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GENDER GAP AND PARENTHOOD PENALTIES IN BUSINESS TRAVEL CHANGES FROM 2001 TO 2017: OCCUPATIONAL VARIATIONS AND ASSOCIATIONS WITH TECHNOLOGY USE

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ABSTRACT

This paper evaluates transitions in gender differences and parenthood penalties in the chance of business travel, focusing on variations by occupation and technology usage. Although literature documents that women and parents of small children are substantially less likely to travel for business, particularly long ones, little research has explored trends in the gap. Moreover, little attention has been given to whether they vary by business travel distance, occupation, or technology adoption. This study analyzes domestic intra-regional business travel likelihood by different distance thresholds, using three U.S. National Household Travel Surveys from 2001 to 2017. By employing the Probit model, our analysis finds narrowing gender gaps and parenthood penalties in business mobility, thanks to shrinking travel needs. Internet-savvy workers experienced narrower gender gaps than non-savvies, especially among those without small children. The conditional prediction suggests a disappearing gender gap and parenthood penalties for sales and service workers, even for trips over 50 miles per day. Contrary, the gender gap in business mobility among professional and managerial workers shrank but persisted in 2017 for long-distance trips. The declining trend in the gender gap and parenthood penalty for business travel likelihood is a vital sign for reducing inequalities and work-family conflicts.

JEL classification: R4, J16

Keywords: Business travel, gender gap, internet (non) savvy, ICT development

1. Introduction

Despite significant progress toward female participation in the labor market, women are still significantly underrepresented in business travel (Aguilera, 2008; Collins and Tisdell, 2002; Schwab et al., 2019). A broad spectrum of research has examined this gender gap, discussing space-time constraints caused by work-family conflicts (Hughes and Silver, 2020; Schwanen and Kwan, 2008). The gender gap in business mobility has attracted research attention because it results in unequal labor market outcomes and career opportunities. As business travel often relates to prestigious jobs, workers with care responsibilities, such as child-rearing duties, often hesitate or fail to take such positions (Magnusson, 2010).

Digital technologies may have helped narrow the gaps as customer-relation management tools and automated data-sharing systems reduced business travel needs with virtual communication (Claffy et al., 2020; Thaichon et al., 2018). Although female workers' work-related travel is under-examined, there are signs of narrowing gaps. The U.S. data says that the average American worker might have traveled less frequently and for fewer miles in 2017 than in 2001 (McGuckin and Fucci, 2018). Moreover, the literature on information and communication technologies (ICTs) suggests that the technologies promote women's work inclusion (Asongu and Odhiambo, 2020). ICTs enable this inclusion because they "constitute the basis of the redefinition of traditional gender norms and support a media of information, understanding, and knowledge in which women's interests, opinions, and rights are taken into account" (Kelkar and Nathan, 2002). Technologies also reduce "place-binds" between work and family life, allowing more flexible coordination to mitigate work-family conflicts (Hughes and Silver, 2020).

This paper examines gender inequalities in business mobility by occupation and ICT usage to address the potential of technology use for female workers. Our research is motivated by ICTs' potential to empower women and decrease the gender gaps in work-related non-commuting business travel. We also try to obtain implications about post-pandemic trends in business mobility and work-family conflicts. The COVID pandemic disproportionally affected more working mothers due to work-family conflicts caused by school closures, while it accelerated ICT adoption in business further (Kirwin and Ettinger, 2022; Lambert et al., 2021). Therefore, the discussion about ICTs' substitution effects on business travel is especially timely, having implications for improving work-family conflicts and gendered labor issues.

This study examines repeated cross-sectional travel data from three U.S. National Household Travel Surveys (NHTS) to assess whether the gender gap and parenthood penalty in business

mobility have narrowed since 2001. Work-related business trips include but are not limited to trips for buying and delivering goods or services, visiting clients or branches for meetings, making door-to-door sales, or participating in conferences. It is also important to note that the NHTS data focuses on day trips, and the recorded trips are mostly intra-regional (less than 200 miles per day) and car-based (more than 90%).

Our paper employs the Probit model to investigate whether occupational categories and ICT familiarity affect the gender gap and parenthood penalty in business travel likelihood. We also test the model for business travel with different daily travel mile thresholds (ranging between 10-100 miles) to see whether the gap is more significant for relatively longer-distance travel. To investigate the associations with technology adoptions, we distinguish internet-savvy from non-internet-savvy workers and compare their travel behaviors. In addition, we test a few variations of internet-savvy definitions to check the robustness of the results.

Our analysis finds narrowing but persistent gender gaps and parenthood penalties in business mobility between 2001 and 2017. In 2001, the differences were more evident for sales and service (SS) workers than for professional and managerial (PM) workers; however, the gaps shrank more quickly for SS workers than for PM workers. In addition, ICT familiarity narrowed the gender gap among workers without small children by giving females higher chances to travel.

The paper proceeds as follows. The next section discusses critically relevant studies on the gender gap and the source of gender differences, focusing on the links with occupational variations, child presence, and ICT familiarity. Section 3 introduces the data and descriptive statistics of male/female business travel characteristics. Next, sections 4 and 5 present our estimations and post-estimation predictions. Finally, the paper concludes with discussions about limitations and future directions.

2. **Business Travel, ICTs, and the Gender**

2.1 Trends in business travels and business travelers since 2000

Businesspersons travel for various purposes: buying and delivering goods, providing and receiving on-site services, and communicating face-to-face with clients, business partners, and others. Among these work-related business trips, trips for inter-personal interactions have attracted research attention because the rise of virtual interactions may have altered face-to-face meeting needs (Aguilera, 2008; Denstadli, 2004; Denstadli et al., 2013; Faulconbridge et al., 2020,

2009). Indeed, over the last 20 years, ICTs and the internet have become essential for businesses and substantially impacted travel behaviors. Specifically, researchers discuss three different implications for travel behavior; substitution effects (Arnfalk and Kogg, 2003; Beaverstock et al., 2010; Denstadli, 2004; Denstadli et al., 2013), complementary effects (Arnfalk and Kogg, 2003; Denstadli et al., 2013; Faulconbridge et al., 2009; Mokhtarian, 2009; Salomon, 1986), and modification effects (Faulconbridge et al., 2020; Haynes, 2010). While substitution effects refer to the virtual replacement of in-person business travel, complementary effects indicate increased business travel due to the spatial expansion of production and consumption networks facilitated by the technologies. The last, modification effects, mean the alternations in the entire business practices caused by ICTs, including business travel needs and characteristics.

Since 2000, virtual communications have gradually replaced business travel, particularly when travel disruptions and economic depressions occur. The first wave of digital substitution was observed in 2001, when the dot-com bubble crashed, and the 9-11 attack happened (Haynes, 2010; Lian and Denstadli, 2004). The second wave came in the late 2000s, when the financial crisis hit the economy, and climate justice attracted public attention (Poom et al., 2017; Roby, 2014). Business air travel was criticized for being financially and environmentally costly, and virtual tools replaced some of it. The most recent wave of digital substitution arrived when the COVID pandemic started in 2020 (Hacker et al., 2020). Due to the severe restrictions on in-person interactions, most business communications went virtual.

Yet, previous research also found that the substitution effect is limited due to the persistent preference for face-to-face meetings. For example, many workers believed in-person interactions were more appropriate for discussions that demanded serendipities, tacit information exchanges, or critical decisions (Arnfalk and Kogg, 2003; Faulconbridge et al., 2009). Face-to-face contact was also preferred for maintaining relationships with clients because it requires deep in-person communication (Faulconbridge et al., 2020). Furthermore, ICTs complement (generate) business travel for sales, marketing, and remote collaboration because of the geographically extended production and consumption networks (Aguilera, 2008; Denstadli et al., 2012; Mokhtarian, 2009).

