectiveness in spurring worker performance challenging (Castilla, 2008).

In this paper, our chosen setting allows us to overcome all these aforementioned challenges. First, in the garment factory that we study, male and female supervisors perform the same job of managing the front-line performance of female workers. Second, supervisors are quasi-randomly rotated across garment lines over time: this allows us to compare the performance of the same individual workers under male and female supervisors controlling for characteristics of individual workers. Third, real-time individual worker performance is captured by the factory using radio frequency identification (RFID) tags that are attached to every garment produced, offering us a rare, direct measure of worker performance. These unique features of our setting allow us to causally test whether lower effectiveness of female supervisors could explain their devaluation.

Using this combination of within-worker changes in supervisor gender along with accessible personnel data on worker performance, we find that the devaluation of female supervisors cannot be explained by their lower managerial effectiveness. In fact, by running panel models with worker fixed effects, we demonstrate that female supervisors elicited 5% higher performance from the same female workers as compared to male supervisors, resulting in over \$500,000 in additional annual revenue for the factory. We also demonstrate that this key finding of our paper would have been masked had we conducted a simple cross-sectional analysis of worker performance under male and female supervisors without worker fixed effects. In order to then understand why female supervisors in our setting are devalued despite their superior effectiveness, we use ethnographic

and field-experimental methods to explore mechanisms through which female supervisors drive worker performance.

Relying on eighteen months of ethnographic fieldwork and 120 interviews, our paper suggests that female supervisors adopted what we call a “non-authoritative managerial style” to stimulate the performance of their workers. We observed that female supervisors managed workers non-authoritatively, often acting like a worker themselves, through (a) their participation in front-line production activities on the shop floor, and (b) their interactive style of communication. In order to test if this managerial style contributes to female supervisors’ superior effectiveness, we designed and implemented a “lab-in-the-field” experiment (Baldassarri, 2015). Each experimental session consisted of five randomly-selected factory workers individually performing a task under either a male or female supervisor. In control sessions, supervisors were allowed to manage the workers as they saw fit. However, in treatment sessions, supervisors were not allowed to participate in the task alongside workers, effectively restricting supervisors’ ability to adopt a non-authoritative managerial style. We find that female supervisors were more effective than male supervisors in motivating worker performance in the control sessions, in line with our initial quantitative results. However, in treatment sessions, when female supervisors were restricted from adopting a non-authoritative managerial style, their effectiveness decreased and was no different than that of male supervisors, establishing that female supervisors’ unique managerial style was necessary for them to be more effective. Further interviews revealed that this non-authoritative managerial style adopted by female supervisors was discredited by upper management, who deemed that asserting authority was a necessary element of managerial success. Therefore, we posit that the managerial style adopted by female supervisors in order to be effective might explain their devaluation.

In this way, using personnel records, ethnographic and experimental data, this paper contributes to our understanding of managerial gender inequality by demonstrating that lower performance effectiveness cannot explain female managers’ devaluation, at least in the context of predominantly female workforces that characterize several workplaces around the world. The paper additionally

uncovers female supervisors' non-authoritative managerial style as a novel and under-explored determinant of devaluation worthy of further investigation. In what follows, we first outline our theory followed by our research setting and data. We then present our quantitative and qualitative observational results, followed by the experimental design and results. We end with a discussion of the contributions and implications of this research.

Managerial Gender Inequality: Substance vs. Style

Devaluation of Women in Management

The status of women in management presents an important phenomenon for study as a visible expression of and important goal for gender equality at the workplace (Kanter, 1977). This is because managerial positions are relatively scarce but offer substantial advantages to incumbents, who have historically been disproportionately male (Reskin and Ross, 1992; Huffman and Cohen, 2004; Cohen et al., 2009; Dobbin, 2009). These advantages include increased job autonomy, higher wages and an improved overall employment experience (Reskin and Ross, 1992; England et al., 1994; Choi et al., 2008; Schieman et al., 2013). Promisingly, the representation of women in management has increased substantially over the past half century, especially in low- and mid-level managerial roles (Blum et al., 1994; Maume, 1999; Cohen and Huffman, 2007; Kaley, 2009). This phenomenon characterizes not only developed countries, but developing nations as well (Appold et al., 1998). However, while the overall proportion of women in management is rising, female managers still continue to be systematically devalued in workplace settings, limiting their ability to benefit from the advantages offered by their positions (Reskin and Ross, 1992; Jacobs, 1992).

The devaluation of women in management has been predominantly measured¹ in the literature

¹Other metrics of devaluation include differential performance evaluations of male and female managers by upper management (Sackett et al., 1991; Eagly et al., 1995; Eagly and Karau, 2002) and differential perception and evaluation by subordinates too (Ragins, 1991; Ely and Padavic, 2007; Brody et al., 2014).

through economic compensation: scholars have extensively studied the managerial ‘gender wage gap’- i.e. the differential monetary value accorded to the work of female and male managers by upper management within an organization (for a review, see Cohen and Huffman (2003b)). These scholars have found that work done primarily by female managers is rewarded less than work done by men, both for broad occupational categories (England et al., 1988; England, 1992; Cohen and Huffman, 2003a) and for specific job titles in work establishments (Bridges and Nelson, 1989; Baron et al., 1991; Tomaskovic-Devey, 1993; Petersen and Morgan, 1995; Huffman and Velasco, 1997; Cohen and Huffman, 2003a).

This systematic devaluation of female managers’ work can undermine their ability to reap the benefits of their workplace participation. The devaluation of women in management can have two broadly overlapping sets of consequences - (a) in the personal sphere, it can lead to reduced confidence and self-esteem (Rosener, 1997), and (b) in the professional sphere, it can limit female managers’ ability to earn a higher salary (Reskin and Ross, 1992; England et al., 1994; Choi et al., 2008), avail the non-monetary benefits of managerial positions (Schieman et al., 2013), and implement change in the workplace (Reskin, 1991). This challenge of continued devaluation of female managers despite increased representation is thus a crucial issue that needs to be addressed in the move towards gender equality.

Effectiveness at Motivating Worker Performance

One explanation for the devaluation of female managers that has received significant attention in the literature is the differential effectiveness of male and female managers at motivating higher performance in their subordinates (Eagly et al., 1995; Thomas-Hunt and Phillips, 2004; Doering and Thebaud, 2015). Sociologists have argued that when supervision is a male-typed task, gender status beliefs held by both men and women in organizations can result in lower performance expectations for female managers that can have self-fulfilling effects on these managers’ behavior and

performance (Lockheed and Hall, 1976; Meeker and Weitzel-O'Neill, 1977; Harris and Rosenthal, 1985; Miller and Turnbull, 1986; Berger et al., 1986; Ridgeway, 1993, 1997; Ridgeway and Correll, 2004). This argument suggests that female managers' lower effectiveness at managing worker performance as compared to male managers can create avenues for comparative devaluation that can catch women and slow them down as they achieve positions of leadership and authority (Ridgeway, 2001, 2011).

Several lab-based studies have tested this performance-based explanation for female managers' devaluation, but collectively, these studies are inconclusive. On the one hand, studies have found that female managers are less effective than male managers at motivating worker performance (Bartol, 1999; Heilman, 2001; Eagly and Karau, 2002). This has been attributed to lower levels of expertise recognition and influence associated with female experts owing to prejudice and stereotyping, limited access to challenging and rewarding assignments and minimal performance feedback received by female managers (Thomas-Hunt and Phillips, 2004; Roberson and Block, 2001). On the other hand, some studies have found exactly the opposite - that female managers' work teams systematically outperform teams led by male managers (Jacobson and Effertz, 1974; Abramson et al., 1977; Fagenson, 1993). These studies posit that women are more effective managers because they are more supportive, they delegate more responsibility, and they foster the careers of their subordinates (Tsui and Gutek, 1984). In this way, lab-based tests offer mixed evidence for whether female managers lag behind male managers in driving worker performance.

