

The Relationship between Gender Differences in Relocation and Promotion

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Caroline Liongosari

Data Scientist

LinkedIn

Matthew Baird

Senior Staff Economist

LinkedIn

Allison Lewis

Senior Research Program Manager

LinkedIn

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We analyze survey and LinkedIn profile data to understand how men and women differ in their likelihood to relocate and motives for doing so. We find that not only men are more likely to relocate, but they are also more likely to relocate to locations where they do not already have many connections. In contrast, women are more likely to live close to their hometowns and are more likely to relocate for their partner's career and not for their own. These differences are also reflected in the gender difference in promotion rates. We find that even though relocation to places where members have few connections only account for 5% of promotions, they account for 40% of the gender gap.

Introduction

As the labor force participation rate for women has been increasing, so has the conversation around how childcare (or the lack thereof) can have adverse career outcomes for the main caregivers. In 2023, Harvard economist Claudia Goldin won the Nobel Prize in Economics, driven by her research on gender inequality studying the history of women's US labor force participation, finding that much of the present-day gender pay gap is attributable to women disproportionately taking on more of caregiving responsibility (Goldin, 2014; Nobel Prize Committee, 2023; Pinquart & Sörensen, 2006). This leads them to be more likely to drop out of the labor force, working fewer hours, or sacrifice promotion to make room for more time with their children (Baker, 2010; Lommerud et al., 2015). As an outcome, other studies have found that women are also less likely to be promoted than men (Lara et al., 2023; Lyness & Grotto, 2018).

Additionally, an updated 2023 study by AARP reported that about 70% of working caregivers had to adjust their work schedules due to their caregiving roles by taking time off, leaving early, and even declining promotions that would lead to more responsibilities (Reinhard et al., 2023). It is also reported that 19% of caregivers – not only for children but for elderly, chronically ill and disabled – had to leave a job entirely to care for their family member or friend.

Such results have great implications on women, who make up approximately two-thirds of all caregivers in the US, according to AARP's from 2009 (National Alliance for Caregiving & AARP, 2009). These caregiver responsibilities that

predominantly fall on women may help explain why women are less likely than men to relocate for work (Kalhor et al., 2024). This in turn may contribute to gender disparities in career growth and overall financial outcomes.

In this white paper, we explore the relationship between two gender disparities: moving away from locations with family and friends (relocation) and moving to a more senior work position title (promotion). We explore how these gaps are related from public data shared on LinkedIn as well as from the LinkedIn Workforce Confidence Index (WCI) Online Survey data, examining these two primary factors:

1. **Relocation:** Are women less likely to move for their careers compared to men?
2. **Promotions:** How do differences in relocation affect women's career progression in terms of promotions?

The first question is explored through a combination of survey data of LinkedIn members and LinkedIn profile and network data, noting that a relocation occurs when members change their locations on their LinkedIn profile.

The second question is answered through a series of observational analyses on LinkedIn members' promotions and career trajectories based on their positions data on their profiles.

Key findings

- **Women are more likely than men to live close to their hometowns.** Women are 8% more likely than men to live less than one hour from where they grew up.

- When surveyed, women report being less likely than men to move for their own career (30.6% vs. 39.3%), but more likely to move for their partner's career (18.7% vs. 15.2%). Put together, 7.7% of women report having moved for their partner's career in the past *but not their own career*, over twice the rate as men on the same questions (2.9%).
- Examining hundreds of millions of LinkedIn profiles across the last few years shows men have a greater chance of career advancement. For entry-level positions, 10.3% of men are working in a non-entry level position one year later, whereas 10.0% of women are. While this promotion gap may seem small, it represents large gaps when scaled to the national level, with tens of thousands of more entry-level men promoted annually than women.
- In profile data, men are more likely than women to relocate each year (3.3% vs. 2.9%), including a higher likelihood of moves to areas where they do not already have many connections. Moves to areas where the member doesn't know as many people (non-social locations) are more likely to be accompanied by a promotion.
- Promotions associated with moves to non-social locations account for 40% of the overall gender gap in promotions, despite only accounting for around 5% of promotions. In a year when a person relocates, they are more than twice as likely to have been promoted than persons who didn't relocate. And men are more likely to make these relocations. For example, for considering when senior non-managers are promoted to a manager positions, 2.1% of men and 1.92% of women relocate to a non-social location in a year.
- If women were promoted at the same rate as men when not moving, over 65% of the

gender gap would be closed. While moving is associated with much higher promotion rates, and this *explains* 40% of the current gap, moves are still relatively uncommon. Each year, over 95% of members stay in the same location. As a result, the largest way to reduce the gender gap—that is, if any single factor could be moved—is to ensure men and women have the same promotion rates when not moving.