Business travel is typically made by workers with authority and discretion, such as managers or executives (Aguilera, 2008). Managers and executives travel more because knowledge- and learning-intensive interactions require in-person communication (Faulconbridge et al., 2020; Poom et al., 2017; Wickham and Vecchi, 2008). For instance, in the U.S., non-Hispanic White males represented about 77% of business travelers in 2001 and 80% in 2009 (NHTS, 2009). Also,

the average age of business travelers was higher than that of workers, a little above 45 years old in 2009, reflecting business travelers' higher hierarchical positions.

PM workers travel to join internal and external meetings for coordination, information exchange, and intra- or inter-organizational collaborations (Denstadli et al., 2013; 2009; Poom et al., 2017). Some of their business travel might be substitutable by virtual communications, especially for intra-organizational managerial meetings (Arnfalk and Kogg, 2003; Denstadli et al., 2012; Poom et al., 2017). Where possible, firms have a motivation to substitute business travel, particularly long-distance or air travel, with virtual ones because of the high cost-saving effects (Arnfalk and Kogg, 2003; Denstadli, 2004).

Besides the managers and executives, SS workers often travel for businesses (Arnfalk and Kogg, 2003). SS workers communicate intensively with external partners, which demands more face-to-face interactions for initiating and developing relationships (Arnfalk and Kogg, 2003; Thaichon et al., 2018). Online communication is regarded as ineffective for SS workers because relationship-building with clients requires more complex and delicate touches (Lian and Denstadli, 2004). Although technological advancements have increased the importance of the inside sales force over the years, they often complement the outside sales force rather than substitute it (Rapp et al., 2008; Thaichon et al., 2018).

2.2 The Gender Gap in Business Mobility

Business travel behavior also varies by gender of the workers. Traditionally, female workers were underrepresented among business travelers (Aguilera, 2008). One of the main factors that might cause gender differences in business travel is the lower hierarchical position of females at work, especially working mothers. Women's lower business mobility intertwines with labor market outcomes as high-profile positions often go hand in hand with commitments to long-distant business travel (Derry, 2002). Research documents that the gender differences in working sectors and their hierarchical positions result in the gender gap in business mobility (Gustafson, 2006). More specifically, females are more likely to take occupations with more routine work or positions with shorter work hours, which provide few opportunities for promotion (Brussevich et al., 2018). Work-hour statistics also confirm that men spend longer time on paid work than women. For example, 86.0% of male workers in the U.S. did 40 hours or more of paid work per week in 2001, while 66.7% of female workers worked 40 hours or more (OECD, 2023). The gender gap was persistent in 2009 and 2017; 82.3% and 84.5% of male workers worked 40+ hours in 2009

and 2017, while the shares were 64.0% and 67.6% among female workers, respectively. Wage statistics also suggest that women were less likely to be promoted to positions with discretionary power. In 2001, the gender gap in the median wage was 21%, which narrowed slightly to 17.2% in 2017 (Economic Policy Institute, 2023). Such job choices, work-hour choices, and slower promotions may result in fewer business travel opportunities for female workers than male workers.

Other research finds that female workers, especially working mothers, explicitly avoid jobs requiring intensive travel because caring responsibilities make accommodating frequent business travel requirements challenging. Even in the US in the 2010s, females bore disproportionally more unpaid household work than males; females spent about 4.3 hours per day, twice as much as males (ILO-OECD, 2019). Females also take on more childcare activities than males, such as escorting children (Han et al., 2019). Hence, when paid and unpaid work are combined, females work more than males, tightening space-time constraints. Between 1999 and 2013, males spent 20.3% of their time on paid work and 11.6% on unpaid and care work, while females spent 15.1% on paid work and 17.9% on unpaid and care work (OECD, 2023). As a result of higher household responsibility, family compositions affect women's business travel likelihood more strongly than men's (Gustafson, 2006; Jeong et al., 2013; Scheiner, 2014; Stewart and Donald, 2006). Gustafson (2006) found that the presence of partners and children affected business mobility differently between men and women; having children was negatively associated with travel likelihood for women, while it had no significant association with men's travel behavior. Jeong et al. (2013) also found that living with a spouse or partner and taking care of family members were negatively associated with overnight work travel probability.

The ICTs' impact on the gender gap in business mobility is not easily predictable because they alter both business and household management. Regarding the business side, whether business travel increases as ICTs advance and spread is inconclusive. On the one hand, technologies may have exacerbated the gender gap because they increased the demand for long-distance business travel by geographically extending businesses' production and sales networks (Aguilera, 2008; Gustafson, 2006; Roehling and Bultman, 2002). On the other hand, technologies may have narrowed the gender gap in business travel by substituting business travel. A reduction in travel requirements may also encourage women to be promoted to managerial positions by allowing for more flexible work schedules and locations (Perrons, 2003; Sowon et al., 2019). Empirically, research on academic workers with young children in the mid-2000s found many virtues of digital technologies in achieving work-life balance (Currie and Eveline, 2011).

Moreover, a Swedish study also found that gender and the presence of children had no significant association with overnight work travel in the early 2000s (Bergström, 2010).

The adoption of ICTs also relaxed "place-binds" in work-family life by making the workforce more mobile and able to work from anywhere, anytime (Hughes and Silver, 2020). Simultaneously, the space-time constraints of parents' family life have been reduced, at least partially, as some household errands can be performed virtually (Neutens et al., 2011). Virtual connectedness also relieves parents' anxiety about separation from their children while working (Schwanen and Kwan, 2008). However, the gender division of household labor may not have changed much as the information and planning hub of household duties remained in mothers' hands (Schwanen and Kwan, 2008). Thus, the extent to which ICTs have boosted working mothers' business mobility remains uncertain.

3. Data and Variables

For the analysis, we employ the U.S. NHTS of 2001, 2009, and 2017. The NHTS provides detailed travel data for one observation day for each sample, including work-related business trips. As NHTS provides sampling weights, we apply the person weights for the following analysis. This study considers all the trips for work-related business purposes other than commuting. Thus, the trip's purposes include but are not limited to buying and delivering goods or services, meetings, door-to-door sales, site visits, or participating in conferences.

NHTS categorizes jobs into four occupational categories: (1) sales and service (SS), (2) administrative and clerical, (3) manufacturing, construction, maintenance, and farming, and (4) professional and managerial (PM). We focus on the SS and PM workers because they often make work-related business trips. They often travel for communication and relationship-building, which can be virtually substituted. Another major category, manufacturing, construction, maintenance, and farming, was not included in the analysis because their work-related trips are much less likely to be replaced by virtual interactions. Administrative and clerical workers are also excluded because their travel likelihood is low.

Our analysis considers the differences between internet-savvy and non-internet-savvy workers. We define internet-savvy as daily internet users and non-internet-savvy (or "non-savvy") as non-daily internet users. Due to data limitations, the intensity of internet usage is measured for general purposes, including private and business use. Although measuring internet usage

frequency specifically at work would be more appropriate, such data is unavailable for 2009 and 2017. Yet, we believe our indicator is still helpful because internet usage is more likely to be distributed proportionally between work and non-work hours. Moreover, the internet was first introduced to workplaces in the earlier ICT adoption stage due to limited infrastructure and high costs in the earlier years. Indeed, in 2001, 87% of workers who didn't access the internet at work were categorized as "non-savvy," and 63% of workplace internet users were classified as "internet-savvy."

