Why Do Women Earn Less Than Men? Evidence from Bus and Train Operators*

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Abstract

Female workers earn $0.89 for each male-worker dollar even in a unionized workplace where tasks, wages, and promotion schedules are identical for men and women by design. We use administrative time card data on bus and train operators to show that the earnings gap can be explained by female operators taking, on average, 1.5 fewer hours of overtime and 1.3 more hours of unpaid time-off per week than male operators. Female operators, especially those who have dependents, pursue schedule conventionality, predictability, and controllability more than male operators. Analyzing two policy changes, we demonstrate that while reducing schedule controllability can reduce the earnings gap, it can also make workers—particularly female workers—worse off.

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The last century has witnessed broad convergence in male and female earnings. The gap between male weekly earnings and female weekly earnings shrank from 38% in 1979 to 20% in 2004, but has plateaued since then at about 18% (Bureau of Labor Statistics, 2017).[1] The reasons for the persistent gender earnings gap are many. We demonstrate that even when men and women work at precisely the same job with exactly the same incentives, women earn less. This finding underscores that gender-neutral workplace policies can still generate different outcomes for the sexes.

We study public transit operators, of whom about 30% are women. Our focus is the Massachusetts Bay Transportation Authority (MBTA), a setting that allows us to control for many traditional explanations of the earnings gap, including occupational sorting, managerial bias, the motherhood penalty, and gender differences in desire to compete and negotiate for promotions. Using administrative time card data, we document that despite having such a controlled setting, the MBTA still has a gender earnings gap: female operators earn \$0.89 for each male-operator dollar in weekly earnings.[2] Moreover, given the MBTA's defined benefit pension program, this 11% earnings gap carries over into retirement.

Mechanically, the earnings gap in our setting can be explained by the fact that male operators take 1.3 (49%) fewer unpaid hours off and work 1.5 (83%) more overtime hours per week than their female counterparts. Female operators' choices indicate that they value time outside of work more than do male operators and that they have greater demand for schedule predictability and controllability. The differences are consistent with women handling more household and childcare duties than men, contributing to women's limited availability for overtime shifts and need to take more unpaid time off (Parker et al., 2015; Bertrand et al., 2015).

Our results provide evidence that earnings gaps can exist even in workplaces that have no explicit gender discrimination. Seniority in one's garage is the sole determinant of workplace opportunities, a feature enshrined in the collective bargaining agreement that covers all MBTA bus and train operators.[3] Conditional on seniority, male and female operators face the same choice sets of schedules, routes, vacation days, and overtime hours, among other amenities. The earnings gap persists even when we condition on seniority. This paper seeks to understand this residual earnings gap.

Three sets of findings help us understand the earnings gap we observe. First, female operators accept fewer overtime shifts, take more unpaid time off than men, and game the overtime system less than male operators do. Second, female operators prioritize conventional work schedules. Third, more predictable and controllable schedules have the potential to help female operators work more hours, reduce the earnings gap, and improve employee welfare.

[1] The Bureau of Labor Statistics (BLS) calculates this gap for each year by taking the average (for men and women separately) of median usual weekly earnings for full-time wage and salary workers.

[2] This is the average weekly female earnings to male earnings ratio over the course of our sample period, 2011-2017.

[3] The MBTA's bus and train operators are all represented by the same union, Carmen's Local 589.

While female operators take fewer overtime shifts than male operators, the driver of this difference is overtime opportunities that arrive on short-notice and therefore demand that operators are flexible about when they work. When overtime is scheduled the day before or the day of the necessary shift, male operators work almost twice as many of those hours as female operators. In contrast, when overtime hours are scheduled three months in advance, male operators sign up for only 7% more of them than female operators. Given that the MBTA's operators are a select group who agreed to the MBTA's job requirement of 24/7 availability, these differences in their flexibility and in their value of time could be lower bounds for the general population.

Exacerbating the disparity in overtime acceptance rates, male operators strategically substitute regular hours for higher-paying overtime hours using the Family Medical Leave Act (FMLA). Throughout our 2011-2017 sample, FMLA allowed operators to take unpaid time off.[4] At the MBTA, FMLA has been nicknamed the "Friday-Monday Leave Act" for the way that operators have used it to avoid undesirable shifts. Both male and female operators take more FMLA hours when faced with undesirable shifts (e.g., a weekend or holiday shift). However, male operators also work enough overtime hours in weeks with an undesirable shift that they effectively trade off hours paid at the regular wage for overtime hours paid at 1.5 times their wage. Female operators also work more overtime hours in weeks with undesirable shifts, but do not make up the pay lost to FMLA leave.

Female operators prioritize conventional schedules. As operators move up the seniority ladder and consequently have a greater pool of schedules to pick from, female operators move away from working weekends, holidays, and split shifts more than do male operators.

Female operators value time outside of work and schedule controllability more than do male operators, especially when they have dependents. Female operators with dependents are considerably less likely than male operators with dependents to accept an overtime opportunity. When it comes to overtime hours worked, unmarried female operators with dependents work only 6% fewer of them when they are preplanned 3 months in advance, but about 60% fewer of them when they are offered on short-notice. Unmarried women with dependents also take the largest amount of unpaid time off with FMLA, making them the lowest earners in our setting.

Lastly, we study the impact of two policy changes at the MBTA on gender gaps. These changes made it harder for operators to swap regular hours for overtime hours. The first policy change, in March 2016, made it more difficult for operators to obtain FMLA certification, to use FMLA for anything other than a medical issue, and to take unpaid time off at a moment's notice. The second policy change, in July 2017, redefined overtime hours from any hours worked

[4]Passed in 1993, FMLA is intended to allow workers facing a personal or family medical emergency to take up to 12 weeks off from work without pay and without retribution from the employer. Many use FMLA for maternity or paternity leave.

in excess of 8 in a given day, to any hours worked in excess of 40 in a given week.

Both policies reduced the gender earnings gap, but also hurt workers. The gap shrank from 12% before the FMLA policy change to 9% between March 2016 and July 2017 and to only 6% from July through December 2017. Yet, in addition to reducing the gap, these policies also reduced schedule controllability. Those who took more unpaid time off via FMLA before the policy changes now took more unexcused leave instead, indicating that these operators still desired control over their schedules. Operators are now procuring this control at a higher cost, since unexcused leave can result in suspensions and discharge from work. Because female workers have greater revealed preference for schedule controllability, these policies – particularly the first – affected female operators more negatively than they did male operators.

Our results suggest two potentially Pareto-improving strategies that could be implemented in this and similar settings. First, if operators are allowed to exchange or transfer shifts, unexpected absenteeism could be reduced. Reducing absenteeism would decrease both unpaid time off and resultant last-minute overtime opportunities – both of which fuel the earnings gap. Service provision would also improve if absenteeism drops. Second, expanding the number of operators whose job is specifically to cover for others' absences would also likely decrease the earnings disparity, overtime expenses, and inconsistent service.

Our work is related to a large literature explaining the gender earnings gap. Broadly, the major explanations cluster into four categories: Women tend to work in lower-paying jobs; women have less experience; women face workplace discrimination; and women may be less willing to fight for better compensation. Our setting allows us to rule out all of these explanations for the earnings gap that we observe.