This lack of clarity from the lab regarding the effectiveness of male versus female managers highlights the need for field-based empirical research to make progress on this question. However, whether gender differences in managerial effectiveness exist is difficult to test empirically in the field for three reasons. First, male and female managers often perform very different managerial jobs, thus making it difficult to compare their effectiveness (Cohen et al., 2009). For example, women might be segregated into managerial occupations that are already losing power and prestige, which could affect their effectiveness at managing worker performance (Cohen et al., 2009). Second,

the kinds of workers assigned to male and female managers could also differ in important ways (Srivastava and Sherman, 2015) - for example, if higher-skilled workers are systematically assigned to male managers, then we cannot accurately identify if higher worker performance is because of managerial effectiveness or due to workers' inherent skills. Finally, it is difficult to obtain fine-grained quantitative data on individual worker performance to measure managerial effectiveness (Castilla, 2008) - many organizations simply do not capture performance data at the individual level and when they do, this data is hard to access due to security and confidentiality concerns. These challenges have meant that there are few causal, field-based empirical tests of the effectiveness explanation for devaluation of women in management.

Additionally, studies have also highlighted the need for more attention to contextual factors that could cause women to be effective in some situations but not others (Eagly and Carli, 2003). These studies make a subtle, yet important addition to prior research by emphasizing the significance of examining not just *whether* female managers can be effective, but *in what situations* they might be more effective. In particular, one key contextual variable that scholars have begun to study is the gender composition of the managers' subordinates (Eagly et al., 1995; Carli and Eagly, 1999; Ayman et al., 2009).

In this paper, we identify a setting that allows us to overcome all these aforementioned challenges, offering us the rare opportunity to causally test the effectiveness of male and female managers in the field in a context where female managers are severely devalued for performing exactly the same job as male managers. Further, male and female managers in this setting manage a female workforce, thus allowing us to hold constant the gender composition of the workforce. These features of our setting enable us to investigate whether lower effectiveness of female managers can indeed explain their devaluation in the context of a female workforce.

In order to gain some insight into whether female managers might be more or less effective at motivating higher performance among female workers, we turn to studies on other outcomes

that could offer some hints. Prior studies have explored how female managers impact the career progression of women in organizations (Ely, 1995; Cohen et al., 1998; Beckman and Phillips, 2005; Castilla, 2011; Maume et al., 2013). These studies have found that female managers often improve career outcomes for female workers by, for example, giving them higher evaluations (Castilla, 2011) and greater job-related support (Cohen et al., 1998). These studies argue that female managers are “agents of change” in organizations, helping female workers do better (Cohen and Huffman, 2007). In this way, these studies hint at greater effectiveness of female managers as compared to male managers in advancing the career of female workers. Extending the findings of these studies to the outcome of effectiveness in motivating female worker performance, we hypothesize that:

Hypothesis 1: Female supervisors will be more effective than male supervisors at motivating female worker performance.

If indeed female managers are more effective than male managers at spurring female worker performance, it begs the question: why are they being devalued despite their higher effectiveness? Could it be that the manner in which female managers achieve greater effectiveness leads to their devaluation? In order to understand this, we explore the mechanisms through which female managers drive worker performance as this might help us understand why female managers remain systematically devalued.

Managerial Style

Managers have historically been known to employ an authoritative managerial style to manage and co-ordinate individual workers’ output to meet specific targets (Doering and Thebaud, 2015). This authoritative style, also called the ‘command-and-control’ style and ‘transactional’ style, has characteristics of ‘supervising from the top’ (Rosener, 1997). The adoption of an authoritative style

indicates not only that managers possess formal as well as real authority,² but also that they assert this authority through specific behaviors. In particular, this style portrays the image of a manager as a person who is tough, aggressive, forceful, rational and competitive (Fagenson, 1990). It stresses behaviors such as visual dominance, assertive gestures, cues of confidence and assertiveness in one's voice tone and speech rate (Berger et al., 1986; Carli et al., 1995; Ridgeway, 2001). In fact, the use of this authoritative managerial style, including aggressive forms of verbal communication, is especially common in the manufacturing sector in developing countries (Macchiavello et al., 2015). It is crucial to note, however, that management has historically been construed as a masculine enterprise, and therefore, our notions of leadership have focused on the desirability of stereotypically masculine qualities in leaders (Miner, 1994; Eagly and Carli, 2003). Thus, a male standard is often applied as the norm and this stereotypically male authoritative managerial style has come to be seen as symbolic of exemplary managerial behavior.

Scholars have also shown that an authoritative style of management might not work for female managers, who have only recently made inroads into managerial roles. For instance, female managers have been shown to be less influential when using dominant forms of communication relative to men (Carli, 2001). To explain this, expectation states theory suggests that different behaviors are often expected from women and men who are in comparable managerial positions and acting on these implicit set of 'status beliefs,' workers may sub-consciously or consciously penalize women who attempt to be authoritative (Heilman et al., 1995; Ridgeway, 2001; Carli, 2001). This is also in line with prior research on gendered behaviors within organizational contexts, which suggests that expectations of gender matter in how male and female employees respond to the same behaviors enacted by their managers (Ely and Padavic, 2007; Brody et al., 2014). Thus, female managers' efforts to adopt an authoritative managerial style might evoke resistance and dislike, reducing their ability to get compliance from their workers and consequently, diminishing their power and effectiveness as leaders (Ridgeway, 2001).

²Here, formal authority refers to an individual's formal location within the structure of organizational hierarchies whereas real authority refers to an individual's decision-making power in their organization (Aghion and Tirole, 1997; Smith, 2002).

While scholars have established that an authoritative managerial style might not work for women, there is less clarity about what the alternative is for female managers to be effective. Some studies suggest that resistance to authoritative female managers can be reduced when these managers temper their authority with displays of “communality” and “warmth” (for a review, see Carli (2001)). Similarly, studies posit that complementing an authoritative managerial style with socio-emotional “softeners” assuages resistance and increases the influence of female managers (Carli, 1990; Carli et al., 1995; Ridgeway, 1982; Shackelford et al., 1996). However, it is important to note that most of these strategies offer ways in which female managers can effectively palliate their authoritative style to conform to expectations of their subordinates and superiors and furthermore, these prior studies have not causally established the effectiveness of these strategies for driving worker performance.

In this paper, we argue that female supervisors might not just “temper” their authoritative style with social softeners, but in fact, go one step further and adopt what we call a “non-authoritative managerial style” in order to elicit better worker performance. We argue that this non-authoritative style manifests in two specific behaviors in managers, namely participation in front-line work and interactive communication. First, managers adopting a non-authoritative style participate in front-line work on a regular basis by “getting their hands dirty” and working alongside their workers, demonstrating that they are no different from their subordinates. Second, these managers communicate interactively with their workers, in terms of both their communication content (professional as well as personal) and style. Further, we posit that adopting such a non-authoritative managerial style could be especially effective for female managers to motivate the performance of female workers. Therefore, we hypothesize:

Hypothesis 2: Female managers adopt a non-authoritative managerial style in order to elicit superior performance from female workers.

It is crucial to note that while female managers might adopt a non-authoritative managerial style,

there could be different reasons for why they do so. In our setting, the adoption of a non-authoritative style by female managers might either be due to the lack of real authority for female managers despite formally being in supervisory positions, or a voluntary choice to not be authoritative. Irrespective of the reason for the adoption of a non-authoritative style, we posit that while a woman manager's use of this style might enable her to improve worker performance, it might also result in her devaluation by upper management. Since managers have historically been male, a masculine authoritative managerial style is often understood as the norm by senior executives, who are predominantly male as well. Therefore, female managers' non-authoritative managerial style might be discredited by upper management. In this way, developing a more thorough understanding of the non-authoritative managerial style that female supervisors adopt might help explain the devaluation of women in management.

In the next section, we describe the research setting in which we test our hypotheses and thereby advance our understanding of managerial gender inequality.

Research Setting: Garment Factory in India

Our setting for this study is a large garment manufacturing firm in India that employs about 10,000 workers across 9 factories located in and around a southern Indian city, reporting an average annual revenue of \$400 million. This firm is part of the textile and garments industry, an important sector of the Indian economy that contributes 4% to the country's GDP, 13% to its export earnings, and 14% to its industrial production (Technopak, 2015). The industry directly employs around 45 million people, the bulk of whom are women (Ministry, 2011). The factories operated by the firm in our study produce both menswear and womenswear, but focus primarily on shirts, trousers and jackets for men in both domestic and export markets. The mean factory in this firm produces 120,000 garments in a month, employing 25 male and female supervisors and 1,000 female workers. We focus on the largest of the firm's factories, which was established in 2001, as this was the only

factory that maintained detailed data on individual worker performance. This factory currently employs 55 male and female supervisors and 1,800 female workers.³ The factory produces an average of 100,000 trousers and 40,000 jackets per month. We now delve into more detail about the specific features of our setting that make it well-suited to answering our research question.