For a robustness check of the internet-savvy effects, we tested two alternative measures of "internet-savviness." For 2001, we employed "web use at work" (one if the person accessed the internet from the workplace, zero otherwise). Although it does not indicate the frequency of use, it measures internet usage at work. For 2017, we tested multi-media access to the internet to measure the internet-savviness, the daily usage of at least two devices from the pc, tablet, or smartphone. We employ this definition because we assume that intensive internet users would need two types of devices. One is a smartphone or tablet for location-free access to email and other data; the other is a PC or high-end tablet for intensive work, such as formal document processing and data analysis. The measure excludes light and casual tech users solely depending on smartphones from the "internet-savvy" category. It also excludes technology laggards who are reluctant to adopt mobile devices. Based on this stricter definition, 21.6% of workers are categorized as non-savvy, and 78.4% are considered internet-savvy.

Table 1 summarizes the demographic and socioeconomic compositions of all workers (left section) and work-related business trip makers (right). Each section consists of three columns summarizing the data for 2001, 2009, and 2017. Approximately 100,000,000 workers existed in those years, and five to ten percent of them made at least one work-related business trip on the observation day. Among all workers, 42.2% were internet-savvy in 2001, increasing to 68.4% in 2009 and 98.2% in 2017. Over the period, slightly more than half (54%) of workers were men. The proportions of workers with children under five were approximately one-fifth in 2001, somewhat higher for men than women. The proportion gradually decreased to one-sixth for female workers in 2017, while it remained slightly above one-fifth for male workers.

Work-related business trip makers were more likely to be male, non-Hispanic Whites, college graduates, and of higher income. In 2001, male workers shared almost 70% of business travelers, which decreased to 60% by 2017. Male workers with small children traveled almost as much likely as those without, while female workers with small children were less likely to travel

than female workers without minors. PM workers took the largest share (more than 45%) among business travelers, followed by SS workers (20 to 25%). Manufacturing, construction, maintenance, and farming workers also took a non-negligible percentage of business travelers because their jobs require on-site goods and service deliveries by nature.

Figure 1 illustrates gender and family status among SS and PM workers between 23 and 69. The top segment shows the results for SS workers, and the bottom shows those for PM workers. The upper set of three bars illustrates all workers' gender and family status distribution in 2001, 2009, and 2017 (from top to bottom), and the lower set displays those of business travelers. The left parts (in dark solid blue and light striped blue) illustrate males, and the right (in pale yellow and dark dotted brown) show female workers. Dark colors are for those with small children under five years old, and light colors are for those without any minor children.

Gender distribution was almost equal for SS workers, yet, female workers, particularly those with children, took a disproportionally smaller share among SS business travelers. In 2001, the women's share was only 30.5%, and women with children under five shared only 5.6% of SS business travelers (Figure 1). Conversely, many male SS workers with small children traveled; 18.0% of SS business travelers were men with minor children. The shares of female workers with and without children increased throughout the period, and in 2017, more than 40% of SS business travelers were female. The narrower gender gap was achieved by increasing travel likelihood among female SS workers without minor children: from 24.9% to 33.0% between 2001 and 2017. The percentage of female SS workers with children also increased to 8.3%, close to that of male workers with children (9.5%).

Women's proportion among PM workers was slightly smaller than men's (45% vs. 55%), but the gender gap was narrower among PM workers than among SS workers. In 2001, 36.7% of PM business travelers were female. The share increased steadily to 44.7% in 2017, becoming close to the gender share among all PM workers (47%). Like SS workers, the gap became narrower mainly because of the travel likelihood increase among female workers without minor children (30.6% to 36.5%). The probability of making business trips also increased among female PM workers with children under five. However, the increase was modest, and their share is still lower than their male counterparts (8.2% vs. 11.3%).

4. The model

We employ the Probit model to estimate the probability of making business trips for SS and PM

workers separately for each year.

$$Pr(BZtrip_{idt}=1 \mid X_{it}) = \Phi(X_{it}, '\beta) \quad \ldots \quad (1)$$

$$Pr(BZtrip_{idt}=0 \mid X_{it}) = 1 - \Phi(X_{it}, '\beta)$$

The dependent variable $BZtrip_{idt}$ is a variable that indicates whether a worker *i* made any business trip *d* miles per day or longer on the observation day in NHTS year *t* (note that this is a repeated cross-sectional, not a panel dataset). $BZtrip_{idt}$ is equal to 1 if there is at least one trip and zero otherwise. Travel distance thresholds *d* are 10, 20, 30, 40, 50, 70, and 100 miles.

The independent variables (X_{it}) include demographic characteristics, family characteristics, internet usage, location characteristics, and their interactions. Society-wide and inter-temporal variations in working conditions (e.g., work hours) and human capital investments may also affect business travel behaviors. However, due to data availability and for the sake of model simplicity, such variations are indirectly controlled by time, location, educational attainment, and occupation.

The primary independent variable, gender, equals one if the person is female and zero otherwise. Internet-savvy equals one if internet usage is "daily" and zero otherwise. The small child categorical variable equals one if the person has a child between 0 and 5 years old. We also consider age, household family income, and racial-ethnic groups as additional personal characteristics. Our analysis targets workers between the ages of 23 and 69. Indicator variables for non-Hispanic Whites, Afro-Americans, Asians, Hispanics, and others control racial-ethnic groups. The household family income is estimated (in logarithm) based on the median value of the income category range. Locational heterogeneity is controlled by indicator variables for four Census regions (Northeast, Midwest, South, and West) and urbanized areas (*urban*=1 if the worker lives in an urbanized area, and 0 otherwise). Last, we address the differences between weekdays and weekends. The data analyses include all possible interactions between the primary variables of interest: female, internet-savvy, and having minor children under five.

5. Results

Since the model includes many interactions among key variables, we analyze primary factors' marginal effects rather than interpret the coefficients. For brevity's sake, we omit the interpretation of variables other than gender, the presence of small children, and internet savviness. The full regression results are available in the appendix.

5.1 SS Workers

Tables 2 and 3 present the average marginal effect of being female (Table 2) and being internet savvy (Table 3) on the business travel probability of SS workers with and without small children. The baseline results with the internet savvy indicator variable for 2001, 2009, and 2017 are shown from the top in each table. The bottom two sets are the robustness check models using web use at work (for 2001) and multi-device users (for 2017). Each year, we estimate marginal effects on the likelihood of having business travel, that is longer than the travel mile threshold. As distance thresholds, we use 10, 20, 30, 40, 50, 70, and 100 miles (from left to right). In some cases, marginal effects were not estimatable (grey-shaded areas) because few non-savvy business travelers were in the observation.

In 2001, female SS workers were less likely to travel for business 10+ miles per day, regardless of their internet familiarity and the presence of small children (Table 2). The gender gap was the widest for internet-savvy workers with children. On average, internet-savvy female SS workers with small children were 12% less likely to make daily business travels of 10+ miles than their male counterparts, twice as much as the gap among those without children. Among non-savvy SS workers with and without small children, the gender gaps in the travel likelihood were almost the same. Non-savvy female SS workers without children were 6.8% less likely to make business trips of 10+ miles per day than their male counterparts, and the gap was 6.4% for those with small children. The gender gap was narrower for longer business trips, partly because the travel probability became lower for long trips. For instance, in 2001, the gender gap between internet-savvy workers with children decreased to 4.1% when we raised the travel distance threshold from 10 to 100 miles per day. All the findings above are consistently observed in the robustness check model using web use at work.

In 2009, the gender gap persisted in business travel likelihoods, but it was narrower than in 2001, especially for internet-savvy SS workers with small children. The average marginal effect of being female on the business travel probability of 10+ miles was 4.3% for internet-savvy SS workers with small children, which was one-third of that in 2001. Among non-savvy SS workers with small children, there were no significant differences in the likelihood of making business travel 10 miles or longer. The marginal gender effects became not estimatable for non-savvy business travelers with small children who traveled 70 miles or more because all the working mothers who traveled 70+ miles were internet-savvy.