One contributing factor to earnings gaps is that women tend to work in settings that pay less. This trend holds true if we compare male and female earnings at the occupation, industry, or firm level (Blau and Kahn, 2017; Levanon et al., 2009). Likewise, more women (24%) engage in part-time work than men (12%) (Bureau of Labor Statistics, 2017), where wages have historically been lower (Blank, 1990; Hirsch, 2005). Our analysis focuses on full-time workers performing the same tasks within the same occupation, eliminating this concern.[5]

Another factor that typically generates an earnings gap is women having less labor market experience or availability. Bertrand et al. (2010) find that the earnings gap amongst MBAs is attributable in part to more workplace interruptions and shorter work hours. Goldin (2014) notes that there are larger earnings differences in jobs that value long (uninterrupted) hours worked or being on-call. Likewise, Diamond et al. (2018) find that the earnings gap among Uber drivers can be partly explained by men working for longer periods of time than women and accumulating more knowledge about the best times and places to drive. Kleven et al. (2018) find that the birth of a child creates a gender gap in earnings of about 20%, with labor

[5]Though there are part-time bus and train operators, their contracts are sufficiently different from those of full-time operators that they are not comparable.

force participation, hours of work, and wage rates each contributing to the gap. Angelov et al. (2016) come to similar conclusions.

In our context, prior work experience is not a differentiating factor. All employees obtain the same training, regardless of their prior experience, and all who meet the basic qualifications and start work on the same day receive the same wage. Moreover, even among those without dependents, the earnings gap remains at 10%. Our results do, nonetheless, echo the literature in two ways: first, we find that demand for flexible hours is highest for those with dependents. Second, we document that the presence of short-notice overtime is akin to being on-call in the way it creates an opportunity for an earnings gap to emerge.

Another thread of research suggests that the gender earnings gap is attributable to discrimination and managerial discretion. For example, Lazear and Rosen (1990) argue that men and women have similar earnings within very narrow job categories, but are not similarly represented in those categories in part because women have a lower probability of promotion than men. In the lab, wage negotiators mislead women more than men (Kray et al., 2014); the gender of an employee's direct manager is predictive of the earnings gap (Hultin and Szulkin, 1999, 2003; Cohen and Huffman, 2007). Our context is free from this concern. In this unionized environment, seniority drives personnel management and curtails managerial discretion. Wages increase at a predetermined rate, with no performance-based incentives and no managerial discretion in who receives a raise. Discharges are rare and can be challenged by the union. As a result, differential managerial standards for men and women do not explain the earnings gap in our setting.

Additional research has argued that women are less willing to compete for higher-paying positions (Gneezy et al., 2003; Niederle and Vesterlund, 2007; Dohmen and Falk, 2011; Reuben et al., 2017). Our setting also removes this channel from consideration, since the collective bargaining agreement specifies that career advancement is based on tenure (the number of days that have passed since the hire date), and not on performance, competition, or negotiation.

Finally, we also contribute to a literature on workplace amenities. Mas and Pallais (2017) find, in their experiment, that women are willing to forgo almost 40% of their wages to avoid irregular schedules. Likewise, they find female workers are willing to take substantial wage cuts to avoid working evenings and weekends. Noonan et al. (2005) and Reyes (2007) support this work with evidence that women with high skills and job market prospects choose positions with fewer hours and more regular schedules. Our findings corroborate these results: female operators put a premium on working conventional hours.

The rest of the paper is organized as follows: the next section explains the nature of work at the MBTA and Section 2 goes into detail on the data that we employ for our analyses. Section 3 shows how the earnings gap can be explained through gender differences in overtime hours and unpaid time off. Section 4 documents gender differences in the value of time away from work, schedule predictability, and schedule controllability. Section 5 discusses how insti-

tutional changes that reduce schedule controllability can narrow the gender earnings gap, but make women worse off in the process. Section 6 concludes.

1 Institutional Details

1.1 The Operators

The MBTA serves the Boston metropolitan area with 173 bus routes and 4 rail lines.[6] Since the late 1970s, anyone with minimum qualifications can enter into a lottery to become a bus or train operator at the MBTA. Lotteries take place at intervals ranging from one to ten years, as the need for more operators arises. At the latest lottery in 2017, qualifications included being a high school graduate who is at least 18 years old, has a driver's license, and has a clean driving record for the past 2 years. Applicants also needed to pass a criminal background check, customer service and driving tests, and to be "Available to work twenty four (24) hours per day, seven (7) days per week."[7]

When applying, a person can choose to apply to be a bus operator, a heavy rail (underground train) operator, or a light rail (above-ground train) operator. There is no difference in pay between these positions and the minimum requirements are very similar. All operators start as part-timers who earn about $20 per hour and see a steady annual increase in their wage to about $33 per hour over the first 4 years of work. Thereafter, wages rise at about the rate of inflation. The only differences in wages that arise are due to new collective bargaining agreements changing the starting wage of new hires.

To the extent that MBTA operators differ from high school graduates earning similar wages in other occupations, they are likely to be more flexible so as to meet the MBTA's expectation that they be available to work at all times. Indeed, the MBTA has an incentive to screen for more flexible workers to limit scheduling difficulties and overtime pay. Attrition likely skews the population of operators further toward those who find the schedule demands of the job to be less taxing.[8] Depending on the garage to which they are assigned when they start (determined by MBTA need, not by operator preference), part-time operators may be promoted to full-time status within a few months or within several years as full-time positions open up.

1.2 The Work

A rail operator is responsible for taking the train out of the yard, conducting the train along the rails in accordance with the lights, making announcements through the overhead system, opening and closing doors for passengers, and resolving any problems that may occur over the course of the day on the train.

A bus operator is likewise responsible for following the prescribed route, picking up passengers at predetermined stops, helping passengers pay using the fare box, making all non-

[6] See Figure A.1 for a map of the area served and the routes.

[7] For the 2017 job lottery postings, see Figures A.2-A.5.

[8] Operators revealed in interviews that the rigid scheduling is one of the most difficult aspects of the job.

automated announcements, and resolving any mechanical or person-related conflicts that may occur on the bus. Bus operators deal with more unpredictable traffic and have more contact with passengers than rail operators through fare collection, assisting passengers with disabilities, and answering questions.

1.3 Scheduling

Operators select their routes and hours every three months in a process called The Pick.[9] During The Pick, the most senior ranked operator chooses which routes, days, and hours he or she would like to work. The operator's selection is subject only to the restriction that an operator must take a 10-hour break between shifts and sign up for more than 39 and fewer than 60 hours of work per week. In addition to hours and routes, certain leave days are selected at this time. Since public transit runs on the weekends and holidays, operators who do not want to work on these days must arrange their schedules and leave around them, possibly using a vacation day on a holiday that they would otherwise have to work. Once the most senior operator's selections are made, the next most senior person selects his or her schedule and vacation days for the upcoming quarter, and so on down the seniority ladder.

During The Pick, overtime may be included in one's schedule. If, for example, the routes an operator selects are expected to take 8 hours and 14 minutes, those additional 14 minutes are considered "built-in overtime" and will be paid at 1.5 times the regular wage. Additionally, the MBTA may need to run extra service to help children get to school or to substitute for service on a rail line that is under repair. During The Pick, an operator can take on such pieces of extra work—called "Trippers"—and earn overtime pay for doing so. Trippers and built-in overtime are also valuable in that pay from these sources counts toward pension calculations.

1.4 Short-Notice Overtime

Taking on short-notice overtime shifts, which are also paid at 1.5 times the regular wage, can generate significant extra earnings for MBTA operators. Short-notice overtime opportunities arise when an operator is not able to come to work, or when a vehicle break-down requires an additional operator to take over a route. The supervisor responsible for that shift will turn to "cover list" employees, whose scheduled work is to be on-call, ready to run any route in a given 8-hour window. When the need exceeds the number of "cover list" operators, the supervisor turns to the rest of the operators in the garage for help.