Female and male supervisors hold identical managerial positions. The factory that we study has a relatively flat organizational structure. In this paper, we focus specifically on the supervisors in this factory, who occupy the first level of the managerial hierarchy above factory workers. Historically, supervisors in garment factories have been male, especially in the developing world (Macchiavello et al., 2015), but a key benefit of our factory is that both men and women are well-represented at the supervisory level. More importantly, both male and female supervisors perform the same job of managing the front-line performance of workers. Typical tasks performed by a supervisor include ‘moving’ pieces along the line to maintain a constant production flow, identifying bottlenecks and easing them in a timely manner, managing technical and non-technical production issues that arise, and motivating workers to maintain high levels of performance.

Supervisors are rotated across production lines. Production activity in this factory is organized into twelve garment lines, where each line works on a particular garment from start to finish. A unique feature of this setting is that supervisors are rotated among the different garment lines in the factory, such that male and female supervisors supervise the same workers in a given line at different points in time. The assignment of supervisors to lines is done by higher levels of management in weekly meetings - the supervisors and workers themselves have no choice in this matter. The key purpose of the supervisor rotation is to produce “multi-skilled” supervisors who can manage multiple garment lines. In this way, the assignment of supervisors to lines is quasi-random and more importantly, not correlated with changes in worker performance. A given line

³In this setting, we do not have enough male workers to test the effectiveness of male and female supervisors in managing male worker performance.

may experience a change in supervisor as frequently as on a weekly basis, although the average frequency of supervisor changes is lower.

The individual performance of female workers can be objectively measured. Workers in this factory are assigned to production lines and perform specific tasks called ‘operations,’⁴ which they typically repeat several hundred times over the course of a day. An advantage of this factory for our research question is that workers vary significantly in their individual performance and the factory employs a Radio Frequency Identification (henceforth ‘RFID’) system to systematically collect and store real-time data on worker performance for a subset of the factory’s lines. The RFID system consists of RFID tags attached to each garment and RFID terminals attached to workers’ stations. When a worker finishes working on a garment, she taps the tag attached to the garment on the RFID terminal placed at her workstation and then passes the garment on to the next worker in the production line. The RFID system then uses radio waves to transmit this real-time information on the performance of both individual workers and the entire production line to a centralized server, where it is compiled and stored. This allows us to track and quantify daily variation in individual worker performance.

Given the identical managerial roles held by male and female supervisors, rotation of supervisors across lines, and the ability to track individual worker performance, this factory is an ideal setting to study the effectiveness of male and female supervisors in prodding female worker performance.

Observational Data

This paper relies on data of three primary types: quantitative personnel records from the factory, qualitative ethnographic and interview data, and quantitative data from a lab-in-the-field experi-

⁴Examples of operations include “zip attach” and “waistband attach”.

ment. This section describes the personnel records and ethnographic observational data that we use to investigate the effectiveness of male and female supervisors in motivating female worker performance. Later in the paper, we describe the experiment we use to test a key mechanism underlying our main effect.

Using detailed personnel records maintained by the factory, we constructed a dataset at the worker-date level, where each data point corresponds to performance for a specific worker on a specific date. Our dataset comprised individual daily performance of 199 female employees who worked in one trouser line in the factory from January 2013 to October 2014. Even though the factory had over 1500 female workers, our sample consisted of 199 workers because the RFID system used to track individual worker performance was only implemented in a small section of the factory due to cost constraints.⁵

Additionally, we obtained detailed data on weekly supervisor assignments in this line over the 2-year period. By merging the worker performance dataset with the supervisor assignment dataset at the individual worker-date level, we were able to create a unified dataset that could monitor and track the performance of each individual female worker under the assigned supervisor on any given date. We were also able to obtain a comprehensive dataset on the demographic characteristics of both the supervisors and female workers in this line. This includes *employee characteristics* such as age, marital status and years of education as well as *employee-workplace characteristics* such as tenure, skill level and career progression within the factory.

In addition to this quantitative data, we conducted eighteen months of ethnographic observation, which produced more than 800 single-spaced pages of field notes and 120 in-depth interviews with a subsample of workers, supervisors and upper management. The ethnographic observation focused on understanding the mechanisms for the variation in effectiveness of female and male supervisors in managing female worker performance. We used in-depth interviews, shadowing of

⁵Each RFID terminal costs \$350 (Interview).

supervisors and participant observation in the lines, spending time with supervisors and workers both inside and outside the factory. In particular, we interviewed both male and female supervisors to understand their managerial practices and how they dealt with people both below and above them in the organizational hierarchy. In shadowing supervisors, we observed their interactions with the workers and understood how they managed a number of common challenges such as machine breakdowns, slow production, worker conflicts, pressure from their superiors and so on. In this way, we were able to uncover key differences in how male and female supervisors approach their work, as well as female workers' and upper management's perceptions of different supervisors.

Causal Identification Strategy

In order to test the effectiveness of male and female supervisors in motivating female worker performance, the first step would be to conduct a cross-sectional comparison of the performance of workers assigned to male supervisors to the performance of workers assigned to female supervisors. However, this comparison would be inaccurate because the supervisor assignment could be correlated with specific characteristics of the workers or supervisors. For example, if more skilled female workers were systematically assigned to male supervisors, then it would be difficult to identify if the workers' higher performance was due to the supervisor's gender or due to the workers' skills.

To overcome the above issues, the ideal experiment would require within-worker changes in supervisor gender to measure the performance of the same individual female workers under male and female supervisors. Our setting offers such a natural experiment through the quasi-random rotation of supervisors across garment lines. By comparing the performance of the same workers under male and female supervisors, we eliminate concerns about cross-sectional differences in individual worker characteristics. We are thus able to run panel models with worker fixed effects in order to establish a causal relationship between supervisor gender and worker performance.

Dependent Variable: Individual daily worker performance for female workers

In trying to assess the effectiveness of supervisors in driving female workers' performance, the ideal dependent variable is one that (1) the supervisors have a direct impact on and stake in, (2) is based primarily on individual, rather than organizational performance, and (3) is available on a consistent basis for all workers. Our choice of individual daily worker performance satisfies all the above criteria.

The performance of workers in the factory is measured as a percentage value calculated using two main parameters: a worker's output per minute in a given operation and the Standard Minute Value (SMV) for that operation defined such that:

$$\text{Worker Performance} = \text{Output per Minute} \cdot \text{Operational SMV} \cdot 100 \quad (1)$$

In the above formula, a worker's output per minute is measured as the number of pieces produced by the worker in a given operation in a minute. Standard Minute Value (SMV), a concept commonly used in Industrial Engineering, is the time required for a typical worker performing at 'Standard Performance' to perform a particular operation. It serves as a proxy for the work 'content' of an operation such that a more complex operation has a higher SMV. Individual worker performance is thus calculated as a compound measure of output per minute and the defined SMV for the operation, making worker performance comparable across multiple operations.⁶

⁶For example, the SMV for the 'zip attach' operation is 0.52 minutes and the SMV for the more complex 'waistband attach' operation is 1.29 minutes. However, a worker attaching 1.5 zips per minute and a worker attaching 0.6 waistbands per minute would have roughly the same performance of 78% because the worker performance measure accounts for the varied complexity of operations.

Independent Variable: Gender of the supervisor

Our primary independent variable is the gender of the supervisor on a given day in the line being studied. In our dataset, the 199 female workers were supervised by 8 unique supervisors, of which 3 were women. While the number of supervisors in our dataset might seem small, we are able to replicate the main quantitative result in our lab-in-the-field experiment, which gives us confidence in our results. Further, despite the limited number of supervisors, we have over 10,000 observations in our dataset since individual performance observations are at the worker-date level.