Survey responses highlight gender gaps

From December 2, 2023, to March 8, 2024, over 18,000 professionals in US responded to the WCI survey asking LinkedIn members to select True or False for the following four questions:

1. I have moved at least 1 hour away from family/friends for my own career advancement
2. I have moved at least 1 hour away from family/friends for my partners' career advancement
3. I currently live near (less than 1 hour away from) my hometown/ where I grew up
4. I currently live far (at least 3 hours) from my hometown/ where I grew up

This survey allows us to collect direct responses and sentiment from individuals about their relocations and career progression.

Survey responses on moving for career advancement

We first examine gender differences in the responses to questions 1 and 2 surrounding career advancement.

Table 1

WCI survey responses on moving for career

Men		Moved for own career		
		True	False	Overall
Moved for partner's career	True	12.4%	2.9%	15.3%
	False	26.9%	57.9%	84.7%
	Overall	39.3%	60.7%	100.0%

Women		Moved for own career		
		True	False	Overall
Moved for partner's career	True	11.1%	7.7%	18.7%
	False	19.6%	61.7%	81.3%
	Overall	30.6%	69.4%	100.0%

Men are 28% more likely to move their own careers (39.3%) compared to women (30.6%), irrespective of whether they had also moved for their partner or not. On the other hand, men are less likely than women to move for their partner's careers (15.3% vs. 18.7%). Together, these form the scenario that 7.7% of all surveyed women have moved for their partner's career while not having moved for their own career. This is over twice as common as it is for men (2.9%). Contrast this with the fact that 26.9% of men report that they have moved for their own careers but not for their partners, compared to 19.6% of women.

We next combine this survey data with their LinkedIn profiles to examine if they are currently working in a leadership position. Figure 1

examines how the fraction of respondents who have moved for their partner's career but not their own differs by gender and by whether or not they currently are working in a leadership position.

We find 7.5% of women who are not in leadership positions have moved for their own career but not their own, compared to 7.7% of women in leadership—around 2% higher. That is, many women in leadership positions got their despite having moved for their partner's career but not their own, even more than those not in leadership positions. On the other hand, men in leadership positions are 24% less likely than men not in leadership positions to have made moves for their partner's career but not their own (2.6% vs. 3.2%).

Figure 1

Share who have moved for a partner's career but not their own: by gender

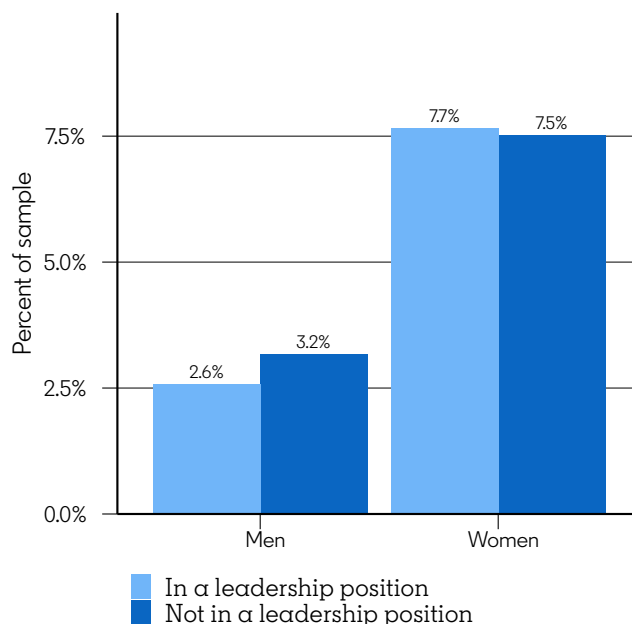
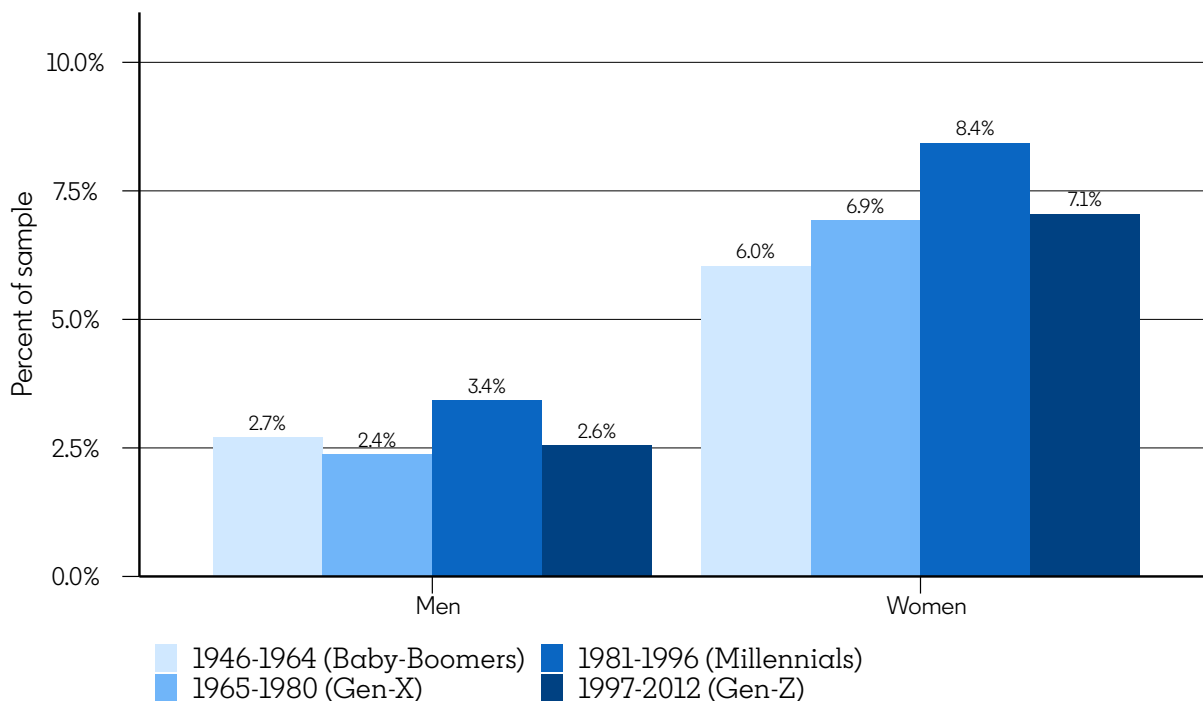