The collective bargaining agreement dictates that supervisors must offer these open shifts to operators within the same garage by seniority. In a time-pressing situation in which there is not enough time for a person to arrive at the garage, operators who are on-site may be offered overtime—again in seniority order. In some cases, overtime opportunities are posted on a bulletin board the day before they must be worked. After a time cutoff, the supervisor allocates

[9]The procedures for The Pick changed in 2018. The process described here was used throughout 2011-2017, the period that our data cover.

it to the most senior operator who expressed interest in the overtime shift.[10,11]

Supervisor discretion in whom to call raises concerns that favoritism, instead of seniority, could determine allocation of overtime opportunities. Two facts should assuage this concern. First, seniority rankings are commonly known, allowing operators to figure out if they have been skipped for overtime. Second, the union intercedes on behalf of operators if there are issues of supervisor favoritism, but conversations with union representatives suggest complaints of favoritism are rare. Our data also show senior operators working nearly twice as much overtime as low-seniority operators, further corroborating that overtime opportunities are allocated by seniority.

2 Data and Descriptive Statistics

2.1 Data

Our analyses are based on a set of confidential administrative data sets from the MBTA. The main data set contains the Human Resources (HR) Department's time-card data, spanning 2011-2017. These data record how many hours of each type (regular work, preplanned overtime, short-notice overtime) each employee logged on each day. Additionally, the data note the number of hours an employee did not work and the reason (sick leave, vacation, FMLA leave, unexcused, etc.). We merge time-card data with HR data on individual employees, including age, gender, date of hire, garage, and tenure. Seniority is determined based on who has the longest tenure within a given garage.

We use federal W-4 tax forms held by HR to infer an operator's marital status and, using the selected allowances, whether he or she has dependents. Allowances dictate how much money should be withheld from a paycheck in anticipation of tax liabilities. Following Internal Revenue Service (IRS) suggestions for calculating allowances, we classify operators as having dependents if they are married and put down an allowance of 3 or higher, or if they are unmarried and put down an allowance of 2 or higher. We have this information for those operators who worked at the MBTA in 2017. These data, however, are only available as a snapshot for 2,318 individuals who had W-4 forms on file with the MBTA in 2017.

Of course, the allowances a person lists on their W-4 are an imperfect measure of whether that person has children or responsibilities to care for children or other relatives. However, the IRS's underpayment penalty for having too many allowances and thus having less than one's annual tax liability withheld provides good incentive to select allowances accurately. Nonethe-

[10] It is possible that the supervisor will skip over an operator if that operator has already worked 60 hours in that week or if the operator is scheduled to work a shift during the same time as the overtime opportunity. We are able to control for whether an operator has already reached the 60 hour limit or not, but we do not observe the exact time frame of the overtime shift being offered.

[11] In our time card data, we define a short-notice overtime opportunity as a segment of overtime pay that is at least 2 hours in length. We do this to avoid overtime segments that result from traffic delays, for example, as opposed to an offer of a separate shift from one's supervisor. Our analyses are robust to using 1 hour instead of 2 to define a piece of short-notice overtime work.

less, some noise in the measurement likely still exists. We check the robustness of our results by performing the same analyses using benefits data managed by HR for employees in 2017. These data report the number of dependents that each operator has on his or her medical insurance plan with the MBTA. Our results are qualitatively the same, with the magnitudes differing only slightly.[12] As such, we believe allowances to be a noisy but unbiased measure of family arrangements.

Likewise, marital status on a W-4 is an imperfect measure of whether a person is partnered. Individuals have the option of selecting "Single", "Married", or "Married, but withhold at higher Single rate" on the form. Thus, those in our "unmarried" category may be unmarried, divorced, or in a partnership outside of the institution of marriage.

To understand the relationship between unexcused absences and disciplinary action, we combine time-card data on unexcused leave with data on the date of discipline and type of discipline received by each operator. These data are available for 2016-2017. In 2016, the MBTA introduced a new 5-step discipline policy that spelled out the type of punishments that operators could face for unexcused tardies or absences. The discipline policy was aimed at leave-taking, specifically because of the connection between leave hours and lost trips.[13] Combining 2014-2017 data on the number of trips lost at each garage on each day with time-card data, we measure the relationship between different types of leave and lost trips.

Finally, we surveyed 164 bus and rail operators about how they make decisions to work overtime, what they know about the pension, and how they value income today relative to income in the future. The 5-minute, anonymous, computer-based surveys were administered in person at 9 of the 11 garages over a 2 week period and $5 Dunkin' Donuts gift cards were offered as incentives.

2.2 Operator Descriptives

Our data contains information on 3,011 full-time bus and train operators in our time-card data (see Table 1). About 65% of operators drive buses, 21% run light rail trains, and the remaining 14% navigate heavy rail trains. Relative to male operators, female operators gravitate toward train positions: 23.2% (19.6%) of women (men) operate light rail trains and 17.4%(12.2%) operate heavy rail trains. On average, operators are 47 years old – more than a decade older than the average age in the Boston metropolitan area. The average operator has been with the MBTA for 12.4 years and is being paid $32.68, more than 3 times minimum wage in Massachusetts. About 30% of the MBTA's operators are women and that share is fairly constant across different tenures. Female operators tend to be about two years younger than male operators, but on average have tenures and wages that are almost identical to those of men.

Only 26% of operators denote their marital status as "Married" on their W-4s and 20% re-

[12] Results using benefits data are available upon request.

[13] A trip, as defined by the MBTA, is a run from point A to point B and back to point A. Losing a trip means skipping a scheduled run from point A to point B and back to point A.

port having dependents. These numbers are considerably lower than what one sees in the general U.S. population, where 48% of adults were married in 2014 and 53% of adults aged 18-40 had at least one child in 2013 (Masci and Gecewicz, 2018; Newport and Wilke, 2013). Breaking the numbers down by gender, female operators (14%) are less likely than male operators (31%) to be married, though female operators (28.5%) are more likely than male operators (15.6%) to report dependents. The latter could be driven by the fact that unmarried women are more likely than unmarried men to retain custody of their children.

Usage of Family Medical Leave Act (FMLA) leave is especially pronounced among MBTA operators.[14] Nearly 95% of operators applied for FMLA certification between 2011 and 2017. In that time, 75% had received FMLA certification at some point. In an average year, about 45% of operators are approved for FMLA. In contrast, the FMLA certification rate across the MBTA overall is only 18%. In a survey conducted by Abt Associates for the Department of Labor in 2012, 13% of employees nationwide had taken FMLA leave and 16% of the national workforce has FMLA certification in a given year (Klerman et al., 2012; Waldfogel, 2001).

As we demonstrate in the sections that follow, FMLA usage among bus and train operators is likely so high because of the rigidity of their work schedules.[15] FMLA serves as a tool for schedule controllability that costs hourly earnings but allows operators to avoid being laid off for taking time off.

Since seniority serves as the mechanism by which schedules, routes, and overtime opportunities are allocated, we also explore differences in our sample across seniority (Table 2). The most senior full-time operators have been with the MBTA for more than a quarter century, while the most junior have been there for 3.4 years. Bus drivers are slightly more likely to be senior. Unsurprisingly, given that overtime is distributed according to seniority, the most seasoned operators take more overtime than the least seasoned operators (0.6 hours/day versus 0.3 hours/day). Senior operators also have slightly higher rates of FMLA certification (63.3% versus 60.0%) and take higher amounts of FMLA-excused unpaid time off on average (0.25 versus 0.19 hours/day) than the least senior operators.