Control Variables

In our quantitative analyses, we control for a set of worker demographic characteristics, including age, tenure in factory, level of skill, and state of origin. We also control for time-based variation in the production cycle in two ways. First, production may vary *within a year* in accordance with seasons in the fashion industry (Fall-Winter and Spring-Summer) where certain months of the year may have more production activity than others. Second, production may vary *across years*. Our interviews with the factory production managers indicated that some years are better than others in terms of overall business. In order to account for this time variation, our regression models include month and year fixed effects.

Quantitative Results: Performance of Same Workers under Male and Female Supervisors

Table 1 first offers descriptive statistics for the supervisors in the factory. Using data on a representative sample of 31 supervisors - 20 female and 11 male supervisors - who were surveyed in

October-November 2015,⁷ Table 1 displays means for male and female supervisors' age, education, marital status, state of origin, tenure, work history and wages. Both female and male supervisors in this setting were around 30 years of age, had an average of 10.5 years of education, were mostly married, and were from the state of Karnataka. They had typically worked in the factory for 10 years, and around half of them had been workers in the same factory prior to becoming supervisors. Across these demographic characteristics, the difference between male and female supervisors is not statistically significant, as indicated by the 'Difference' column in the table.

However, one key difference between female and male supervisors is in their daily wages. In this setting, the mean daily wage for male supervisors is higher than the mean daily wage for female supervisors by nearly 14.6 per cent, a statistically significant difference. Male supervisors earned about 573 rupees per day, which is significantly higher than female supervisors' earnings of 500 rupees per day. This gender wage gap for the same managerial role provides evidence for the devaluation of female supervisors in this setting.

INSERT TABLE 1 ABOUT HERE

As a next step, we produce descriptive statistics for the workers in our setting. Our worker dataset consisted of 199 female workers who worked in one trouser line in the factory over a 2-year period from January 2013 to October 2014. As Table 2 indicates, the mean age of the workers was 29.8 years, and nearly 72 per cent of them were married. Almost all the workers were from the state of Karnataka (93.5 per cent), and the remaining were from the neighboring state of Tamil Nadu. The mean tenure in the firm was about 2.9 years and about half of the workers were categorized as low-skilled.⁸ The average daily performance of the female workers in the sample was 59.6%. Of particular interest for our research question is the average fraction of an individual worker's time that she was exposed to a female supervisor. We see that a female worker in this setting was, on

⁷The dataset is not balanced because of difficulties in obtaining wage data for all supervisors in the factory.

⁸This means that they were in the two lowest categories in the 4-category skill system in use by the Government of India (Highly Skilled, Skilled, Semi-skilled and Unskilled).

average, equally exposed to both male and female supervisors.⁹

INSERT TABLE 2 ABOUT HERE

Before we test the key research question of the effectiveness of female supervisors in motivating worker performance, we wanted to check that the *timing* of the assignment of supervisors to lines is indeed quasi-random. While our research design of exploiting within-worker changes in supervisor gender controls for differences across workers, we might be concerned that female supervisors were systematically assigned to lines when workers in the line were already on an upswing in terms of their performance. In order to investigate this concern, we examine the trend in mean individual worker performance before and after a change in gender of the assigned supervisor. Figure 1 demonstrates the change in slope in mean worker performance when a female supervisor replaces a male supervisor as compared to when a male supervisor replaces a female supervisor. On the x-axis, time=0 represents the supervisor gender change event such that the weeks before the change are labelled -2 and -1, and the weeks after the change are labelled +1 and +2. Before the supervisor gender change event, we observe parallel trends in performance when we compare workers supervised by male and female supervisors. This demonstrates that there was no mechanical effect of female supervisors being more effective by simply being assigned to the line at a time when the workers were already on a higher performance path. However, after the supervisor gender change event, we notice that the mean individual worker performance rises more steeply when a female supervisor gets assigned to the line than when a male supervisor does. This offers preliminary evidence that female supervisors might be more effective than male supervisors at motivating worker performance.

INSERT FIGURE 1 ABOUT HERE

⁹Despite 3 of the 8 supervisors being female, an average worker was supervised by a female supervisor for about 50% of her time because workers were assigned to the particular line being studied for different “spells” of time.

In order to systematically test our observations from Figure 1, we ran least-squares regression models at the individual worker-date level. Table 3 reports the results of the regression. Model (1) compares daily worker performance under female supervisors versus male supervisors. It controls for worker age, tenure in the factory, skill level and state of origin. However, it does not include any worker fixed effects. It is difficult to establish causality in Model (1) because of assignment effects, wherein the assignment of workers to certain supervisors could be correlated with specific characteristics of the workers or supervisors. Therefore, in order to establish causality, Model (2) includes worker fixed effects, wherein we use dummy variables for each individual female worker in our dataset to control for differences across workers. In addition, time fixed effects are included to control for seasonal variation. Standard errors are clustered by individual female worker in both models.

As Table 3 indicates, Model (1) finds no significant differences in the effectiveness of male and female supervisors in motivating worker performance. However, Model (2) demonstrates that female supervisors are more effective than male supervisors at motivating higher performance among female workers. Individual worker performance improves by 2.79 under female supervisors as compared to male supervisors. Given that the average daily productivity is 59.6%, this amounts to a 4.7% performance increase under female supervisors. Note that if we relied solely on the more traditional cross-sectional analysis without worker fixed effects presented in Model (1), this main effect would have been masked and we would have incorrectly concluded that supervisor gender does not influence female worker performance. This demonstrates the importance of comparing the performance of the same individual worker under male and female supervisors using worker fixed effects, as done in Model (2). In this way, we are able to causally estimate the effectiveness of male and female supervisors in motivating worker performance, revealing the positive and significant impact of female supervisors on female workers in our setting. More importantly, we are able to rule out lower effectiveness as an explanation for the devaluation of women in management at least in the context of a female workforce.

INSERT TABLE 3 ABOUT HERE

Mechanism: How do Female Supervisors Achieve Superior Effectiveness?

Having causally identified that female supervisors are more effective at managing female workers in this setting, we next seek to identify mechanisms through which female supervisors achieve this superior effectiveness. We rely on our ethnographic observation of working life at the factory over the course of eighteen months to shed light on mechanisms that could help explain our quantitative results. In particular, we focus on the question of *how* female supervisors manage the performance of female workers differently than male supervisors. Subsequently we test a key mechanism uncovered in our ethnographic observation using a lab-in-the-field experiment.

Ethnographic Results: Non-Authoritative Managerial Style adopted by Female Supervisors

One crucial finding that emerged from the ethnographic observation was that female supervisors adopted a *non-authoritative managerial style* in order to improve worker performance. In particular, female supervisors acted non-authoritatively by displaying two specific behaviors: first, female supervisors themselves participated in the production activities in ways that male supervisors did not. Female supervisors got involved in front-line work in two primary ways - one, by working alongside workers on a regular basis, and two, by substituting and ‘filling in’ for workers when required. Second, female supervisors communicated differently with their workers, in terms of both the *content* and *style* of their interactions. The content of their conversations was not limited to professional matters, but extended to personal issues as well. Further, unlike their male counterparts, female supervisors did not raise their voices or shout frequently in order to get work done.

In terms of participation in front-line activity, female supervisors offered three reasons for their

detailed involvement in the work - a) participation as a demonstration of team-oriented and empathetic behavior, b) participation as a means to establishing competence and c) participation as a reflection of their managerial philosophy of focusing on the work rather than on supervision. First, female supervisors often participated in front-line work when their participation would help the team such as when workers were absent, critical new operations were introduced, garment styles were changed leading to workers “mess[ing] up,” and when workers faced health problems. In interviews, female supervisors often spoke about how they saw front-line participation as “normal” and emphasized that this practice made them closer to their workers and made them feel as though they were “part of the team.” One female supervisor said, “If I pitch in and work too, then the operators feel that I am one among them.” Female supervisors also took it upon themselves to fill in for workers who were absent, tired, or sick. One female supervisor even said that she sat in the line and produced garments when her workers went to the toilet so that “production will continue normally in those five minutes.” By filling in for workers who needed a break, were on leave, or had health issues, female supervisors showed that they cared and were empathetic to workers’ needs.