Figure 2

Share who have moved for their partner's career, but not their own: by generation



These gaps are somewhat explained by age - men and women reach leadership roles as they get older, giving a longer time horizon for them to move as seen below when analyzing by generation with Millennial women being 1.45x more likely to move for a partner than Millennial men and Gen X women being 1.9x more likely (see Figure 2).

Proximity to Hometown

Women are 8% more likely to live less than one hour from where they grew up compared to men—40.7% of all surveyed women, compared to 37.8% of all surveyed men. Additionally, women who moved for their own careers but not for their partners are 47% more likely to live less than one hour away from home compared to

women who moved for their partners and not for themselves. This is different to men who are 4% less likely to move less than one hour away from home if they moved for themselves, compared to men who moved for their partners.

The gender gap in living close to hometowns becomes more prevalent in generations where raising children becomes more common. Millennial women are 8.4% more likely than Millennial men to live less than one hour away from their hometown. In comparison, Gen Z women are 3% less likely to live close to less than one hour away from their hometown compared to Gen Z men.

This may suggest that women prefer being close to family and that moving for their partners is generally a sacrifice of this preference. It also

may reflect disparities in dependent-care expectations, both for children and for parents, especially those with ailing health.

Gaps are evident from evaluating changes in member's profiles over time

We next move to evaluating how we observe individuals relocate between different types of locations, and the relationship with probabilities of promotion.

To do so, we evaluate changes in US LinkedIn member's profiles from one year to the next. We examine individuals from January 2019 through January 2024, contrasting their position and location in January of each year compared to

one year prior (spanning January 2018 through January 2023).

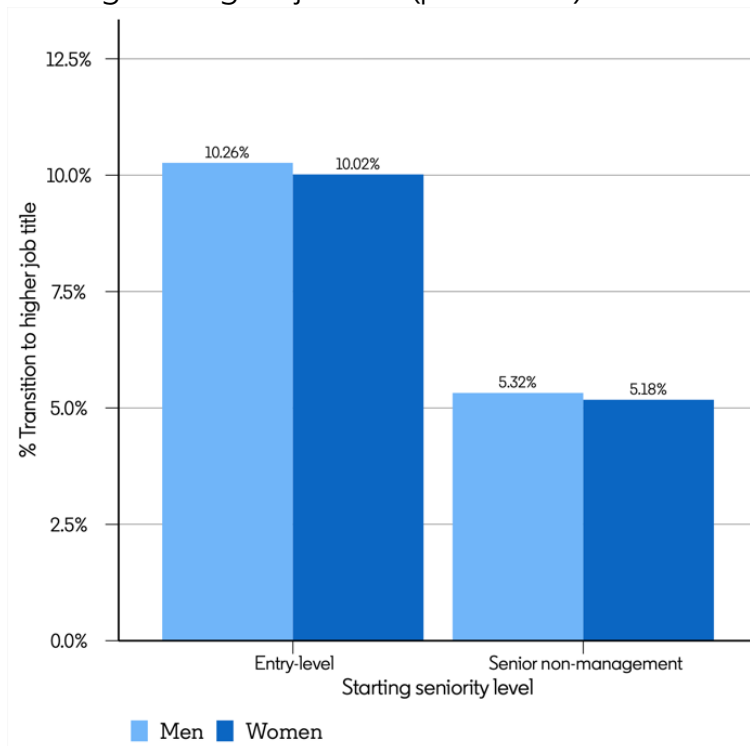
Promotion Gaps

We use the term promotion broadly in the context of this study, signifying one-year transitions to jobs with titles signifying higher seniority levels (whether internally at the same company or at a new company). We examine two groups of workers based on their starting seniority level one year prior.