3 Accounting for the Earnings Gap

3.1 Choosing Overtime and Unpaid Leave

While Table 1 confirms that the average hourly wage barely differs between male and female operators, when we compare how much male and female operators take home in an

[14]Signed into federal law in 1993, FMLA applies to workers who have been with their employers for over 12 months and worked more than 1,250 hours in the preceding year. It guarantees up to 12 unpaid weeks of job-protected leave per year. FMLA leave is intended specifically to allow the individual to address specific personal or family medical conditions without losing his or her job. Acceptable reasons for leave include employee illness, child-care, spouse-care, parent-care, and adoption.

[15]The MBTA offers all operators, regardless of seniority, two weeks of paid sick leave per year. Sick leave can rollover from year to year. Operators who take the most FMLA hours are predominantly those who run out of paid sick days and those individuals are mostly female operators.

average week, we see that female operators earn \$0.89 on the male-operator dollar. Regressing total weekly earnings on a female dummy variable reveals that male operators earn \$1,447.30 per week on average while female operators earn \$160.10 (11%) less (Column 1 of Table 3).[16] Controlling for seniority, which determines potential work differences between male and female operators, results in the same gap (Column 2). Comparing male and female operators without dependents (Column 3), shrinks the gap only slightly to 10%. The earnings gap between unmarried female operators with children and unmarried male operators with children is the largest, at 13% (Column 4). The results reported in Column 4 are estimated from the following regression:

$$y_{it} = \alpha + \beta F_i + \lambda D_i + \theta M_i + \kappa F_i D_i M_i + \phi F_i D_i + \eta F_i M_i + \gamma D_i M_i + \upsilon Seniority_{it} + \epsilon_{it} \quad (1)$$

where, y_{it} reflects person i's earnings in week t, F_i is an indicator of being female, D_i is an indicator of having dependents, M_i is an indicator of being married, and $Seniority_{it}$ is a continuous variable denoting operator i's seniority decile in week t.

The earnings gap exists at each seniority level (see Figure 1, Panel A). The earnings gap narrows somewhat as operators become more senior and the choice sets faced by operators expand. Likewise, the earnings gap persists at each seniority level even for those without dependents (Panel B).

How does the earnings gap emerge despite identical choice sets? The key lies in differences in overtime acceptance rates and usage of unpaid time off through FMLA. Figure 2 shows an operator's scheduled earnings (the sum of their scheduled monthly work hours multiplied by their wage), adds monthly earnings from overtime work, and subtracts earnings lost from unpaid leave taken through FMLA, arriving at actual monthly earnings.

Panels A and B perform this exercise separately for male and female operators, showing that the wedge in take-home pay arises from overtime and unpaid leave. Male operators work about 2 times the overtime hours that female operators work and take about half the FMLA hours off throughout the seniority spectrum. As a result, male operators take home more than their scheduled earnings, while female operators take home less, until they get to the highest seniority levels. The results that we report in upcoming sections also suggest that, with more options that increase schedule controllability, female operators will work more hours and earn more.

Panels C and D in Figure 2 perform the same accounting exercise for those who have dependents. Men with dependents take less unpaid time off and work more overtime than the average male operator. Female operators with and without dependents behave more similarly. These figures demonstrate visually why the earnings gap grew when dependents came into

[16] For the specification with log earnings as the outcome variable, see A.1. We focus on the dollars specification here because it does not exclude those who work 0 hours in a particular week.

the picture in Table 3.

3.2 Pension Implications

The earnings differences we document here are not only present across seniority levels, but also extend into retirement. The MBTA offers a defined benefit pension plan to its employees, with annual pension payments determined by a formula hashed out with the union in collective bargaining agreements. The formula takes the average of an operator's three highest earning years and multiplies it by years of service and 2.46% to arrive at the annual pension payment. Since wages are inflation adjusted each year and annual pension payments are not deflated when they are paid out, operators have an incentive to earn the most they can when most senior.

Earnings that are pension-eligible include those from regularly scheduled work hours, from built-in overtime and Trippers. Despite the additional pension incentive to work more hours at the highest levels of seniority, we still see female operators working fewer pension-eligible hours than male operators. As a result, the gender earnings gap extends to pension-eligible earnings as well. It is worth noting, however, that the gap in pension-eligible earnings is smaller than it would be if earnings from short-notice overtime were also pension-eligible.

We estimate the size of the pension earnings gap using the pension payment formula and average earnings right before retirement. For the average male operator who retired during the course of our sample, the annual pension payment comes out to $46,677, while for retired female operators it is $41,419.[17] Thus, male operators' annual pension payments exceed those of female operators by $5,258 or 11% per year. Given that the earnings gap at the MBTA is an average of 11% for 2011-2017, this number is mostly a reflection of the earnings gap in the workplace.[18] However, women live longer than men and they tend to have lower social security payments and higher medical expenses than men (Waid, 2013). Therefore, we would expect female operators to work towards a pension gap that is narrower than the earnings gap they experience at work.

To understand operators' approach to pensions and overtime, we surveyed 164 operators about the MBTA's pension system. Fully 86.4% of the operators told us that earning more had either no effect or a tiny effect on their future pension payments. Specifically, we asked "If you earn an additional $1,000 close to retirement, how much will that increase one year of your pension payment?" Most operators (89.4% of female operators and 85.5% of male operators)

[17] We calculate $2.46\% \cdot 70,800 \cdot 26.8 = \$46,677$ and $2.46\% \cdot 66,288 \cdot 25.4 = \$41,419$, respectively. Male operators work an average of 26.8 years at the MBTA prior to retirement, while female operators work 25.4. These differences further widen the pension gap.

[18] The collective bargaining agreement also states that an operator will receive 20% of the value of his or her remaining sick leave hours as a lump sum payment upon retirement. Of those operators who retired between 2011 and 2017, the male operators had an average sick leave balance of 118 hours while the female operators had 43 hours on average. If we take the average wage at retirement to be $32/hour, male operators received an average lump sum payment of $755 upon retirement, compared to $275 for female operators.

chose the lowest option, <$10. In actuality, it would convert to at least $24.60.

Similarly, when evaluating how important various considerations were when deciding to work overtime, pension was not a top priority. While being able to buy more things got an average score of 7.7 out of 10 from female operators and 7.3 from male operators, pension considerations received an average score of 4.5 and 4.4, respectively. Both male and female operators are focused on using overtime as a way of meeting present day needs, with other considerations secondary in importance for both genders.[19] Additionally, we find that male and female operators have similar discount rates, using the staircase time task employed in Falk et al. (2016).

Male and female operators appear to be similarly uninformed about the pension formula, to put similarly little weight on the pension when considering overtime, and to have similar levels of patience. Why then do female operators work fewer overtime hours right before retirement than men? If female operators live longer and expect to receive more installments of the pension than male operators, it is possible that, in net present value (NPV) terms, the 11% gap in annual pension payments is actually considerably smaller. Data on the life expectancies of male and female operators would be necessary to make more precise NPV calculations and to gain a better understanding of the root of the pension gap.