In addition to showing empathy, participating in the work was also regarded by female supervisors as a clear demonstration of their expertise in the tasks being performed by the workers. Female supervisors reported that being able to display greater competence in the workers’ own operations helped establish confidence among workers that their supervisor “knows everything” and workers were subsequently less likely to “take them for a ride.” At the same time, female supervisors believed that they were often able to demonstrate more effective ways of accomplishing workers’ tasks and, by observing and mimicking their supervisors, workers then improved their own performance.

Finally, supervisory participation in front-line work was also linked to the value that supervisors placed on working versus managing. Female supervisors often stressed “more working” and “less managing.” One female supervisor said, “I need not keep watching the operators all the time. If I sit down and work with them, I can produce 20 more pieces,” and described this as being more effective. In this way, female supervisors discussed a strategic decision-making process that led

them to adopt a non-authoritative managerial style.

In contrast, there were very few instances where male supervisors participated in front-line work. Male supervisors saw the performance of “low status tasks” such as stitching as “beneath them.” One male supervisor warned, “If you give the workers too much lenience, they will take the supervisors for a ride. They wander around and supervisors won’t have control over them. They begin to regard supervisors as their own family members and take advantage of this familiarity.” Male supervisors thus did not typically physically perform any stitching tasks, choosing to focus instead on overseeing the production activity of their workers. Male supervisors could often be seen walking in the lines, giving instructions and scrutinizing workers as they stitched garments. In case a worker was absent or sick, male supervisors often focused their efforts on securing a replacement for the missing worker rather than sewing garments themselves. A male supervisor said, “I have to supervise...I don’t have time to sit down and work.” Similarly, a male supervisor who constantly yelled at the workers said, “It is better to stand and get work done than to sit and work [myself]. Isn’t that what being a supervisor is about?”

The second non-authoritative characteristic displayed by female supervisors was their interactive, conversational style of communication. Female supervisors could often be seen seated at a sewing machine, engrossed in conversation with the workers around them. The content of the conversation varied widely, ranging from problems at the workplace to issues concerning family and friends. Female supervisors typically did not impose barriers on the type of conversation they allowed both between workers and between supervisors and workers. In fact, they took pride in being able to talk to their workers and help them “solve personal problems.” One female supervisor said, “My operator was very dull this morning. I was watching her for a while, then I went and spoke to her, I comforted her. Look at her now, she is alright and doing her work well!” Female supervisors often emphasized that their conversation “makes workers feel as though supervisors understand their problems.” They demonstrated empathy for the difficult socio-economic and personal circumstances that often defined the lives of their workers. As one supervisor said, “every

woman who comes to this factory does so out of necessity - she will have some problem at home. Shouldn't I try to talk to her and offer solutions to her problems if I can?" Female supervisors also displayed a distinct tone and demeanor when interacting with workers. One female supervisor said, "If I speak to my workers softly, they will listen to me. Otherwise, they will think that I keep yelling all the time and there is no meaning to my words." In contrast, male supervisors often raised their voices, yelling instructions and shouting at workers if they made mistakes. Male supervisors did not ascribe any special value to conversation and often saw it as a hindrance to work. One male supervisor said, "That is the problem with these women. They are always talking."

In-depth interviews with workers further strengthened our understanding of the distinct managerial styles of male and female supervisors. When asked about what they thought of women as supervisors, workers often expressed appreciation for female supervisors' willingness to participate in production work and to interact with them. As one worker said, "If she too sits down and works with us, then I feel as though she is just like me." Supervisory participation had the effect of portraying the female supervisors as being empathetic and sensitive to workers' production pressures and problems. It also humanized the supervisors, portraying them as humble and understanding, as opposed to aloof and arrogant. One worker said that "they should not have arrogance that they are supervisors." Workers seemed to regard this non-authoritative style as especially important for female supervisors. One worker who saw participating in production as a normal part of a female supervisor's work said - "If they want production, then they have to work, right?"

In contrast, when workers had male supervisors, they saw the supervisors as intimidating, authority figures and expected them to behave authoritatively. Workers thought it would be strange and unusual for male supervisors to help out in production. A male supervisor who sometimes participated in production activity said "I visited another factory recently. There, supervisors are not allowed to do production... [and] those supervisors get a lot of respect...But, I get no respect because I myself sit down and work." Two female workers, when asked about this particular male supervisor said that he "behaves like a mental [crazy] person" for helping in production activities

and “has not moved up the ladder at all.” Workers thus perceived the practices of male and female supervisors quite differently, especially with respect to supervisory participation in front-line work. This is in line with prior research on gendered behaviors within organizational contexts, which suggests that gender expectations matter in how male and female employees respond to the same behaviors enacted by their managers.

While female supervisors had some intuition that their participation resulted in greater worker performance because “workers feel bad that supervisors are doing the workers’ own work [and] so, they put in extra effort and get the work done,” upper management of the factory did not value being participative and interactive as important traits for supervisors. Instead, top management felt that supervisors have to be “dominant on the line” in order to be able to get better performance from workers. One senior executive said, “we always tell female supervisors not to sit at the machine and work - they do not need to engage in production, they need to make the workers improve their production.” The same executive went on to say, “good supervisors tend not to participate in the work.” For this reason, almost all upper management believed that workers would perform better under male supervisors than under female supervisors. Therefore, while our fieldwork suggests that one key reason female supervisors might be more effective is because of their willingness to adopt a non-authoritative managerial style, it is possible that this same style might hurt their careers and result in their devaluation by upper management at the factory.

Experimental Design

Are female supervisors eliciting better performance from their female workers because of their non-authoritative managerial style? In order to systematically test this, we designed and implemented a lab-in-the-field experiment in the garment factory. Lab-in-the-field experiments represent a relatively new addition to the social scientist’s toolkit. The idea is to run behavioral games

in a controlled, experimental setting within the field site to gain insights into human behavior (Baldassarri, 2015). This important tool offers us the best of both worlds: the chance to study specific mechanisms in a lab in isolation from confounding factors, but not in isolation from the rich context that the field setting provides. We received whole-hearted cooperation from factory staff, allowing us to run the experiment smoothly.

Experimental Participants. As a first step, female workers were offered the opportunity to voluntarily sign up to participate in the experiment, called a ‘production game.’ The sign-up procedure was systematically advertised to all workers in the factory for seven days through flyers and announcements in the local language. The sign-ups were then conducted during lunch for seven days in the factory canteen, where workers could approach research assistants seated at a prominently placed table and register to participate in the game. No specific details about the experiment were revealed at this stage. The voluntary sign-up ensured that the workers who were eventually randomly picked to participate in the experiment were indeed available and interested in the game. As for supervisors, we enlisted all supervisors in the factory to participate in the game.

Schedule. The experiment was conducted over twenty days in September-October 2015 on the factory premises in a separate building, which had classrooms that were not being used at the time. The experiment was conducted in two phases, before and after a major Hindu festival. Experimental sessions were held in the evenings during the factory overtime hours at the end of the workday. This ensured minimal disruptions to the factory’s own production process. Also, factory-run buses were available to workers for a safe commute back to their homes. A session typically lasted 90 minutes, including the time involved in bringing the participants to the classrooms, running the game and conducting a brief survey at the end of the game. The entire experiment was piloted in another factory owned by the same firm to eliminate contamination of our research setting.

Ten workers and two supervisors participated on each day of the experiment. Each day consisted of two sessions conducted in parallel, run by one male and one female supervisor. From the

list of workers who signed up, we then randomly assigned five workers to participate in the ‘production game’ in a session supervised by either a male or a female supervisor on a specific date. All participants were informed in advance and reminded on the day of their session about their participation in the game.

Design of the Production Game. The ‘production game’ consisted of a uniform task performed by the five randomly-selected female workers in a given session. The task was to individually sort brightly colored buttons under the supervision of either a male or a female supervisor. Button sorting is a common activity in the production lines of the factory, so the exercise was familiar to the workers. Further, we modeled this button sorting exercise on a recent paper that used a similar setup in a garment factory in Bangladesh to study the effect of different supervisor incentives on worker productivity (Macchiavello et al., 2015). Our buttons were of four distinctly different colors, but were identical in shape and size.