By 2017, the gender gap had become almost unobservable, except for the probability of

making business trips of 20+ miles or 30+ miles among internet-savvy SS workers without minor children. Even for them, the marginal effect of being female was much smaller than in the earlier years; 0.99% for 20+ miles and 0.83% for 30+ miles. In 2017, the gender gap was not estimatable for non-savvy SS workers with children because no one remained non-savvy among them.

When we employ a more strict measure for "internet-savvy" for 2017 (i.e., daily users of multiple devices), being female showed a negative association for non-savvy workers without small children making business travel 30 miles or longer. These significant marginal effects may suggest gaps among unskilled male and female SS workers who rely solely on smartphones. However, we must be cautious because the gap may also have been driven by the gender gap among non-savvy senior workers, who have already exited the child-raising life stage.

Being internet-savvy was almost always associated with a higher probability of making business trips for female SS workers without minor children (Table 3). Specifically, in 2001, being internet-savvy was associated with a 1.9% higher chance of making business trips 20 miles or longer per day for female SS workers without children under five. The robustness check model with web use at work also suggests that, in 2001, internet familiarity was associated with higher travel likelihood for women without small children. Likewise, in 2009, it was associated with a 2.3% higher chance for female SS workers without children. Although the magnitude of the marginal effects became smaller as we limited the observations to long-distance business travel, it was persistently positive and significant in 2001 and 2009. In 2017, no non-savvy SS worker traveled 40 miles or longer for business, and the effect became not estimatable beyond that point. Yet, in the analysis of business travels of 10+ miles, 20+ miles, or 30+ miles, the internet-savvy effect remained positive and significant in 2017. In addition, the robustness check model also suggests that being tech-savvy is associated with a higher chance of business travel for females without small children.

Contrary to those without children, the marginal effect of being internet-savvy was insignificant for female SS workers with children. The insignificance may be caused either by the suppressed travel among working mothers or by the prevalence of internet usage among working mothers. We will take a closer look at the prediction section.

Among males, internet savviness had little association with the probability of making business trips in 2001 and 2009. Namely, the marginal effect of being internet-savvy was insignificant for those with and without small children, regardless of the travel distance thresholds. In 2017, all the male business travelers with minor children became internet-savvy in the baseline

model, and the average marginal effects were not estimatable. Even with the stricter definition of "internet-savvy," it is mostly insignificant except for the one for 20+ mile business travel. Among male SS workers without children under five, a few non-savvy business travelers existed in 2017. Yet, these non-savvy male SS workers did not make business travel 30+ miles per day, and they were 3.4% less likely to make business travel 10+ miles than their internet-savvy counterparts.

The results suggest a disappearing gender gap in business travel likelihood, even for long-distance ones. Internet usage positively correlated with travel likelihoods for female SS workers without small children, suggesting that being internet savvy gave them more business opportunities. However, for male and female workers with children, internet savviness did not have significant effects in 2001 and 2009. In 2017, the association with internet usage became not -estimatable. By 2017, all the business-traveling mothers and fathers of children had come to use the internet daily and needed more strict definitions to address the intensity of internet usage.

5.2 PM Workers

In 2001, all the female PM workers were less likely to make business trips than their male counterparts, regardless of the distance thresholds (Table 4). Among internet-savvy PM workers, the gender gap was slightly wider for those with children under five than for those without. For instance, internet-savvy female PM workers with small children were 3.9% less likely to make business travels 10+ miles than their male counterparts, twice as high as the gender gap for those without children. Among non-savvy PM workers, the gender gaps were only slightly greater for those without minor children than those with children (e.g., 6.2% and 5.1% for those without and with children, respectively). As observed for SS workers, the gender gap narrowed for longer business trips because the probability itself was low.

In 2009, the average marginal effect of being female became smaller than in 2001, and it became insignificant for internet-savvy female SS workers with small children. For internet-savvy female PM workers without small children, the gap became only marginally smaller and persisted. For instance, internet-savvy female workers without small children were 2.2% less likely to make business travel of 10+ miles per day than their male counterparts, which used to be 1.8% in 2001.

As internet usage became essential for business, only a few PM workers remained non-savvy in 2009. Among the remaining non-savvy female PM workers, the gender gap in business travel likelihood was wider for those without minor children than for those with small children. Non-savvy female PM workers without minor children were 2.5% less likely to make business travel

of 70+ miles per day than their male counterparts. In contrast, those with children were 0.4% less likely to travel 70+ miles than their male counterparts. As discussed in Section 5.1, the more significant gender gap among non-savvy workers without small children may have been driven by the gap among senior workers.

By 2017, the gender gap was no longer estimatable for non-savvy workers in the baseline model because there were no non-savvy female PM workers. When we used multi-device daily users as the tech-savvy definition, the gender differences were insignificant at a 95% level for all the cases. Among internet-savvy PM workers, the gender gap persisted, particularly for long-distance travel, although it has become smaller than before. Internet-savvy female PM workers without children were 0.34% less likely to travel 100+ miles per day for business than their male counterparts (significant at a 95% level). The marginal effect of being female for internet-savvy female PM workers with children was 0.72% and significant, more substantial than the corresponding effect for those without small children. These negative associations are consistently found in the robustness check model.

Internet-savvy female PM workers were more likely to make business trips, although the association was significant only in limited cases (Table 5). In 2001, internet-savvy female PM workers without children had a higher chance of making mid-to-long distance business trips of 50+ miles than their non-savvy counterparts. In 2009, internet-savvy working mothers had a significantly higher chance of traveling, even for short-to-mid-distance ones. For instance, internet-savvy female PM workers with small children were 2.8% more likely to travel 10+ miles for business than their non-savvy counterparts. By 2017, almost all the PM workers had become internet-savvy in the baseline definition, and the marginal effect of internet usage was estimatable only for males without small children. For these people, internet-savviness positively affected the chance of business travel 30+ miles. When we employ multi-device users for the tech-savvy definition for 2017, positive and significant associations appear for short-to-mid-distance business trips of male and female workers without children or for 50+ miles travel for male workers with children.

Interestingly, internet-savviness was negatively associated with the travel likelihood of male PM workers without minor children in 2001, when relatively short-distance trips were included. As suggested in the literature, substitution effects might have been evident for frequent short-to-mid-distance trips. However, the association was insignificant when we employed web use at work as the definition of internet-savvy.

5.3 Conditional prediction of business travel likelihoods

To better understand the inter-group differences and over-the-year differences in the likelihood of business travel, we predicted the conditional probability of making business travel longer than daily travel mile thresholds. Specifically, we calculate the travel likelihood for non-Hispanic White SS or PM workers at 32 years old each year and compare them by gender, internet savviness, and the presence of small children under five. We also assume they have a bachelor's degree, have a household income of $80,000, and live in the Northeast region. We did not predict the probabilities for racial-ethnic minorities because their sample size was too small to conduct a reliable analysis. Although gender differences may intersect with racial, ethnic and socioeconomic inequalities (Yuan et al., 2023), our data are insufficient for analyzing minority groups.

Figures 2 and 3 present the predicted probabilities for SS and PM workers, respectively. Detailed values are available in the Appendix tables. In each figure, results for 2001, 2009, and 2017 are shown from top to bottom. The graphs on the left illustrate the outcomes for workers without small children, and the right ones are for those with children under five. In each chart, the predicted travel probabilities for 10 miles or longer per day are displayed far left, followed by the estimates for longer daily travel distance thresholds. The set of columns consists of four predicted values. From left to right, they represent non-savvy males (hatched light blue columns), internet-savvy males (solid light blue columns), non-savvy females (hatched orange columns), and internet-savvy females (solid dark brown columns). Columns may not appear for cases where probabilities are not estimatable.