4 Roots of the Earnings Gap

The evidence we have seen so far on the earnings gap in our setting leads us to a number of testable hypotheses:

1. **Values of Time:** Female operators value time away from work more than male operators.
2. **Schedule Predictability:** Female operators take more overtime when it is scheduled in advance than when it is offered on short notice.
3. **Schedule Conventionality:** Female operators value conventional schedules more than male operators.
4. **Response to Undesirable Schedules:** When faced with having to work an unfavorable schedule, female operators are more likely than male operators to take unpaid leave.

We address each of these hypotheses in the sections that follow.

4.1 Different Values of Time

One possible explanation for why female operators use less overtime and take more unpaid time off is that female operators may value time away from work more than male operators do. We can assess this hypothesis by looking at how operators behave when offered to work an

[19] Given the relatively small size of our survey sample and high standard deviation of responses, differences between male and female responses are not statistically significantly different from each other.

overtime shift. The seniority structure of overtime offer rules create exogenous variation in the availability of overtime. For all but the most senior operator, the availability of overtime depends on whether more senior operators accepted a given overtime opportunity. Assuming that no individual operator can meaningfully affect the decisions of more senior operators, we can treat the arrival of an overtime opportunity as a Poisson process. We capture gender differences in overtime acceptance rates through the following regression:

$$y_{it} = \alpha + \beta F_i + \gamma \mathbf{X}_{it} + \epsilon_{it} \tag{2}$$

where y_{it} equals 1 if person i accepts an overtime opportunity conditional on being offered it on day t. F_i is a female indicator, and $\mathbf{X}_{it}$ is a vector of controls including age, tenure, seniority decile, and garage fixed effects.

As Panel A in Table 4 demonstrates, when we look at all offers to work overtime, female operators are consistently less likely to accept them than are male operators. The differences in acceptance rates are most pronounced on weekends and are the smallest on days when operators are already scheduled to work.

These results suggest that either (a) male operators value overtime work more than female operators, and/or (b) female operators value not having to work additional hours on top of their scheduled hours more than male operators.[20]

We explore how family arrangements relate to the differences in propensity to accept overtime. Figure 3 shows that the difference in acceptance rates between male and female operators is higher if the operators have dependents (6.8 percentage points) than if they do not (5.7 percentage points). Male acceptance rates, meanwhile, are similar for the two groups (38.2% for male operators with dependents, 41.1% for male operators without dependents). Though dependents generate this wedge in acceptance rates among married and unmarried operators, the wedge is largest among married operators. Married men with dependents accept overtime opportunities 27.1% of the time, while married women with dependents accept them 19.6% of the time. For unmarried men with dependents the acceptance rate is 40.3%, compared to 33.6% for unmarried women with dependents.

These results are consistent with male operators doing more child care through their pocketbooks, and with female operators doing more child care through time spent outside of work. Differences in care-taking approaches and responsibilities thus appear to be a significant reason why female operators work less overtime than male operators.

It is, of course, possible that this situation is not as much an innate preference as it is a constrained choice. The fact that differences in overtime acceptance rates are still quite pronounced for operators without dependents and for those who are unmarried also suggests that

[20] Panel A in Table 4 also, reassuringly, shows that whether or not we control for age, tenure, seniority, and garage does not affect the results in a significant way.

there is more to this story than our data are able to capture. Intra-household dynamics — gender norms and some mixture of biases with preferences — are likely keeping married female operators without dependents from accepting opportunities to work more hours at a premium rate. Perhaps the fact that relationships are more stable when the man earns more than the woman is playing a role here too (Bertrand et al., 2015).The social norm that the man in a partnership should be earning more than the woman has persisted into the 2010s (Murray-Close and Heggeness, 2018), and could help explain why we still see a gender earnings gap even for those who are unmarried and without dependents.

4.2 Schedule Predictability

Another potential explanation for the gap in overtime hours between male and female operators lies in schedule predictability. If female operators work fewer overtime hours than male operators because they have a higher cost of working unanticipated hours, we should see a larger gap in overtime acceptance rates for short-notice overtime than for preplanned overtime. As described in Sections 1.3-1.4, operators can sign up for overtime three months in advance at The Pick, and also for short-notice overtime just days or hours before it needs to be worked. Both types of overtime vary in their availability with seniority.

Using the same logic as in Section 4.1, we run regressions to see how male and female operators differ when it comes to working short-notice and preplanned overtime. Panel B in Table 4 compares male and female acceptance rates for preplanned overtime and Panel C does the same for short-notice overtime. Male operators accept preplanned overtime opportunities about 34.6% of the time, while female operators accept them about 30% of the time — a 13% difference. The acceptance gap is even narrower when we zoom in on days when operators are already scheduled to work. Preplanned overtime opportunities are much more plentiful than short-notice overtime opportunities, making the results in Panel B look similar to those we see for overtime opportunities overall. Results for short-notice overtime acceptance rates, however, present a different picture. Male operators accept short-notice overtime about 9.5% of the time, while women accept them about 5.2% of the time — a 45% difference.

Focusing on differences in hours worked rather than acceptance rates of overtime shifts, Table 5 further illustrates the major differences between preplanned and short-notice overtime. Controlling for age, tenure, seniority decile, and garage fixed effects, we see that female operators work 7.2-10.7% fewer preplanned overtime hours per month and 39.4-47.5% fewer short-notice overtime hours per month than male operators. The starkest difference between preplanned and short-notice overtime hours worked emerges when we look at operators who are unmarried and have dependents. Female operators who are unmarried with dependents take about 6% fewer preplanned overtime hours than unmarried male operators with dependents, but about 60% fewer short-notice overtime hours (Table 5, Columns 5 and 6). Schedule predictability and time away from work thus appear to be more valuable to female operators,

especially unmarried female operators with dependents.

4.3 Schedule Conventionality

If female operators are more committed to working conventional schedules than are male operators, a gap in overtime and unpaid hours could emerge as female operators opt to take unpaid leave and not to take on overtime during unconventional periods. By comparing operators' schedule selections during The Pick, we glean that while neither female nor male operators like to work unconventional schedules, female operators avoid these shifts more than men.

Both male and female operators avoid unconventional shifts such as weekend shifts, shifts on holidays, and split shifts.[21] We deduce preference for conventional shifts from the fact that those who can avoid unconventional shifts do so: the most senior operators, who pick their schedules first, have much lower incidence of these types of shifts relative to operators who choose their schedules later. While 95% of the least senior operators get stuck with a weekend shift on their schedules, only 28% (female operators) to 35% (male operators) of the most senior operators do (Panel A in Figure 4). The same pattern holds true for holiday shifts and split shifts.[22]

Female operators avoid scheduling weekend, holiday, and split shifts more successfully than male operators throughout the seniority spectrum. Indeed, female operators are on average about 2.5 percentage points less likely to select a weekend shift than are male operators. The gap is 3 percentage points and 4 percentage points for holiday and split shifts, respectively.

4.4 Responding to Undesirable Schedules

Differences in how male and female operators value schedule conventionality translate into behaviors that exacerbate the earnings gap. While all operators take more leave in weeks when they have an undesirable shift, male operators compensate with enough overtime to make more in those weeks than in weeks without undesirable shifts. In contrast, female operators make up some of their lost earnings with overtime, but not all of them.

We consider within-person behavior changes as the desirability of their schedule changes. We regress the number of hours of FMLA leave an operator takes in a week on a dummy variable for whether the operator has, say, a weekend shift scheduled in that week. Panel A of Figure 5 reports the coefficient on the weekend shift dummy variable in regressions that we run for male and female operators separately, including controls for age, tenure and seniority.