Control and treatment sessions were held on alternate days. So, on any given day, the two parallel sessions that were run - with a male and female supervisor respectively - were either both treatment sessions or both control sessions. In control sessions, supervisors were allowed to manage workers as they saw fit. In treatment sessions, supervisors were not allowed to participate in the task of sorting buttons alongside workers, taking away their ability to adopt this key aspect of a non-authoritative managerial style.¹⁰

Session Logistics. Parallel sessions on any given day of the experiment were held in two separate classrooms with no visual connectivity so that each supervisor did not know what the other supervisor was doing. A session began upon the arrival of the experimental participants at the venue. Participant workers were taken to a preparation room, where they listened to a pre-recorded set of instructions informing them that the supervisor conducting the game would explain all necessary details. Workers then took an ‘oath of secrecy’ that bound them to not reveal details

¹⁰Therefore, in the treatment session, if the supervisors actually began to sort buttons during the game, the research assistant conducting the session would forbid them from doing so.

about the game to other workers who were yet to participate.¹¹ Finally, the workers picked numbers in a lottery that randomly assigned them to one of the two classrooms with either a male or female supervisor. In a similar fashion, the male and female supervisors on a particular day were taken to their respective classrooms,¹² where they listened to a pre-recorded set of instructions that explained the game to them. As a final step, when both the workers and supervisors were ready, workers were brought to their assigned classrooms, and the supervisors began conducting the button-sorting game.

Supervisors were tasked with explaining the activity as well as managing the workers' performance, allowing us to simulate the actual production lines in the factory as closely as possible. In addition to a large pile of unsorted buttons, each supervisor was given a timer and a weighing scale to measure the numbers of buttons sorted. There were 6 chairs in each classroom as well as a table that the supervisor could use as they desired. Much care was taken to ensure that the classrooms were set up to look identically day after day as the experiment progressed.

The outcome variable in the game was the individual performance of each female worker, measured as the number of correctly sorted buttons. To ensure that we captured this data, four boxes were provided per worker, one box for sorted buttons of each color. Supervisors were informed at the beginning of the game that failure to turn in separate boxes for each worker would result in a heavy penalty. Extra boxes were provided so that, if the supervisor themselves chose to sort buttons in the control sessions, their buttons would also go into separate boxes by color.

The sessions were recorded on both audio and video with the consent of the participants and were additionally observed by research assistants. The game lasted for a total of 25 minutes, after which surveys were conducted for all participants by surveyors who were hired for this project. Each survey typically took 15 minutes and consisted of questions on a range of topics including

¹¹It is worth noting that workers in this setting take oaths very seriously, and so this helped us keep the details of the game confidential.

¹²Assignment of classrooms to supervisors was randomized through a lottery in which they picked one of the rooms.

experiences on the shop-floor as well as in the production game. After the surveys, all participants were given a snack consisting of biscuits and a juice box before they departed.

Payoffs for participants. The supervisors were offered payoffs that were linked to the total number of correctly sorted buttons in their session in order to incentivize them to elicit better performance from their workers. Each supervisor received a baseline payoff of 200 rupees for their participation and an additional 100 rupees for every 1000 buttons correctly sorted by their workers. The workers were each paid a fixed sum of money of 150 rupees¹³ - this amount was calculated in line with the hourly overtime rate for the workers in the factory.

Experimental Results

Table 4 summarizes the experimental design. Data from a total of thirty two sessions,¹⁴ including fourteen control sessions and eighteen treatment sessions, was used for the analysis in this paper. The control and treatment sessions were equally distributed between male and female supervisors, as indicated in Table 4.¹⁵ Each session consisted of five workers under one supervisor. In total, 159 workers participated in the experiment.¹⁶

INSERT TABLE 4 ABOUT HERE

Figure 2 presents a comparison of the mean individual worker performance measured as the average number of individually sorted buttons for each of the four experimental conditions - female supervisor-treatment, female supervisor-control, male supervisor-treatment and male supervisor-

¹³The factory did not offer piece-rates to its workers.

¹⁴Of these forty total sessions, data from the first treatment day and the first control day was discarded since they were 'trial runs.' Data from two control days were also discarded due to issues with the reporting of results.

¹⁵Of the 9 male-control and 9 female-control sessions where supervisors managed the sessions as they saw fit, male supervisors chose to sort buttons in 6 sessions while female supervisors chose to sort in 7 sessions.

¹⁶One observation is missing in one of the treatment sessions run by a male supervisor because the assigned worker could not attend the session on that particular day.

control – with confidence interval bars around the mean. It is important to note that even if the supervisor chose to participate in button sorting in the control sessions, their sorted buttons were not included in the calculation of individual worker performance and hence worker performance did not mechanically increase because of supervisory participation. This figure demonstrates that mean individual worker performance was higher under female rather than male supervisors in the control sessions, replicating the results observed in our prior quantitative analysis. Specifically, worker performance was 5.1% higher in control sessions run by female supervisors. In contrast, in the treatment sessions, where female supervisors could less effectively employ a non-authoritative managerial style, their superior worker performance disappeared. As a next step, we systematically test the comparison of raw means presented above through a least squares regression model.

INSERT FIGURE 2 ABOUT HERE

Table 5 presents least squares regression models to test if the difference-in-differences in worker performance across treatment and control sessions, under male and female supervisors was statistically significant. Both models include an interaction between supervisor gender and assignment to treatment sessions, robust standard errors, and time fixed effects to control for differences across the two phases of the experiment described earlier. In addition, Model (2) includes control variables including workers' age, years of education and marital status. The difference-in-differences estimate that is represented by the interaction term between supervisor gender and assignment to treatment sessions is statistically significant at the 0.05 level in both models, and the addition of control variables in Model (2) only serves to strengthen the effect in Model (1). The experimental results thus demonstrate that the mechanism of managerial style uncovered through our ethnographic observation has merit in the quantitative casual analysis: a key mechanism through which female supervisors achieve superior worker performance is by adopting a non-authoritative managerial style.

INSERT TABLE 5 ABOUT HERE

Discussion

Superior Effectiveness of Female Supervisors in Managing Female Workers

In order to better understand the devaluation of women in management, we began with the research question: are female and male managers differentially effective at managing female worker performance and if so, how? We studied a large garment factory in India that had female and male supervisors in identical managerial roles, offering within-worker changes in supervisor gender and RFID technology to measure individual worker performance. Using panel models with worker fixed effects, we first demonstrated that female supervisors are more effective than male supervisors at motivating female workers, increasing worker performance by 5%. Next, using ethnographic methods, we identified the adoption of a non-authoritative managerial style by female supervisors as an important mechanism underlying their superior effectiveness. We then causally tested this mechanism using a lab-in-the-field experiment, finding support for this mechanism of managerial style underlying female supervisors' effectiveness. Finally, our interviews revealed that this managerial style adopted by female supervisors was devalued by upper management, who deemed that asserting authority was a necessary element of managerial success. Combined, these results rule out managerial substance as an explanation for the devaluation of female managers, pointing instead to managerial style as a novel determinant of gender inequality in the workplace.

As an alternative explanation, could female supervisors' effectiveness at managing female workers be explained by gender-based homophily? Prior studies suggest that when there is manager-subordinate homophily along dimensions such as gender and race, worker performance improves (Brewer and Brown, 1998; Fiske, 1998; McPherson et al., 2001; Castilla, 2011). However, ho-

mophily cannot fully explain our results: we argue that the interaction of gender and managerial style is necessary to explain female supervisors' superior effectiveness. In particular, our experiment demonstrates that female workers perform better under female supervisors in the control sessions as compared to the treatment sessions. If gender-based homophily was driving female supervisors' effectiveness, then there should have been no difference between worker performance under female supervisors in the control and treatment sessions, since the only difference between these sessions was supervisors' ability to use a non-authoritative managerial style. Based on this observation, we conclude that homophily is insufficient; female supervisors need to additionally adopt a non-authoritative managerial style to elicit superior performance from their female workers.