Entry-level workers: these are workers whose seniority level is classified as entry-level based on their job titles. We examine whether one year later, they are still in an entry-level position (*not promoted*), or if they have progressed to more senior positions, which may be management or non-management roles (*promoted*).

Figure 3

Percent transitioning to a higher job title (promotion)



Senior non-management: these are workers whose seniority is classified as senior, but not in management (e.g., not managers, directors, VPs or C-suite). We examine whether one year later, they are in senior non-management or entry-level positions (*not promoted*), or if they are in a management position now such as manager, director, VP, C-suite (*promoted*).

As shown in Figure 3, for both entry-level workers and senior non-management workers, men have a higher share than women who one year later are at a job with a higher seniority level. For entry-level positions, 10.26% of men are working in a non-entry level position one year later, whereas 10.02% of women are. That gap of 0.24 percentage points (pp) represents a 2.4 percent higher share promoted for men than women. A similar disparity is observed for senior non-management workers.

While that promotion gap is relatively small, it represents large gaps at the national level. For every 1,000 entry-level men in the US, 103 will be promoted in a given year; for 1,000 entry-level women, 100 women will be. With millions of entry level workers in the US, this translates to tens of thousands of more men promoted out of entry level positions every year than women.

Relocation

We next examine gender differences in relocation across markets. To do so, we both look at any type of move, as well as separated into moves to “social locations” or “non-social locations”. We define a social location as a geography (at the labor market level) where the

individual has preexisting connections before they moved there. We use as our threshold locations where members had at least 10% of their connections before relocating there. We limit the sample to members who have at least 50 connections on LinkedIn to reduce the noise from this classification.¹

Thus, a move to a social location would be one when an individual moves to a market that, one year prior, they had 10% or more of their connections, and a move to a non-social location would be one where an individual moves to a market that, one year prior, they had fewer than 10% of their connections.

Men are more likely than women to relocate. For example, for entry-level workers, 3.3% of men relocate from one year to the next, while 2.9% of women do. For senior non-management workers, 2.9% of men and 2.7% of women relocate from one year to the next.

Additionally, moves to non-social locations are about twice as common as moves to social locations, which is a function of the fact that a relatively small share of people have more than a couple social locations given our definition.

Of the two types of moves, the bigger gender gap is for moves to non-social locations—both in absolute and relative terms. For example, for entry-level workers, men are 0.32 percentage points more likely than women to make a move to a non-social location, which represents a 16 percent higher likelihood. Men are only 0.08 percentage points more likely than women to

¹ Note that we also test several alternative thresholds around larger counts of people or fractions of their network, shown in the appendix.

make a move to a social location, or 9 percent higher likelihood.

Relationship between relocation and promotion

Men are more likely than women to be promoted, and are also more likely to relocate, especially to non-social locations. Are these connected? Let's start breaking down where these gaps might be coming from. As shown in equation 1, we can decompose the total probability of being promoted first by using the law of total probability, and second by using the definition of conditional probability. This allows us to separate the overall difference in promotion into six elements: three conditional probabilities of being promoted and three probabilities of move status.

Figure 4 focuses first on the joint probabilities, i.e. the first decomposition of equation 1 into three elements. Three things stand out from Figure 4. First, in every moving condition and for both baseline seniority levels, men have higher promotion probabilities than women. There is no exception to this. Second, entry-level workers have higher promotion rates than senior non-management workers. Third, in relative terms the

gender gaps in promotion rates and move status are higher when a move is involved than when a move is not involved.

When examining the numbers, we find that the disparities in promotion when moving to a non-social location account for the largest predictors of the overall promotion gap in our data. Despite accounting for only around 5% of all promotions (e.g. for entry-level male workers, $0.62/10.26=6\%$, and for female workers, $0.52/10.02=5.2\%$), this outcome accounts for 40.2% of the gap for entry workers (for entry-level workers, $0.62-0.52=0.1$ percentage points out of 0.247 percentage points) and 38.6% of the gap for senior non-management workers.