Findings about Hypothesized SS Workers

In 2001, the hypothetical female SS workers were much less likely to make business travel than their male counterparts, and the gap was significantly wider for those with children under five. Among those without small children, the travel likelihood for the female SS workers was approximately half of that their male counterparts; for example, the predicted probability for females making business travel of 10+ miles is 6.46% (c.f., 12.7% for males). The ratio of travel probability between internet-savvy women and men without children stayed close to 1 to 2, even for longer-distance travel (e.g., 2.06% versus 5.29% for 70+ miles). In contrast, the gender gap widened among non-savvy workers without children for longer-distance travel. The primary

reason is that non-savvy females traveled were unlikely to travel long-distances. Non-savvy female SS workers had almost no chance of making business travel 70+ miles per day (0.87% for those without children, which is not significantly different from zero), whereas the corresponding figure is 2.06% for internet-savvy ones.

The presence of small children strongly discouraged mid-to-long business travel among female SS workers in 2001. When all the business trips of 10+ miles were included in the analysis, the chance of travel for the internet-savvy female SS workers with and without children was 5.21% and 6.46%, respectively (Figure 2, top). However, for business travel of 50+ miles, the travel likelihood for the internet-savvy females with small children was 0.36% and not significantly different from zero, which was substantially lower than that for those without minor children (2.72%). The probability is even lower for non-savvy females with children. The likelihood of making business travel 10 miles or longer was 3.62% for the non-savvy female SS workers with minor children. It became not significantly different from zero for 20+ miles of business travel.

Unlike females, having small children was associated with a higher chance of making business trips among the hypothesized internet-savvy male SS workers (Figure 2, top). For example, almost one-fifth of the internet-savvy male SS workers with children under five were estimated to travel, which is a 1.5 times higher probability than those without children. Even for long-distance travel of 100+ miles, the travel likelihood of the internet-savvy male SS workers with minor children remained higher than those without. Such a tendency is not observed among the non-savvy male SS workers with the same sociodemographic characteristics. The probability of making business travel was almost the same between the non-savvy male SS workers with and without minor children.

The likelihood of business travel in 2009 decreased for male SS workers with minor children, while it did not change much for female SS workers. As a result, the gender gap among those with small children significantly narrowed. For instance, among the internet-savvy SS workers with small children, males' travel likelihood of 10+ miles became less than half between 2001 and 2009, from 19.3% to 9.25%. In contrast, the chance for the hypothesized females decreased more moderately by a quarter, from 5.21% to 3.92% (Figure 2, right). The same is observed for long-distance business travel. Although the internet-savvy male SS workers with children reduced their predicted probability of making business travel 50+ miles substantially (from 10.3% to 4.27%), the chance increased for females with small children (from 0.36% to 1.33%).

Interestingly, the non-savvy female SS workers with and without children were predicted to have traveled more than their savvy counterparts in 2009. Yet, the prediction is unstable, and the expected probabilities beyond the threshold of 20+ miles are not significantly different from zero. As discussed earlier, non-savvy working mother business travelers were already rare in 2009.

In 2017, the gender gap narrowed even further as the estimated travel likelihood among the hypothesized male SS workers decreased. First, the probability of business travel for the non-savvy SS workers was virtually zero for all business trips, regardless of gender or the presence of minor children (Fig. 2, bottom). Second, the travel likelihood of the internet-savvy male SS workers became as low as that of females, especially for short business trips. Among those with a small child, the predicted probabilities of making business trips of 10+ miles were 6.96% for males and 6.15% for females. Third, the parenthood penalty also disappeared in 2017 for short-distance business travel, as travel likelihood became higher for internet-savvy female SS workers with children under five. For example, the chance of business travel 10+ miles increased from 3.92% to 6.15% between 2009 and 2017 for the hypothesized females with small children. In contrast, the predicted probability for those without minor children was 4.83% in 2017, lower than that for their with-children counterparts.

Findings about Hypothesized PM Workers

In 2001, the gender gap existed but was narrower for PM workers than for SS workers, particularly among internet-savvy ones with children (Figures 2 and 3, top). The presence of small children also discouraged female PM workers' travel slightly; however, the gap between with and without children was narrower than among SS workers. For instance, in 2001, the predicted probability of business travel of 10+ miles for internet-savvy female PM workers without children was 5.09%, which was three-quarters of their male counterparts. Even among those with small children, the predicted probability for the internet-savvy female PM workers was half of their male counterparts for travel of 10+ miles (3.77% compared to 7.28%). The gap between male and female PM workers was most evident among non-savvy PM workers without children, possibly driven by a more significant gender gap among senior workers. Even though the prediction is made for 32-years-old, it can happen because the gender gap coefficient is not differentiated by age group.

In 2009, the gender gap and parenthood penalty decreased substantially among internet-savvy PM workers with children under five, primarily because travel increased among internet-

savvy working mothers (Figure 3, middle). For example, the chance of making business travel 10+ miles was 6.20% for the hypothesized internet-savvy females with children in 2009, substantially higher than in 2001 (3.77%). It is higher than that of internet-savvy females without children (5.47%) and close to their male counterparts (7.49%). Even for long-distance business travel, internet-savvy working mothers' likelihood slightly increased (from 0.70% to 1.04% for 50 miles or longer) and reached more than half of their male counterparts (1.72%). Unlike internet-savvy PM workers, the parenthood penalty remained among non-savvy male and female PM workers in 2009. The predicted probability of traveling 20+ miles for the non-savvy female PM workers with children was 0.59% (not significantly different from zero), while the likelihood for those without children was 3.54%. For non-savvy males, the travel likelihood was also lower for those with children than those without and was more substantial for extended travel than for shorter ones. For business travel of 40+ miles, the likelihood became less than 0.5% and not significantly zero for non-savvy males and females with children.

In 2017, the gender gap and parenthood penalty remained small but persisted, particularly for long-distance trips. As the travel likelihood dropped substantially, only 3% of the internet-savvy males with and without children were predicted to travel 10+ miles in 2017. Internet-savvy female workers were also much less likely to travel than in 2009, at approximately 2.5% for both with and without children. For relatively long-distance travel over 50 miles per day, the travel likelihood of females with children was 0.42% and not significantly different from zero, which is two-thirds of those without small children (0.62%) and one-third of their male counterparts. The analysis for non-savvy workers is not feasible because all young PM workers with small children were internet-savvy (Figure 3, bottom).

6. Conclusion

Our paper aims to raise awareness of gender differences in business travel behavior and the potential of ICTs to reduce the gap. The analysis finds that gender inequalities and women-specific parenthood penalties exist in business travel behavior. The gender gap and parenthood penalties were the most severe among SS workers in 2001, suggesting that outside sales were a masculine job at that time. In contrast, PM workers' negative associations with being female or having small children were relatively modest in 2001. The finding may suggest that female workers who overcame mobility constraints might have been promoted to managerial positions, rather than PM jobs that were female-or parent-friendly.

The gender gap and parenthood penalties shrank between 2001 and 2017 for both SS and PM workers, primarily through reductions in travel likelihood among male workers. The decline in business travel likelihood among SS workers coincided with the growth of inside sales and customer-relation management tools discussed by Thaichon et al. (2018), suggesting that ICTs helped narrow the gender gap by reducing business travel needs. Working mothers' increased travel likelihood also contributes to narrowing the gender gap, which might be promoted by cultural shifts and increased childcare availability. However, the women-specific parenthood penalty in business mobility remained for long-distance business travel for both SS and PM workers.