As a second alternative explanation, could female supervisors' effectiveness at managing female workers be explained by different work histories of male and female supervisors? The argument here is that if female supervisors had been factory workers prior to being promoted to managerial roles, this might explain their superior effectiveness over male supervisors who might not have risen up the organizational hierarchy. However, Table 1 shows that female and male supervisors are actually similar along most dimensions, including whether they were workers before taking up their supervisory positions. This table rules out the alternative explanation that career differences between male and female supervisors accounts for female supervisors' superior effectiveness. In addition, even if there were other unobservable differences between male and female supervisors, our experiment provides causal evidence that one key mechanism, not necessarily the only mechanism, through which female supervisors achieve greater performance is their non-authoritative managerial style.

Contributions to our Understanding of Managerial Gender Inequality

This paper makes three contributions to our understanding of managerial gender inequality. First, some existing studies have posited that the devaluation of female managers is a function of male

and female supervisors' differential effectiveness in positions of authority (Eagly et al., 1995). In particular, the expectation states theory suggests that both men and women have lower performance expectations of women in management positions, and that these expectations are self-reinforcing such that female managers do, in fact, perform worse than male managers in organizations (Ridgeway, 2001). By contrast, this paper documents a setting where women in supervisory roles are devalued but female supervisors are more effective than male supervisors in managing the performance of female workers. In this way, the paper suggests that at least in some contexts such as those with a female workforce, the devaluation of women in management cannot be explained by inferior effectiveness of women in supervisory roles and is more likely to reflect some gender bias (Fernandez and Abraham, 2011). The paper also highlights the importance of paying attention to the gender composition of the workforce being managed to better understand the devaluation of women in management.

Second, our study rules in a novel explanation, namely female managers' managerial style, to help account for the devaluation of female managers despite their superior effectiveness. This explanation is consistent with research suggesting that an authoritative style might not work for female managers (Carli, 2001; Ridgeway, 2001). However, our findings differ from existing research in a substantive way: existing studies argue that female managers can be effective by complementing their display of authority with social softeners such as warmth (Ridgeway, 1982; Carli, 1990; Carli et al., 1995; Shackelford et al., 1996), while our study points to the effectiveness of a non-authoritative managerial style for female supervisors. Further, we advance the existing literature by positing that such a non-authoritative managerial style might be responsible for female managers' devaluation because historically, management has been construed as a masculine enterprise, and many theories of leadership have focused on the desirability of stereotypically masculine qualities in leaders (Miner, 1994; Eagly and Carli, 2003).

Finally, while prior studies have argued that female managers are penalized by their subordinates when they behave in ways that are incongruent with their gender status (Ridgeway, 1997), our

findings provide only limited support for this notion. In particular, our qualitative data suggest that female workers expect female managers to behave non-authoritatively. However, when we restrict female supervisors' ability to adopt a non-authoritative managerial style in our experiment, worker performance under female supervisors is no different than worker performance under male supervisors, as opposed to being lower than worker performance under male supervisors. This suggests that while female supervisors lose their advantage when they are restricted from using a non-authoritative managerial style, in contrast to the predictions of previous research, female supervisors are not penalized by their workers for their failure to adopt this non-authoritative managerial style. In sum, these contributions advance our understanding of gender inequality at the managerial level in organizations.

Practical Implications

For organizations, the practical implications of the findings presented here are threefold- first, organizations should consider the possibility that female managers might be more effective than male managers at managing the performance of female workers. This is important because the proportion of women in the workforce is dramatically increasing all over the world (Blum et al., 1994; Huffman, 1999; Maume, 1999; Cohen and Huffman, 2007). Further, workplaces continue to have high levels of gender segregation such that many sectors such as nursing and teaching have a predominantly female workforce - the findings of this study are especially relevant in such settings. Second, in order to prevent the devaluation of women in management even when they are effective managers, organizations would benefit from using objective performance data to evaluate male and female managers to get past their gender biases, wherever possible. Finally, organizations should consider expanding their narrow definition of the "ideal" managerial style, which at the moment is defined as a male, authoritative style, in order to prevent female managers from being devalued for simply being different than male managers.

For female workers too, the practical implications are clear: female managers could play an important role in advancing their careers by improving their performance at work, which could result in greater wages and more promotions (Beckman and Phillips, 2005; Cohen and Huffman, 2007; Castilla, 2011). Therefore, when faced with a choice, female workers would do well by electing to work under a female manager. For female managers, however, the practical implications are more complicated. On the one hand, female managers elicit better worker performance than their male counterparts when they adopt a non-authoritative managerial style, which suggests that they should continue adopting this managerial style. On the other hand, the very adoption of this managerial style might be resulting in female managers' devaluation in the workplace. This suggests that female managers should proceed with caution, piloting managerial styles at their disposal, until organizations and workers update their expectations of women in management towards creating more inclusive workplaces.

One unique feature of our setting is that the workforce is female. While garment factories in many parts of the world today do have a female-dominated workforce, this might not be as common in other industry sectors. Future research on this topic should study the effect of supervisor gender in workplaces that are more gender-balanced or male-dominated. This would be an effective way to test if the main findings of this paper prevail in settings with differing proportions of male and female workers.

Further, while studies on the devaluation of female managers are limited in developed countries, they are even more rare in developing countries. This is especially true in developing regions like South Asia. These regions, however, are areas of concentrated economic growth where new formal organizations are being created everyday and women are a pivotal part of this growth story. Studies such as this paper that explore the status and effectiveness of women at managerial level are thus particularly important in developing countries. Preliminary evidence suggests that the effective deployment of women in managerial roles has transformative effects on the women's personal lives, their families and their societies (Heath and Mobarak, 2014). The promotion and recognition of

women in supervisory roles thus has the potential to not only improve firm productivity through improved worker performance, but also impact society through the increased earning power and empowerment of its women.

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Figures and Tables

Table 1: Descriptive Statistics for Factory Supervisors

	Female	Male	Difference
Age (in years)	31.55 (4.796)	29.64 (4.342)	1.914
Education (in years)	10.10 (1.252)	11.09 (1.973)	-0.991
Fraction Married	0.900 (0.308)	0.818 (0.405)	0.082
Fraction from Karnataka state	0.667 (0.492)	0.875 (0.354)	-0.208
Tenure in Factory (in years)	10.57 (4.383)	9.410 (5.565)	1.164
Fraction who have been worker in same factory	0.650 (0.489)	0.455 (0.522)	0.195
Daily Wage (in Indian rupees)	500.7 (78.22)	573.8 (82.14)	-73.093*

mean coefficients; sd in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Sample of 20 female and 11 male supervisors surveyed in October-November 2015;