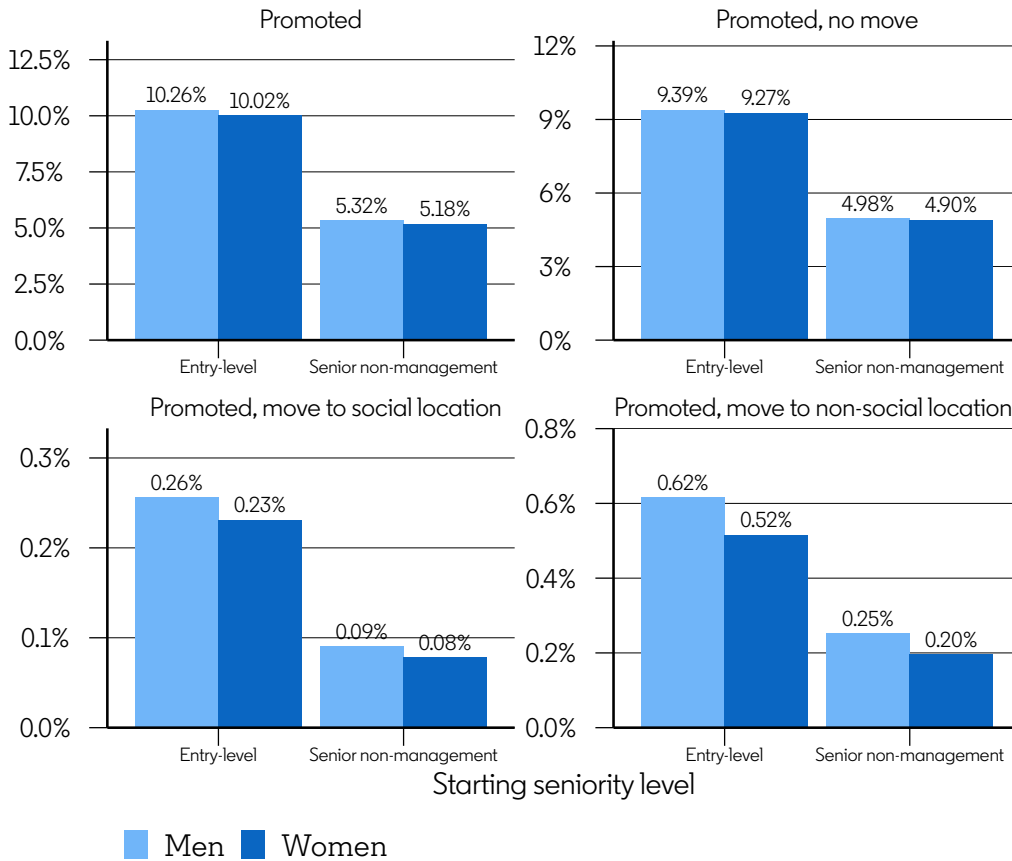
Figure 4 shows that women are promoted less often than men, and that this is disproportionately driven by gaps in moving to non-social locations. This suggests examining the extent to which these are then driven by gaps in promotion rates conditional on move type, gaps in move type, or both. Table 2 presents all of the underlying numbers for the full decomposition, as well as absolute and proportional measures of the gender gaps for each. We find that the largest contributor to the gap for both starting seniority levels is differences between men and women in the probability of being promoted conditional on

Equation 1

$$\begin{aligned} \text{Pr(Promoted)} &= \text{Pr(Promoted, no move involved)} \\ &\quad + \text{Pr(Promoted, move to social location)} \\ &\quad + \text{Pr(Promoted, move to a non-social location)} \\ &= \text{Pr(Promoted | no move involved)} \times \text{Pr(No move)} \\ &\quad + \text{Pr(Promoted | move to social location)} \times \text{Pr(Move to social location)} \\ &\quad + \text{Pr(Promoted | move to a non-social location)} \times \text{Pr(Move to non-social location)} \end{aligned}$$

Figure 4

Promotion probabilities



moving to a non-social location. For example, men are promoted 26.69% of the time they have a move to a non-social location, whereas women are promoted 25.96% of the time, 0.73 percentage points less. These results align with the WCI survey results, wherein women are more likely to have made moves for their partner’s careers than their own careers (which we would observe in the data as a move without a promotion).

Additionally, men have higher conditional promotion rates in each of the three moving scenarios, but the largest gap (proportionally and in percent terms) is the gap in the promotion rate

for those moving to a non-social locations. For example, for entry-level workers there is a 0.73 percentage point higher promotion rate for men who move to a non-social location compared to women, translating to 2.81% higher. The gap for promotion without moving is 0.17 percentage points (1.8%), and promotion moving to a social location is 0.4 percentage points (1.5%). The same trends occur for senior non-management workers. This again aligns with the survey results above, wherein women are more likely to have made career moves for their partner than men.