Both male and female operators take more unpaid FMLA leave during weeks where they have to work weekend shifts compared to weeks without weekend shifts. The increase for fe-

[21] Split shifts are those in which an operator does not work 8 hours straight, but instead works a few hours (usually during morning rush hour), has an unpaid break of several hours, and then works the remaining hours (usually during the evening rush hour).

[22] The data that allow us to identify split shifts are only available for July through December of 2017.

male operators, however, is substantially larger than it is for male operators. Female operators see an increase of 0.85 hours per week, which represents a 34% increase off of an average of 2.5 hours of FMLA taken in non-weekend shift weeks. Meanwhile male operators take an additional 0.4 hours of leave per week, representing a 28.6% increase off of an average of 1.4 hours of FMLA taken in non-weekend shift weeks. Male operators perfectly offset their FMLA hours with additional overtime hours. Female operators, on the other hand, fall short of making up lost earnings with overtime hours in weekend shift weeks.[23] By affecting male and female behavior differently, weekend shifts exacerbate the gender earnings gap.

A similar trend occurs with both holiday and split shifts (Figure 5, Panels B and C). In weeks where an operator is scheduled to work on a holiday, male operators take an average of one more hour of FMLA in those weeks than in weeks without a holiday shift. They also work an average of two more hours of overtime in holiday shift weeks. Female operators take 1.8 more hours of FMLA in weeks with a holiday shift and work 1.2 more hours of overtime. On split shift days, male operators take on average 0.07 more hours of FMLA leave and work 0.07 more hours of overtime. Female operators, on the other hand, increase FMLA leave by 0.15 hours — fully 3 times their increase in overtime hours on split shift days.

Female operators' avoidance of unconventional schedules during The Pick and, when avoiding them during The Pick is not possible, during a particular week, demonstrates that female operators prize schedule conventionality more than male operators. We cannot fully determine whether preferences or personal life constraints are driving the choices we observe. However, our evidence shows that increasing the predictability of overtime opportunities and boosting work schedule controllability and conventionality can help female operators work more hours and thereby reduce the earnings gap.

In the following section, we discuss the effects of two policy changes at the MBTA on the earnings gap and suggest other approaches that are grounded in our findings.

5 Altering Institutional Features

The gender earnings gap observed in our setting emerges because men and women respond differently to the same institutional environment. Consequently, we consider how changing aspects of this environment can affect the gap. Specifically, we focus on two major policy changes undertaken by the MBTA in 2016-2017, both with the objective of saving money and reducing absenteeism. One policy made it harder to take FMLA leave, while the other changed which hours qualified as overtime.

[23] Saturday, Friday, and Sunday, in that order, are the likeliest of all days of the week to see an operator take unpaid time off. We are not aware of reasons why family medical emergencies would be more likely to happen on those days of the week than on other days, suggesting that operators are using FMLA to avoid undesirable schedules.

5.1 FMLA

In March of 2016, the MBTA hired UPMC Work Partners to be a third-party administrator in charge of making sure that FMLA certification was obtained and used properly. UPMC was tasked with ensuring that (1) doctor's notes certifying FMLA eligibility were legitimate and (2) on a day-to-day basis, operators took FMLA leave in the way prescribed by their doctor. In particular, the latter role requires UPMC to ensure that operators who were only certified to take continuous FMLA leave (for weeks or months at a time), did not instead take it intermittently (for spells of several hours or days interspersed with work).

The policy also required operators to bring in new doctor's notes and to recertify their eligibility for FMLA. This policy change took the active FMLA certification rate at the MBTA down from 45% of operators in 2015 to 27% of operators at the end of 2016. FMLA-usage among female operators went down from an average of about 35 hours per quarter to 25 hours per quarter—a decrease of 28% (Figure 6). Male operators saw a drop from 20 hours per quarter to about 15 hours per quarter — a decrease of 25%. Additionally, the pre-trends here are fairly flat for both male and female operators, suggesting the drops are associated with the policy change.

Another consequence of the policy was an increase, especially among female operators, in unexcused leave. Figure 7 illustrates vividly how the FMLA policy has led to a spike in unexcused leave, with female operators going from taking an average of 2 hours per quarter to an average of 16 hours in 2017Q3 (Panel A). Male operators increase unexcused leave from 2 hours per quarter to about 6. The flat pre-trends here as well, at 2 hours per quarter for both men and women, suggest we are capturing the effect of the policy on operator behavior. Moreover, in line with our earlier finding that the presence of dependents exacerbates the earnings gap but does not explain all of it, the increase in unexcused leave is slightly steeper for those with dependents than for those without dependents (Panels B and C in Figure 7).

Those who took more FMLA in 2015, before the policy change, were the ones who saw the biggest increase in unexcused leave in 2017, after the policy change (Panel B in Figure 8). In contrast, the relationship between earlier years' FMLA usage and subsequent years' unexcused leave is not present for other years (e.g., Panel A in Figure 8).

While there was some substitution from FMLA leave to unexcused leave — 1 FMLA hour transformed into 0.1 unexcused hours — in total there was still a reduction in the amount of leave taken by both male and female operators. This incomplete conversion reflects the fact that unexcused leave is considerably costlier to take than FMLA.[24] Whereas FMLA leave is protected under federal law and is no-questions-asked, unexcused leave can result in warnings, suspensions, limits on ability to work overtime, and ultimately recommendations for discharge. The fact that operators, particularly female operators, are nevertheless willing to take

[24]Operators also revealed this before the policy change by using mostly FMLA, and not unexcused leave, to avoid undesirable schedules.

unexcused leave reaffirms how much they value schedule controllability.

While the policy reduced absenteeism, its impact on overtime and service provision was more tepid. By being more predictable and more easily substituted by operators on the cover list at regular wages, FMLA leave translates into fewer lost trips than does unexcused leave. As Figure 9 shows, 0.18 trips are lost per FMLA hour on average, versus 0.27 trips per unexcused hour. By pushing operators to substitute toward leave that is harder for supervisors to manage and accommodate, the policy achieved only a muted improvement in service provision.

Thus, two takeaways emerge from this policy change: (1) While unexcused leave is costlier than FMLA leave, operators use it nonetheless, revealing that they need a mechanism that provides some control over their schedules. By forcing them to use a costlier option for such control, the policy change made operators, especially female operators, worse off. (2) While absences and overtime went down, service provision failed to improve. Unexcused leave, unlike excused leave, entails no advance warning from the employee, making it harder for supervisors to manage.

5.2 Overtime

The second policy change was announced at the end of 2016 with the new collective bargaining agreement, but did not go into effect until July 9th, 2017.[25] Overtime went from being defined as any time in excess of 8 hours worked in a day to any time worked in excess of 40 hours in a week. The result, as we can see in Figure 10, was a drop in the average number of overtime hours worked by male operators from about 40 hours per quarter to about 10 hours per quarter. Female overtime hours dropped, from about 20 hours to about 10 hours per quarter.[26] The pre-trends are fairly flat from 2011, through the FMLA policy change in 2016, and up to the third quarter of 2017 when the overtime policy actually took effect.[27]

On their own, the FMLA policy curtailed operators' ability to take leave, while the overtime policy limited operators' opportunities for additional earnings. In conjunction, the policies made it harder for operators to engage in the kind of gaming we discuss in Section 4.4, in which operators take regular pay hours off and make them up with overtime hours at premium pay. Indeed, the percent of male operators who took FMLA leave and overtime in the same week dropped after the policy changes by 41% (from 22% to 13%). Similarly, the percent of female operators who took both FMLA leave and overtime in the same week dropped by 37% (from 16% to 10%). While reducing gaming by both sexes, the policies also reduced operator ability to shift their work hours around, effectively eliminating the hack operators used to have more

[25] The policy was supposed to go into effect on January 1st, 2017, but a software issue delayed the rollout until July 9, 2017.