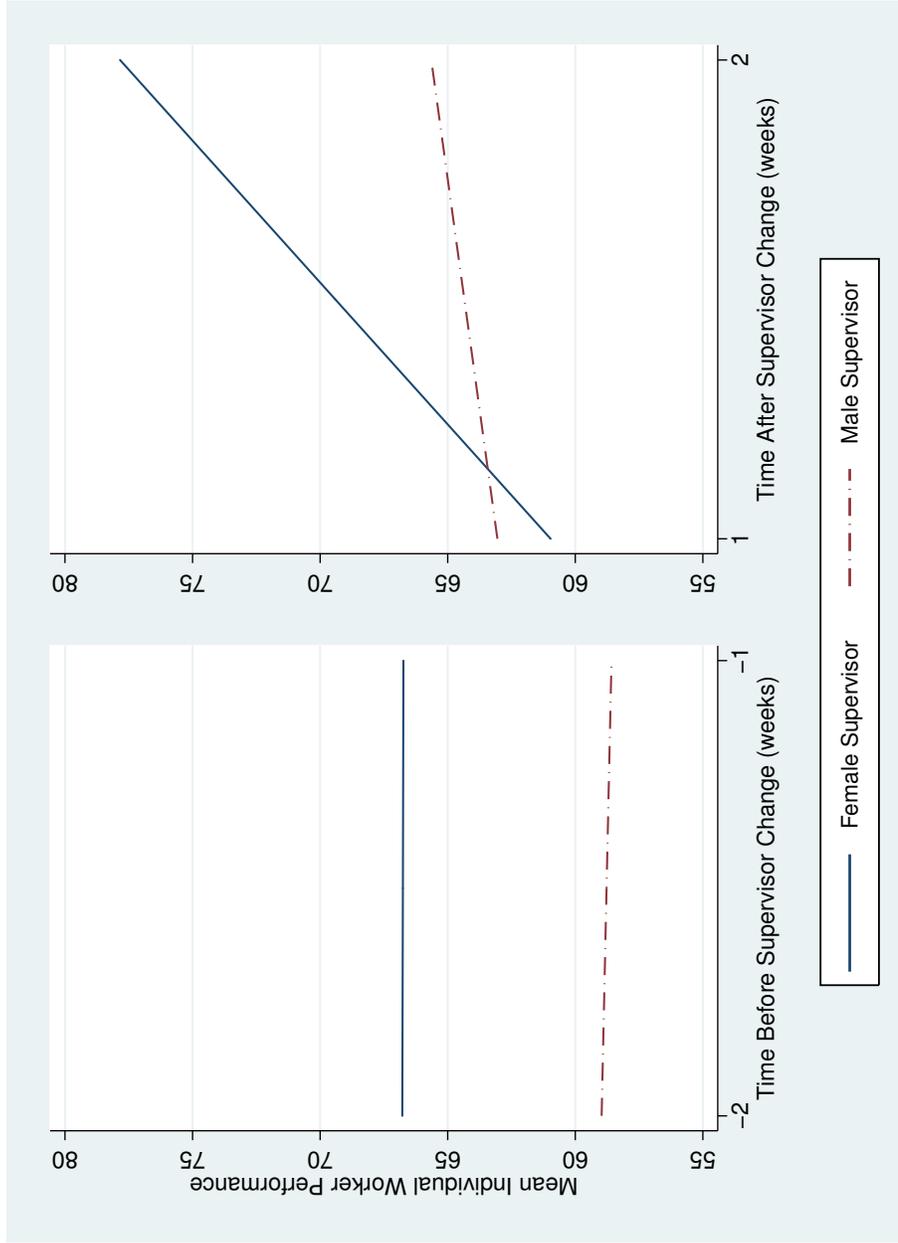
Daily wages are as of December 2014.

Table 2: Descriptive Statistics for Female Factory Workers

	mean	sd
Fraction Female	1	0
Age (in years)	29.80	6.057
Fraction Married	0.719	0.451
Fraction from Karnataka state	0.935	0.248
Fraction Low-skilled	0.508	0.501
Tenure in Factory (in years)	2.871	2.357
Average Daily Performance(percent)	59.58	20.27
Fraction of time exposed to Female Supervisor	52.79	37.57
Observations	199	

Low-skilled accounts for two lowest categories in 4-category skill system as per Government of India (Highly Skilled, Skilled, Semi-skilled and Unskilled); Average Daily Performance calculated using daily output, taking into account variation between garment operations.

Figure 1: Mean Worker Performance before and after Supervisor Gender Change



The figure demonstrates the change in slope in mean worker performance when a female supervisor replaces a male supervisor as compared to when a male supervisor replaces a female supervisor, while showing parallel trends prior to the supervisor gender change event. On the x-axis, time=0 represents the supervisor gender change event.

Table 3: OLS Regression of Effect of Supervisor Gender on Individual Worker Performance

	(1)	(2)
Female Supervisor	-0.526 (1.138)	2.789*** (0.767)
Age	0.060 (0.177)	
From Karnataka	7.008 (3.847)	
Low-Skilled	-1.529 (3.182)	
Tenure in Factory	0.676 (0.544)	
Constant	58.959*** (5.373)	72.171*** (1.847)
Worker Fixed Effects	No	Yes
Year Fixed Effects	No	Yes
Month Fixed Effects	No	Yes
Observations	10923	10923

Observations are at the worker-date level.

Standard errors clustered by individual worker are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Experimental Design

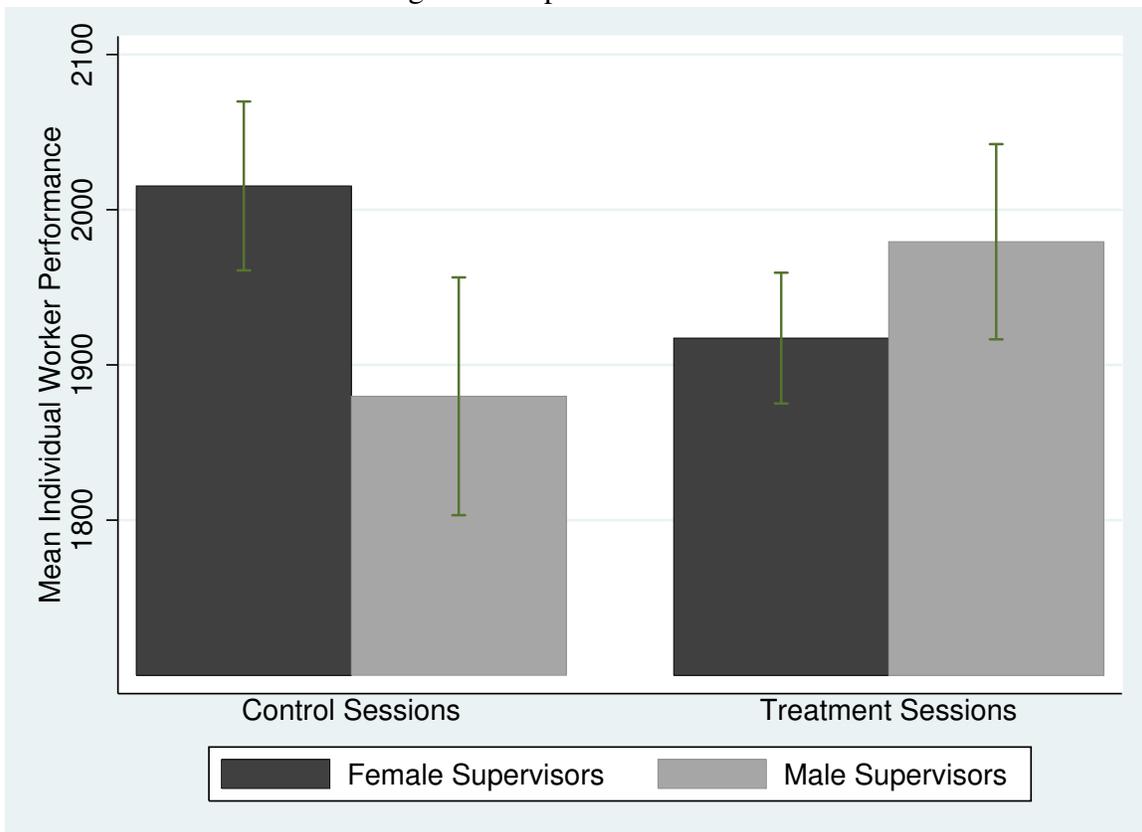
	Control Sessions	Treatment Sessions
Male Supervisors	9 (45 workers)	7 (34 workers*)
Female Supervisors	9 (45 workers)	7 (35 workers)

Each session had 5 randomly picked workers individually performing a task under the management of 1 supervisor. In control sessions, supervisors were allowed to manage workers as they saw fit.

In treatment sessions, supervisors were explicitly prevented from participating in the task alongside workers.

*One observation is missing in one of the treatment sessions run by a male supervisor because a randomly picked worker could not attend the session on that particular day.

Figure 2: Experimental Results



In control sessions, supervisors were allowed to manage workers as they saw fit.

In treatment sessions, supervisors were explicitly prevented from participating in the task alongside workers.

Bars represent mean individual worker performance, excluding any supervisor contribution.

90% confidence interval bars are drawn the mean.

Table 5: OLS Regression of Effect of Supervisor on Individual Worker Performance during Lab-in-the-Field Experiment

	(1)	(2)
Female Supervisor	135.778* (67.601)	142.662* (68.874)
Treatment Session	93.284 (75.001)	88.257 (74.016)
Female Supervisor * Treatment Session	-194.415* (97.012)	-214.656* (97.668)
Age		-5.940 (4.490)
Education		-5.385 (10.698)
Married		104.332 (59.787)
Constant	1773.026*** (66.802)	1912.255*** (180.022)
Phase Fixed Effects	Yes	Yes
Observations	159	159

Experiment was conducted in two phases, before and after a major Hindu festival.

Observations are at the individual worker level.

Robust standard errors are in parentheses.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$