Table 2 also allows us to observe one other trend that both men and women share. First, the lowest

Table 2

Decomposition of promotion probabilities

Outcome	Men	Women	Gap	% gap
Starting seniority level: Entry-level				
Pr(Promoted)	10.26%	10.02%	0.25pp	2.48%
Pr(Promoted no move)	9.71%	9.54%	0.17pp	1.75%
Pr(No move)	96.72%	97.12%	-0.40pp	-0.41%
Pr(Promoted moved to social location)	26.46%	26.06%	0.40pp	1.53%
Pr(Moved to social location)	0.97%	0.89%	0.08pp	8.98%
Pr(Promoted moved to non-social location)	26.69%	25.96%	0.73pp	2.81%
Pr(Moved to non-social location)	2.31%	1.99%	0.32pp	16.07%
Starting seniority level: senior non-management				
Pr(Promoted)	5.32%	5.18%	0.15pp	2.81%
Pr(Promoted no move)	5.13%	5.04%	0.09pp	1.84%
Pr(No move)	97.06%	97.30%	-0.25pp	-0.25%
Pr(Promoted moved to social location)	11.26%	10.12%	1.14pp	11.29%
Pr(Moved to social location)	0.80%	0.78%	0.03pp	3.26%
Pr(Promoted moved to non-social location)	11.77%	10.20%	1.58pp	15.48%
Pr(Moved to non-social node)	2.14%	1.92%	0.22pp	11.45%

probability of us observing a promotion is for when the members do not move: 9.71% of the time for men and 9.54% for women. Contrast this with the probability of being promoted when making a move to a non-social location, wherein men are 26.69% likely to have been promoted year-over-year, and women 25.96%. These are over double the probabilities from those not moving. Given women move less often than men, this will also impact the promotion gaps.

In the appendix, we use this set-up and do simple counterfactual calculations of what women's promotion rate would be if one of each of the six elements were equal to men's rate. Each of the factors makes a difference, although the largest differences happen if women were promoted at the same rate as men when there is no move involved. This is true because of the high frequency of not moving. Another way to see this is, if women and men had the same promotion rates when not moving, for entry-level workers this

would shift the gender gap from 0.248pp (10.265-10.017) to 0.086pp (10.265-10.179), closing 65% of the overall promotion gap. For senior non-management workers, equal promotion rates when not relocating would narrow the overall promotion gap 63% of the way.

The smallest gap for both seniority levels is the gap in promotion rates when men and women have the same probabilities for moving to a social location.

Adjusting for worker characteristics

Finally, we can estimate the gap for each of the elements of the decomposition, adjusting for covariates, and contrast it to the gaps when not

adjusting for covariates.² Table 3 presents these results.

Overall for entry level workers, while women are 0.212 percentage points less likely than men to be promoted each year, when we compare men and women who are similar (education, occupation, industry, etc.), there is no remaining gender gap. On the other hand, for senior non-management workers, the gender gap increases from 0.156 percentage points to 0.249 percentage points in favor of men when we compare similar men and women.

Controlling for observable characteristics tends to make promotion probability gaps larger, meaning if anything we are understating the disparity between men and women’s promotion rates conditional on move type when we look at just the raw statistics. For example, for entry-level

Table 3

Gender gap in promotion probability rates, adjusted and unadjusted

Outcome	Entry-level workers		Senior non-management workers	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Pr(Promoted)	-0.00212***	0.00011	-0.00156***	-0.00249***
Pr(Promoted no move)	-0.00132***	0.00092***	-0.00102***	-0.00190***
Pr(no move)	0.00397***	0.00113***	0.00249***	0.00242***
Pr(Promoted social move)	-0.00277**	-0.01296***	-0.01135***	-0.01238***
Pr(Social move)	-0.00088***	-0.00026***	-0.00030***	-0.00054***
Pr(Promoted non-social move)	-0.00713***	-0.01583***	-0.01609***	-0.01917***
Pr(Non-social move)	-0.00309***	-0.00087***	-0.00220***	-0.00187***

² Covariates controlled for: age, year, educational attainment, market area, industry, and occupation

workers, the unadjusted gap between men and women in the probability they are promoted given they made a move to a non-social location is 0.00713 (0.73 pp). If we adjust for observable characteristics (e.g. compare men and women in similar occupations and industries, etc.), the gap widens to 0.01583 (1.58pp). The one exception is probability of being promoted conditional on not moving for entry-level workers, where adjusting for observable characteristics actually flips the sign and gives women the edge.

On the other hand, while adjusting for covariates tends to increase the promotion gap, it tends to decrease the probability of move type gaps.

The above-documented elimination of the overall promotion gender gap for entry-level workers seems to be due to improvements in the gap for promotions when not moving, as well as the narrowed move type gaps for higher promotion probability events (moves to social or to non-social locations). These outweigh the widened gap in promotion probabilities when moving. On the other hand, the widening of the gaps for promotion probabilities for senior non-management workers dominates, leading to the estimated overall promotion gap men hold over women of 0.156 percentage points to increase to 0.249 percentage points.