[26] Here, overtime refers to both preplanned and short-notice overtime.

[27] The fact that the announcement of the policy at the end of 2016 does not have an immediate impact on overtime hours is evidence that either (a) operators have no control over when they are offered overtime or (b) operators do not find loading up on overtime in advance to be worthwhile. Our results and our conversations with MBTA personnel suggest that the former is the most likely explanation.

control over their schedules.

Since male operators had been engaging in these tradeoffs more than female operators, the reduction in gaming capacity was mostly felt by the former. This is illustrated in the narrowing of the differences in leave-taking and overtime patterns between weeks with weekend shifts and weeks without. The lighter bars in Figure 11 measure the intensity of these differences in 2011-2015, prior to the policy changes. The observations in full color show the differences in 2016-2017. Differences in 2016-2017 between weeks with and without weekend shifts are considerably smaller than the differences we see in 2011-2015. To the small extent that operators are continuing to cover their FMLA hours with overtime hours, there is now essentially no difference in the way that male and female operators do so. As a result of the policy changes, weekend shifts no longer contribute to the gender earnings gap.

5.3 Other Ways To Reduce the Gap

The policies discussed above were aimed at reducing absenteeism at the MBTA, but they also narrowed the earnings gap, from $0.89 in 2015 to $0.94 in 2017. The policies illustrate, however, that not all ways of shrinking the gender earnings gap are created equal and some affect different workers differently. The increased oversight over FMLA usage has decreased female operator welfare by reducing their schedule controllability. The decrease in overtime hours decreased male operator welfare by decreasing the value of the extra work hours they previously wanted to work. The impact on the public is likewise mixed. While operators are now taking less leave and the MBTA is spending less on overtime, saving taxpayers dollars, service provision did not see the desired effect of reduced absenteeism. More unexcused leave is harder to plan around and less overtime availability exacerbates the difficulty in filling shifts.

We posit that increasing schedule controllability and predictability can further reduce the earnings gap, increase operator welfare (especially for female operators), decrease absenteeism, and improve public service provision. One such approach would be to allow operators to exchange shifts they cannot make for shifts that others cannot make, or to transfer an inconvenient shift in advance to someone who is willing to work it for the extra income. Shift-swapping capabilities could complement the current system that relies on seniority for shift assignment. A 2016 study that introduced shift sharing and increased schedule stability at certain retail GAP Inc. locations suggests that this approach has merit (Williams et al., 2016). The result was happier employees, higher employee retention, and a consequent 7% increase in sales.

A similar approach would be beneficial for the MBTA as well. It would allow employees to inject flexibility into their schedules without resorting to unexcused leave, which would lower the need for disciplinary actions, improve employee morale, and reduce lost trips in the process. In turn, those who would like to work for additional income, at any seniority level, would be able to do so more easily.

A complementary strategy for reducing the earnings gap would be to expand the number

of operators whose job is to fill in when others are absent. Today, the number of such operators at the MBTA is fairly small, forcing supervisors to offer overtime to fill the absences. Having a dynamic cover list of operators, one that expands on weekends and holidays, for example, would improve service provision and deliver services at the regular wage rate. Fewer overtime opportunities would also make it harder for operators to trade off unpaid time off for overtime, reducing the kind of gaming that has contributed to the earnings gap at the MBTA.

6 Conclusion

We show that a gender earnings gap can exist even in a environment where work tasks are similar, wages are identical, and tenure dictates promotions. Gender neutral policies can have differential effects on the two sexes, causing an earnings gap to emerge. The earnings gap of 11% in our setting arises mechanically from female operators taking fewer overtime hours and more unpaid time off than do male operators.

At the root of these different choices is the fact that female operators value time, as well as schedule controllability, conventionality, and predictability, more than male operators. Male and female operators choose to work similar hours of overtime when they are scheduled months in advance, but male operators work nearly twice as many overtime hours than female operators when they are scheduled on short notice. Moreover, male operators game the overtime system more than female operators: when faced with an undesirable schedule, male operators take unpaid time off, but also work more overtime during the rest of the week, resulting in an increase over base income. These results are consistent with female operators having less flexibility in their personal lives than male operators.

In an effort to reduce absenteeism and overtime expenditures, the MBTA implemented two policy changes: one that made it harder to take unpaid time off with FMLA and another that made it harder to be paid at the overtime rate. While the policy changes reduced the gender earnings gap from 11% to 6%, they also decreased both male and female operators' well-being. Constraining work schedule controllability disproportionately reduced female operators' well-being; reducing the overtime hours they could work disproportionately reduced male operators' well-being. Because men and women face different personal life preferences and constraints, workplace policies, even if gender-neutral by construction, can affect male and female workers differently.

We suggest that workplaces — especially those that involve shift work or have seniority apportion amenities — can increase the welfare of their employees and reduce gender earnings gaps by increasing schedule predictability and controllability. Shift sharing and dynamic cover lists are some of the ways of achieving these improvements. Workplaces that provide defined benefit pension plans will also see the gender pension gap narrow. The changes should allow female workers to work more hours, reducing absenteeism and overtime pay, and improving the reliability of service provision.

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TABLES

Table 1: Operator Characteristics

	All Operators	Male	Female	With Schedule Data	With W4 Data
Age	47.01	47.62	45.65	46.14	45.60
	(10.6)	(10.6)	(10.3)	(9.8)	(10.0)
Female	30.72	0.00	100.00	29.48	30.46
	(46.1)	(0)	(0)	(45.6)	(46.0)
Tenure	12.42	12.52	12.20	11.09	11.10
	(7.6)	(7.8)	(7.1)	(6.5)	(6.6)
Hourly Wage	32.68	32.66	32.72	34.23	33.88
	(5.4)	(5.4)	(5.5)	(2.8)	(3.4)
Bus	65.53	68.26	59.35	68.78	65.36
	(47.5)	(46.6)	(49.1)	(46.4)	(47.6)
Light rail	20.69	19.56	23.24	20.10	19.93
	(40.5)	(39.7)	(42.3)	(40.1)	(40.0)
Heavy rail	13.78	12.18	17.41	11.12	14.71
	(34.5)	(32.7)	(37.9)	(31.4)	(35.4)
Ever FMLA	75.62	70.85	86.38	78.89	80.46
	(42.9)	(45.5)	(34.3)	(40.8)	(39.7)
Overtime hrs/day	0.36	0.41	0.24	0.36	0.36
	(0.4)	(0.5)	(0.3)	(0.4)	(0.4)
FMLA hrs/day	0.28	0.23	0.37	0.25	0.26
	(0.5)	(0.5)	(0.6)	(0.5)	(0.5)
Married					26.19
					(44.0)
Dependents					19.59
					(39.7)
Observations	3,011	2,086	925	1,781	2,318

Table 1: This table presents summary statistics for the whole sample of bus and train operators (Column 1), male operators only (Column 2), female operators only (Column 3), only the operators for whom we have detailed schedule data (Column 4), and only the operators for whom we have W-4 data on marital status and dependents (Column 5). While we do not have schedule or W4 data for our entire sample, the subsamples for which we do have data are not considerably different than the main population. Age and tenure are denominated in years; Female, Bus, Light Rail, and Heavy Rail along with Married and Dependents show the percent of operators with that trait; Hourly Wage shows dollars; Ever FMLA is the percent of operators who have ever been approved for FMLA; Overtime hrs/day shows scheduled plus unscheduled overtime taken on average per day; FMLA hrs/day shows average number of FMLA hours taken per day. Standard deviations are in parentheses.