Internet familiarity is associated with a narrower gender gap in business travel when they don't have small children. Having ICT skills may have helped improve women's positions in the office, but such tools were not enough to reduce or ease family obligations.

From organizational and policy perspectives, developing inclusive business travel policies that are friendly to workers with family obligations is critical in promoting more gender-equal work opportunities. In particular, travel substitution options for longer business trips should be provided more generally and flexibly. In that sense, the COVID pandemic had a positive impact on promoting gender equality and reducing parenthood penalties by accelerating the virtual substitution of communications. Besides accelerating travel reduction, more public and private support for family life (child and senior care) may be necessary to enable active participation in business travel for critical career development.

Our research has limitations due to the availability of data. First, this research cannot address causal relationships between the gender gap in business mobility and the gender gap in the labor market. The gender gap in the labor market may result in a disparity in business mobility. Simultaneously, female workers' lower business mobility may lead to a gender gap and parenthood penalties in the labor market. Our model does not control endogeneity, and thus, we cannot conclude whether the narrower gender gap in business mobility promotes gender equality outcomes in the labor market. Second, the lack of data availability for trip purposes makes it difficult to determine why and how the travel necessities have shrunk. Third, the unavailability of internet usage's objectives makes the "internet-savvy" variable less reliable. Although our internet-savvy indicator had high correlations with internet usage at work in 2001, its validity after the widespread use of the internet (in 2009 and 2017) is unknown. Fourth, our findings are limited to non-Hispanic Whites in the US, not to racial/ethnic minority groups, because the data

does not allow us to explore intersectionality.

Despite the limitations, our results show promising signs of better gender equality in business mobility, thanks to the reduction in intra-regional work-related business travel. Advancements in ICTs may have contributed to the trend by eliminating travel needs through digital replacements of communications. Although working mothers struggled to manage work and child-rearing responsibilities during the COVID lockdown periods, accelerated digital transformation during the pandemic may reduce the gender gap and parenthood penalties in businesses in the post-COVID era.

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TABLES

Table 1. Descriptive Statistics of All Workers and Business Trip Makers

	All workers			Business Travelers		
	2001	2009	2017	2001	2009	2017
Obs.	63,313	98,580	87,635	4,569	10,280	4,885
Population	106,243,884	103,460,131	104,906,728	7,828,717	10,129,114	5,236,333
Internet Savvy	42.2%	68.4%	98.2%	47.1%	72.3%	99.4%
Avg. Age	41.3	44.1	43.1	42.7	45.2	44.8
Gender and Child						
M no Child U5	41.1%	41.4%	43.0%	52.9%	50.2%	48.0%
M w/ Child U5	12.7%	12.6%	11.2%	15.7%	13.4%	10.9%
F no Child U5	36.8%	38.0%	38.2%	26.3%	30.5%	34.4%
F w/ Child U5	9.4%	8.0%	7.7%	5.2%	5.9%	6.8%
Racial Ethnic Mix						
Non-Hsp White	72.6%	71.3%	65.2%	76.4%	79.6%	72.9%
Afro American	10.8%	10.1%	10.5%	9.4%	6.3%	8.3%
Asian	2.5%	3.1%	5.1%	1.7%	1.9%	4.6%
Hisp/Latino	11.8%	13.3%	1.6%	9.3%	9.6%	11.0%
Others	2.3%	2.2%	3.5%	3.2%	2.7%	3.2%
College Degree	35.5%	41.5%	51.2%	41.4%	48.6%	62.0%
HH Fam Income	58,059	66,464	89,108	62,669	70,818	100,252
Urban	78.8%	76.1%	84.3%	76.4%	69.3%	84.6%
Occupation						
Sales & Service	23.4%	25.9%	21.8%	25.2%	26.1%	21.0%
Adm. & Cleric.	11.5%	10.6%	11.0%	5.2%	5.6%	7.1%
Mnf., Cnst., Ag.	19.2%	17.5%	15.1%	20.2%	19.8%	14.4%
Prof. & Manag.	40.7%	44.2%	51.9%	45.8%	46.9%	57.4%
Other / Unknown	5.3%	1.7%	0.2%	3.5%	1.6%	0.0%

Table 2. Marginal Effects of Being Female (SS Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy	-0.068**	-0.060**	-0.060**	-0.054**	-0.053**	-0.037**	-0.025**
	Savvy	-0.059**	-0.047**	-0.041**	-0.028*	-0.028*	-0.029**	-0.022*
With Sm Child	Non Savvy	-0.064**	-0.060**	-0.050**	-0.045**	-0.040**	-0.026**	-0.019**
	Savvy	-0.12**	-0.11**	-0.090**	-0.088**	-0.087**	-0.053**	-0.041*
2009		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy	-0.046**	-0.043**	-0.038**	-0.034**	-0.034**	-0.027**	-0.021**
	Savvy	-0.044**	-0.039**	-0.036**	-0.038**	-0.034**	-0.034**	-0.021**
With Sm Child	Non Savvy	ns	ns	ns	ns	ns		
	Savvy	-0.043**	-0.041**	-0.034**	-0.030**	-0.023*	-0.015^{+}	-0.016**
2017		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy	ns	ns					
	Savvy	ns	-0.0099**	-0.0083**	ns	ns	ns	ns
With Sm Child	Non Savvy							
	Savvy	ns	ns	ns	ns	ns	ns	ns
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Sm Child	No Webuse at Work	-0.072**	-0.062**	-0.056**	-0.048**	-0.045**	-0.034**	-0.026**
	Webuse at Work	-0.045*	-0.040*	-0.047**	-0.039**	-0.041**	-0.035**	-0.018*
With Sm Child	No Webuse at Work	-0.086**	-0.067**	-0.051**	-0.041**	-0.039**	-0.030**	-0.020**
	Workplace Internet	-0.079*	-0.10**	-0.089**	-0.092**	-0.087**	-0.046*	-0.040*
2017 / Multi-Device		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Tech Savvy	ns	ns	-0.0098**	-0.0082**	-0.0040^{+}	-0.0036+	-0.0040^{+}
	Tech Savvy	-0.013^{+}	-0.012^{+}	ns	ns	ns	ns	ns
With Sm Child	Non Tech Savvy	ns	ns	ns	ns	ns	ns	ns
	Tech Savvy	ns	ns	ns	ns	ns	ns	ns

ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

Table 3. Marginal Effects of Having a Small Child (SS Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
Non Savvy	Male	ns	ns	ns	ns	ns	-0.02^{+}	ns
	Female	ns	ns	-0.0085*	-0.0083**	-0.0072*	-0.0059*	ns
Savvy	Male	0.062^{+}	0.054^{+}	ns	ns	ns	ns	ns
	Female	ns	ns	ns	-0.022**	-0.022**	-0.018**	-0.012**
2009		10+	20+	30+	40+	50+	80+	100+
Non Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns		
Savvy	Male	ns	ns	ns	ns	ns	-0.017^{+}	ns
	Female	ns	ns	ns	ns	ns	ns	-0.0045*
2017		10+	20+	30+	40+	50+	80+	100+
Non Savvy	Male							
	Female							
Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Webuse at Work	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	-0.0074*	-0.0069*	-0.0056**	ns
Webuse at Work	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	-0.036*	ns	-0.025**	-0.024**	-0.020**	-0.016**
2017 / Multi-Device		10+	20+	30+	40+	50+	70+	100+
Non Tech Savvy	Male	-0.019**	ns	ns	-0.0069^{+}	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns
Tech Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	-0.0079^{+}	ns	ns

ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

Table 4. Marginal Effects of Being an Internet Savvy (SS Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	0.019*	0.015*	0.013*	0.012*	0.0089^{+}	0.0096*
With Sm Child	Male	0.064^{+}	0.055^{+}	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns
2009		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	0.026**	0.023**	0.019**	0.013**	0.013**	0.0065**	0.0036*
With Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns		
2017		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	0.034**	0.023**					
	Female	0.023**	0.012**	0.0068*				
With Sm Child	Male							
	Female							
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	0.040**	0.035**	0.021*	0.017*	0.014*	0.012^{+}	0.014**
With Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	0.043^{+}	ns	ns	ns	ns	ns	ns
2017 / Multi-Device		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	0.035*	ns	0.0090**	0.0083*	0.0086*	0.0072*	0.0070*
With Sm Child	Male	ns	0.033*	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns

ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

Table 5. Marginal Effects of Being Female (PM Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy	-0.062**	-0.050**	-0.042**	-0.037**	-0.032**	-0.025**	-0.024**
	Savvy	-0.018*	-0.025**	-0.022**	-0.018**	-0.017**	-0.0098*	-0.0087*
With Sm Child	Non Savvy	-0.051*	-0.030*	-0.030*	-0.029*	ns	ns	-0.0096*
	Savvy	-0.039*	-0.029*	-0.027**	-0.026**	-0.017*	ns	-0.014*
2009		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy	ns	-0.028^{+}	ns	-0.026*	-0.027**	-0.025**	-0.027**
	Savvy	-0.022**	-0.016**	-0.015**	-0.015**	-0.012**	-0.010**	-0.0072**
With Sm Child	Non Savvy	ns	-0.017*	-0.014^{+}	ns	ns	-0.0040^{+}	
	Savvy	ns	ns	ns	ns	ns	ns	ns
2017		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Savvy							
	Savvy	-0.0057^{+}	-0.0064*	-0.0041^{+}	-0.0043*	-0.0042*	-0.0039*	-0.0034*
With Sm Child	Non Savvy							
	Savvy	ns	ns	ns	-0.010*	-0.0073*	-0.0074**	-0.0072*
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Sm Child	No Webuse at Wk	-0.053**	-0.042**	-0.041**	-0.037**	-0.031**	-0.023**	-0.026**
	Webuse at Work	-0.030**	-0.032**	-0.025**	-0.021**	-0.020**	-0.013**	-0.011**
With Sm Child	No Webuse at Wk	-0.086**	-0.048**	-0.043*	-0.042*	-0.031^{+}	ns	-0.014*
	Webuse at Work	-0.027^{+}	-0.021^{+}	-0.022*	-0.020*	ns	-0.011^{+}	-0.012*
2017 / Multi Device		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Non Tech Savvy	ns	-0.0068^{+}	ns	ns	ns	ns	ns
	Tech Savvy	-0.0070^{+}	-0.0064*	ns	-0.0042^{+}	-0.0043*	-0.0040*	-0.0037*
With Sm Child	Non Tech Savvy	ns	ns	ns	ns	ns	ns	ns
	Tech Savvy	ns	-0.011^{+}	ns	-0.013**	-0.0086*	-0.0090**	-0.0087**

ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

Table 6. Marginal Effects of Having a Small Child (PM Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
Non Savvy	Male	ns	-0.028^{+}	ns	ns	ns	-0.020**	-0.017*
	Female	ns	ns	ns	ns	ns	ns	-0.0016*
Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	-0.0070^{+}
2009		10+	20+	30+	40+	50+	70+	100+
Non Savvy	Male	ns	-0.036*	-0.029*	-0.031**	-0.029**	-0.026*	-0.026**
	Female	-0.029^{+}	-0.025*	-0.022*	-0.0081*	-0.0045^{+}	-0.0039*	
Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns
2017		10+	20+	30+	40+	50+	70+	100+
Non Savvy	Male							
	Female							
Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	-0.0035**	-0.0020*
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Webuse at Work	Male	ns	ns	ns	ns	ns	ns	-0.015^{+}
	Female	ns	-0.017^{+}	ns	ns	ns	ns	-0.0022*
Webuse at Work	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	-0.0078^{+}	-0.0058^{+}
2017 / Multi-Device		10+	20+	30+	40+	50+	70+	100+
Non Tech Savvy	Male	ns	ns	ns	ns	ns	-0.0049*	-0.0034^{+}
	Female	ns	ns	ns	ns	ns	ns	ns
Tech Savvy	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	-0.0040**	-0.0022*

ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

Table 7. Marginal Effects of Being Internet-Savvy (PM Workers)

		y: Probability of Having Daily Business Travel Miles Longer Than						
2001		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	-0.022*	-0.020*	-0.017^{+}	ns	ns	ns	ns
	Female	0.021*	ns	ns	ns	0.0072^{+}	0.0094**	0.0093**
With Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	ns	ns	ns	ns
2009		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	-0.019*
	Female	ns	ns	ns	ns	ns	ns	0.0033**
With Sm Child	Male	ns	ns	ns	0.018**	0.015*	0.0072^{+}	0.0055*
	Female	0.028*	0.025**	0.016**	0.014**	0.011**	0.0078**	
2017		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	0.014**	0.011**	0.0090**	0.0070**	0.0044^{+}
	Female							
With Sm Child	Male							
	Female							
Robustness check								
2001 / Webwork		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	ns	ns	ns	0.0073^{+}	0.0071*	0.0069*	0.0060**
With Sm Child	Male	ns	ns	ns	ns	ns	ns	ns
	Female	0.025^{+}	ns	ns	ns	ns	ns	ns
2017 / Multi-Device		10+	20+	30+	40+	50+	70+	100+
No Sm Child	Male	0.012*	0.0076^{+}	0.0064^{+}	0.0064*	0.0047^{+}	ns	ns
	Female	ns	0.0078*	0.0067*	0.0064**	0.0039^{+}	ns	ns
With Sm Child	Male	0.016^{+}	ns	ns	ns	0.0096*	0.0088**	0.0084*
	Female	ns	ns	ns	ns	ns	ns	ns

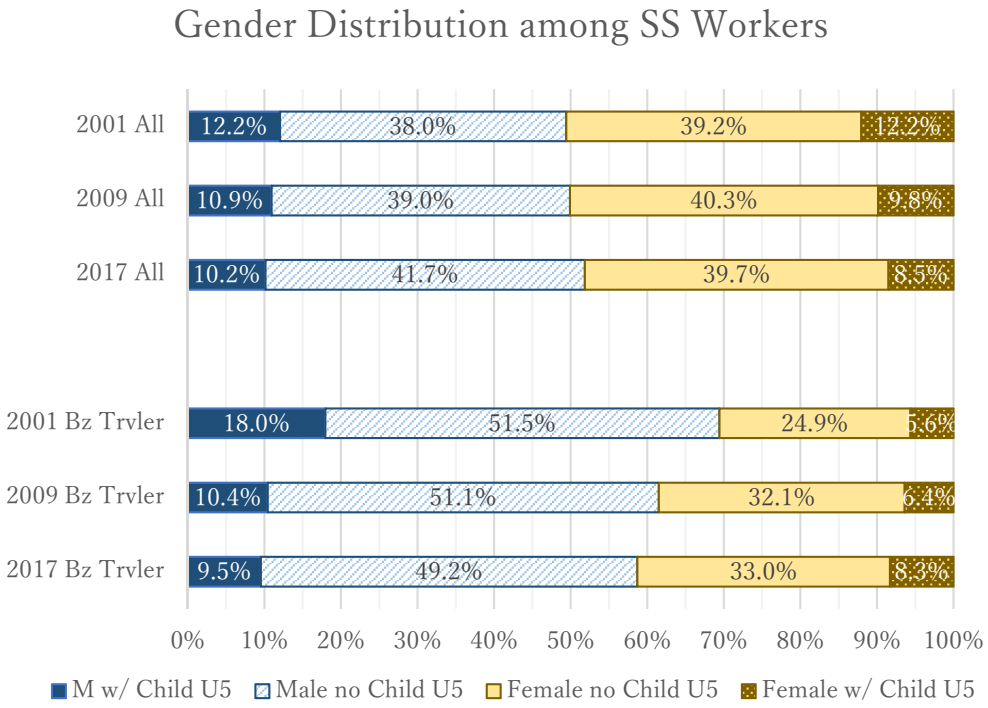
ns: insignificant, $^{+}$: significant at 90% level, *: significant at 95%, **: significant at 99% level

The average marginal effects are not estimatable for the shaded areas.