Discussion

Prior research has documented the gender difference in caregiving responsibilities and how these affect women's labor force participation, relocation, and career trajectories. In this paper, we leverage LinkedIn data to explore the extent to which we can observe gender gaps in

relocation and promotion, and how they relate to each other.

From the WCI survey, we observe that men and women have different behaviors when it comes to relocation: women are less likely than men to have moved for their own career and more likely to have moved for their partner's career. This disparity grows with older workers for both genders, as well as when they move into leadership positions.

These survey findings are supported when we explore LinkedIn member profile data across time. Women are less likely than men to relocate to non-social locations (areas where they did not already have connections), and this is related to lower promotion rates. Women being promoted at the same rate as men when they don't move would narrow the gap the most (given the fact that people do not regularly move). Additionally, while promotions associated with moves to non-social locations account for only 5% of the promotions, they account for around 40% of the gender gap. However, even if promotion disparities did not change, if women moved as often as men and these were for career opportunities, this would help narrow the gender gap substantially as well.

Altogether, this research is aligned with prior research showing US gender disparities in care responsibilities and their impact on labor outcomes. We demonstrate that women are less likely to move for their own careers than men, but more likely to move for their partner's careers. The overall promotion gap is not only because women are promoted less often than men in any given condition, but because they are less likely to make moves that may offer promotions.

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Methodology

Data and Privacy

This body of work represents the world seen through LinkedIn data, drawn from the anonymized and aggregated profile information of LinkedIn's one billion members around the world. As such, it is influenced by how members choose to use the platform, which can vary based on professional, social, and regional culture, as well as overall site availability and accessibility.

In publishing these insights from LinkedIn's Economic Graph, we want to provide accurate statistics while ensuring our members' privacy. As a result, all data show aggregated information for the corresponding period following strict data quality thresholds that prevent disclosing any information about specific individuals.

WCI Survey

LinkedIn's Workforce Confidence Index (WCI) Online Survey is distributed to members via email every two weeks. Roughly 10,000 members in the U.S., Canada, Brazil, the U.K., France, Germany, Spain, Italy, Netherlands, India, Australia, and Japan respond to each wave. We focus our study on the US, which contains over 2,000 members in each wave. Members are randomly sampled and must be opted into research to participate. Students, stay-at-home partners, and retirees are excluded from the analysis to get an accurate representation of those currently active in the workforce. We analyze data in aggregate and will always respect member privacy. Data is weighed by engagement level to ensure fair representation of various activity levels on the platform. The results represent the world as seen through the lens of LinkedIn's members; variances between LinkedIn's membership and the overall market population are not accounted for.

Definitions

Relocation: A relocation instance occurs when a LinkedIn member changes their location on their LinkedIn profile.

Social location: one where, one year prior to the move, a LinkedIn member has more than or equal to 10% of their connections on LinkedIn.

Non-social location: one where, one year prior to the move, a LinkedIn member has less than 10% of their connections.

Promotion: having a job title seniority level increase from one year to the next. For entry-level workers, this involves moving to a job title of senior non-management or to any management position (manager, director, VP, C-suite). For senior non-management, higher job titles are any management position.

Counterfactual estimates of promotion rates if men and women had similar rates for each element of the decomposition

Using Equation 1, we can calculate the predicted aggregate promotion rate for women keeping all of the six probability values for women except for one at a time, which is instead substituted with a probability value associated with men. That is, let π_{NM}^W be the probability of not moving for women, for example, and ψ_{NM}^W be the probability of being promoted for women who don't move. Then we could express the total probability again for women as

$$\Pr(\text{Promoted}|\text{Women}) = \psi_{NM}^W \times \pi_{NM}^W + \psi_{MS}^W \times \pi_{MS}^W + \psi_{MNS}^W \times \pi_{MNS}^W$$

This just repeats the original decomposition equation but with notation differentiating between men and women. From this, we can consider simple counterfactuals for each, such as

$$\Pr(\text{Promoted}|\text{Women}, \Psi_{NM} = \psi_{NM}^M) = \psi_{NM}^M \times \pi_{NM}^W + \psi_{MS}^W \times \pi_{MS}^W + \psi_{MNS}^W \times \pi_{MNS}^W$$

On a technical note, when taking the value as men for probability of moving, given the underlying probabilities π must sum to one we rescale the other two probabilities, e.g. if we

$$\text{set } \pi_{NM}^M = \pi_{NM}^M, \text{ then we would rescale } \pi_{MS}^W = \frac{\pi_{MS}^W}{\pi_{NM}^M + \pi_{MS}^W + \pi_{MNS}^W}.$$

The above process allows us to examine what the promotion rate for women would be if only one of the elements were to be the same as men's values, and determine relative importance of each factor. These are presented in the below table.