In the robustness check models, the "Webwork" variable equals one if the person uses the internet from the workplace, and the "Multi-Device" variable equals one if the person uses multiple devices daily (daily usage of at least two devices from the following: desktop PC, laptop PC, tablet, or smartphone).

FIGURES

Figure 1: Gender Distribution and Child Presence among SS and PM Workers/Business Travelers



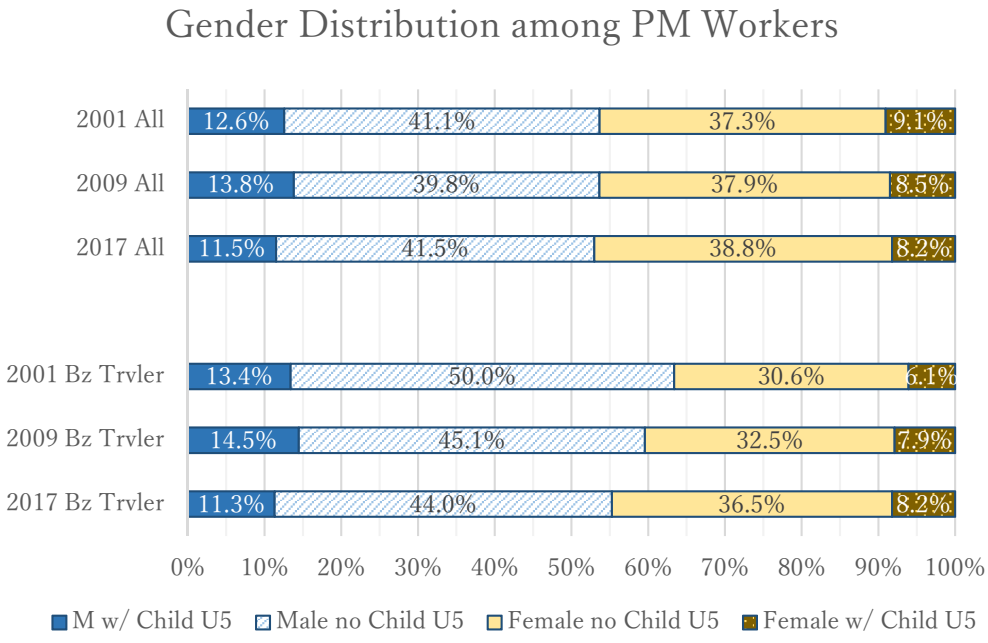
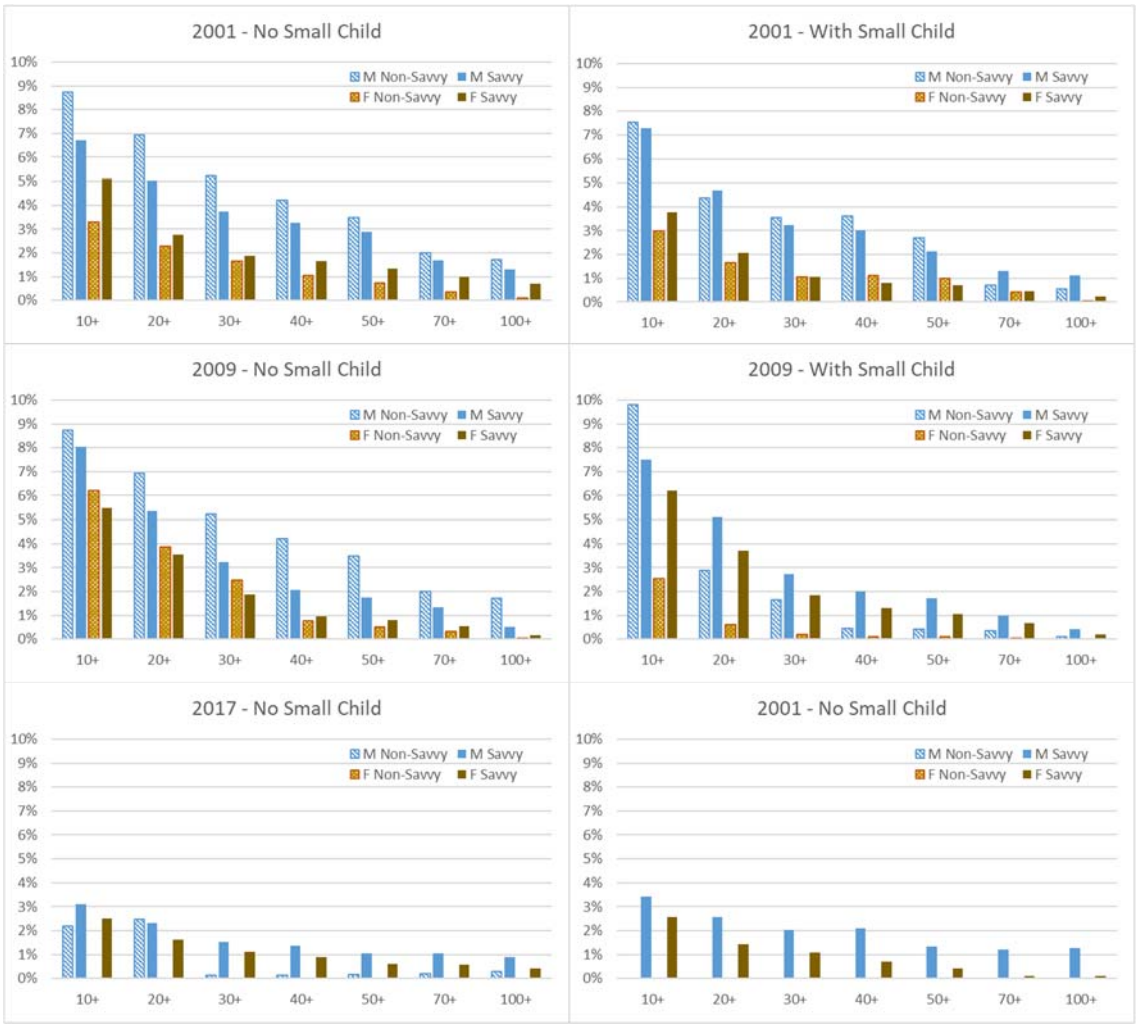


Figure 2: Conditional Predictions of SS Workers Having Daily Business Trips Longer Than Certain Miles

Note: Probabilities of having daily business travel miles 10, 20, 30, 40, 50, 70, and 100 miles or longer are predicted for 32 years old non-Hispanic White SS workers with bachelor's degree, household income of $80,000, living in urban areas in the Northeast region.

Figure 3: Conditional Predictions of PM Workers Having Daily Business Trips Longer Than Certain Miles



Note: Probabilities of having daily business travel miles 10, 20, 30, 40, 50, 70, and 100 miles or longer are predicted for 32 years old non-Hispanic White PM workers with bachelor's degree, household income of $80,000, living in urban areas in the Northeast region.