Each of the factors makes a difference, although the largest differences happen if women were promoted at the same rate as men when there is no move involved, given the high frequency of not moving. The smallest gap for both is the gap in promotion rates when moving to a social location.

Table A.1: Promotion Probabilities under Different Scenarios

	Entry-level	Senior non-management
Pr(Promoted Men)	10.265%	5.322%
Pr(Promoted Women)	10.017%	5.177%
<i>Pr(Promoted Women) if women had the same value as men for...</i>		
Pr(Promoted no move)	10.179%	5.267%
Pr(No move)	10.082%	5.189%
Pr(Promoted moved to social location)	10.020%	5.185%
Pr(Moved to social location)	10.029%	5.178%
Pr(Promoted moved to non-social location)	10.031%	5.207%
Pr(Moved to non-social location)	10.069%	5.188%

Sensitivity around threshold choice for social location

We did several sensitivity checks for determining what is a social location and what is not, based on network counts within a market for individuals or percentages of their networks.

The first check we investigate merges the WCI survey data of whether they report living within an hour of family onto the revealed preference analysis data where we define whether they are in a social location or not according to each threshold. These are not identical—a person can, for example, go to college out of state, never return home, and build a new social network in the new city. Even if they don't live close to family, eventually they would presumably consider that area a social location. Nonetheless, it gives us one clue as to how well the metric is performing and which threshold to select.

Consider the threshold we ultimately use as the primary definition—having 10% of your network in a geography. That information cross-walks with the WCI question as follows:

Table A.2: Relationship between WCI Survey Responses and LinkedIn Profile Moves

	1. Relocation in social location	2. Relocation not in social location
1. WCI close to family	88.9%	11.1%
2. WCI not close to family	74.9%	25.1%

The main diagonal—the top left and bottom right cells—are where there is alignment. It tells us that of those that report living close to family on the WCI, we classify 89% of them as living in a social location, while we classify 11.1% as not living in a social location. Meanwhile, for those who report not living close to family, 74.9% are classified as living in a social location, whereas 25.1% are classified as not living in a social location.

One thing this reveals, unsurprisingly, is that we classify most people as living in a social location, whether or not they live close to family. This reflects the reality of what a social location may or may not mean. Another thing to note is that it does classify a higher portion living in a social location for those who report living close to family.

While not entirely accurate, we can consider the off-diagonal as follows:

- **Type I error:** false positives--we say they are in a social location but they are not. That would be the bottom left cell.
- **Type II error:** false negatives--we say they are not in a social location, but they are not. That would be the top right cell.

One approach would be to select the threshold that minimizes the average of Type I and Type II errors—treat them equally.

Alternatively, one type of error may be more important than the other in this context. For example, it may be more important to classify a non-social location as truly non-social. That is likely the case given the research purposes here. In that case, the choice would prioritize only classifying something as a non-social location when it isn't. We would want a broad definition of social location, so that all remaining is non-social and strict. That would be minimizing the Type II error, and would be choosing low thresholds. This however comes at a cost of a high Type I error rate.

The table below reports the statistics, with the weighted average being the ranking metric. The metric based on 10% of the person's network living in a given geography gives us the best score for this weighted metric, and does fairly well at balancing the Type I and II errors (with the acknowledgement that we have a different definition of social location and living close to family).

Table A.3: Sensitivity Analysis Around Social Location Thresholds

Threshold	For those WCI report not living close to family % classified as living in a social location	For those WCI report living close to family the % classified as living in a social location	Type I error	Type II error	Average of type I and II errors	Weighted average (Type II error has twice as large of a weight)
10pct	74.9%	88.9%	74.9%	11.1%	43.0%	32.4%
10cnt	89.2%	95.9%	89.2%	4.1%	46.6%	32.5%
20cnt	82.1%	92.1%	82.1%	7.9%	45.0%	32.7%
20pct	59.6%	80.6%	59.6%	19.4%	39.5%	32.8%
30cnt	76.9%	87.9%	76.9%	12.1%	44.5%	33.7%
30pct	48.1%	71.0%	48.1%	29.0%	38.5%	35.3%

We can also investigate the average number of social locations people have by threshold:

Table A.4: Average Number of Social Locations per Member Under Different Thresholds

Threshold	Average number of social locations
Count of 10	3.95
Count of 20	2.26
Count of 30	1.72
10%	1.24
20%	1.01

30%

0.95

By construction, thresholds with higher bars yield fewer average social locations. The 10% threshold yields 1.24 total social locations. Digging into that deeper, we find the following distribution:

Table A.5: Distribution of Number of Social Locations

Number of social locations	Percent of sample
0	2.19%
1	74.25%
2	21.47%
3	2.04%
4	0.05%
5	0.00%

Nearly 3/4rds of members have only one social location in our data by this definition. This aligns relatively well with other evidence (e.g., finding that 20% of Americans live more than a couple hours from their parents).