Table 2: Operator Characteristics by Seniority

	All Operators	Top Decile	Middle Decile	Bottom Decile
Age	47.01	55.43	44.30	40.43
	(10.6)	(6.2)	(10.2)	(9.5)
Female	30.72	28.39	31.95	25.65
	(46.1)	(45.1)	(46.7)	(43.8)
Tenure	12.42	25.61	9.07	3.35
	(7.6)	(4.3)	(1.9)	(0.9)
Hourly Wage	32.68	32.34	34.31	28.81
	(5.4)	(4.9)	(4.6)	(3.2)
Bus	65.53	71.40	61.98	65.22
	(47.5)	(45.2)	(48.6)	(47.7)
Light rail	20.69	18.79	23.00	19.13
	(40.5)	(39.1)	(42.2)	(39.4)
Heavy rail	13.78	9.81	15.02	15.65
	(34.5)	(29.8)	(35.8)	(36.4)
Ever FMLA	75.62	63.26	82.43	60.00
	(42.9)	(48.3)	(38.1)	(49.1)
Overtime hrs/day	0.36	0.60	0.32	0.29
	(0.4)	(0.6)	(0.4)	(0.4)
FMLA hrs/day	0.28	0.25	0.27	0.19
	(0.5)	(0.5)	(0.4)	(0.6)
Observations	3,011	479	313	230

Table 2: This table shows summary statistics for the whole sample of bus and train operators (Column 1), for just those operators who are in the top seniority decile (Column 2), for just those operators who are in the 50th seniority decile (Column 3), and for just those operators who are in the bottom seniority decile (Column 4). Notably, the proportion female is fairly consistent across seniority deciles. Age and tenure are denominated in years; Female, Bus, Light Rail, and Heavy Rail along with Married and Dependents show the percent of operators with that trait; Hourly Wage shows dollars; Ever FMLA is the percent of operators who have ever been approved for FMLA; Overtime hrs/day shows scheduled plus unscheduled overtime taken on average per day; FMLA hrs/day shows average number of FMLA hours taken per day. Standard deviations are in parentheses.

Table 3: Gender Differences in Weekly Earnings

	(1)	(2)	(3)	(4)
Female	-160.1***	-158.7***	-145.6***	-138.2***
	(1.20)	(1.19)	(1.41)	(1.58)
Seniority Decile		2.710***	3.063***	3.021***
		(0.019)	(0.020)	(0.020)
Dependents=1			2.760	26.83***
			(1.85)	(2.44)
Married=1				52.48***
				(1.60)
Female × Dependents			-33.22***	-53.58***
			(2.89)	(3.39)
Female × Married				-6.96*
				(3.52)
Dependents × Married				-71.69***
				(3.76)
Female × Dependents × Married				85.65***
				(8.67)
Constant	1447.3***	1296.3***	1316.0***	1302.7***
	(.67)	(1.25)	(1.30)	(1.37)
Male Mean	1447.3	1447.3	1447.3	1447.3
Adjusted R^2	0.025	0.053	0.064	0.066
Observations	682,583	682,583	571,344	571,344

Table 3: We regress operator sex on total weekly earnings. Sans controls, women earn $0.89 on the male-worker dollar (Column 1). Controlling for seniority, female operators still earn $0.89 on the male-worker dollar (Column 2). Female operators without dependents earn $0.90 to the $1 earned by a male operator without dependents (Column 3). Unmarried female operators with dependents earn $0.87 compared to the $1 earned by an unmarried male operator with dependents – the biggest gap in our setting (Column 4). Standard errors are in parentheses. * = p<0.05, ** = p<0.01, *** = p<0.001.

Table 4: Probability of Accepting Overtime Opportunity, Conditional on Being Offered

	Any OT	Any OT	Weekend OT	Working OT
Female	-7.66***	-6.46***	-5.09***	-3.60***
	(0.05)	(0.05)	(0.08)	(0.07)
Constant	39.11***	40.14***	35.09***	62.47***
	(0.03)	(0.13)	(0.22)	(0.17)
Controls	No	Yes	Yes	Yes
Male Mean		39.11	25.06	58.81
Adjusted R^2	0.005	0.027	0.068	0.071
Observations	4,486,458	4,483,428	1,229,163	2,713,663

(a) Panel A: All Overtime

	Any OT	Any OT	Weekend OT	Working OT
Female	-5.41***	-4.41***	-2.58***	-1.96***
	(0.05)	(0.05)	(0.07)	(0.07)
Constant	34.58***	38.56***	35.99***	60.44***
	(0.03)	(0.13)	(0.20)	(0.18)
Controls	No	Yes	Yes	Yes
Male Mean		34.58	18.83	55.09
Adjusted R^2	0.003	0.028	0.102	0.066
Observations	4,421,339	4,418,865	1,201,454	2,687,499

(b) Panel B: Preplanned Overtime

	Any OT	Any OT	Weekend OT	Working OT
Female	-4.62***	-4.31***	-4.34***	-4.51***
	(0.03)	(0.03)	(0.06)	(0.04)
Constant	9.50***	8.53***	5.38***	11.05***
	(0.02)	(0.09)	(0.18)	(0.12)
Controls	No	Yes	Yes	Yes
Male Mean		9.50	10.48	10.77
Adjusted R^2	0.006	0.011	0.015	0.013
Observations	3,747,826	3,747,089	995,462	2,246,614

(c) Panel C: Short-Notice Overtime

Table 4: Female operators are less likely to accept overtime opportunities, regardless of whether the overtime shifts are offered on a weekend (Column 3) or a day they are already working (Column 4), and regardless of whether the overtime is preplanned (Panel B) or short-notice (Panel C). Any OT reflects accepting overtime on any day, while Weekend OT and Working OT reflect accepting overtime on a weekend or a day the operator was already working. Controls include age, tenure, seniority decile, and garage fixed effects. Overtime in Panel A includes preplanned and short-notice overtime. Preplanned overtime shifts are selected 3 months in advance, while short-notice overtime shifts are offered a day or so in advance. Since short-notice overtime can arise from being caught in traffic, for example, we define short-notice overtime to be overtime in excess of 2 hours that was no preplanned. Standard errors are in parentheses. * = p<0.05, ** = p<0.01, *** = p<0.001.

Table 5: Preplanned vs. Short-Notice Overtime

	(1) Preplanned	(2) Short-notice	(3) Preplanned	(4) Short-notice	(5) Preplanned	(6) Short-notice
Female (Yes=1)	-0.107***	-0.475***	-0.0691***	-0.456***	-0.0715***	-0.394***
	(0.00653)	(0.00901)	(0.00781)	(0.0113)	(0.00877)	(0.0127)
Dependents (Yes=1)			-0.0447***	-0.000344	-0.0681***	0.123***
			(0.00995)	(0.0144)	(0.0131)	(0.0189)
Female × Dependents			-0.0200	-0.0470*	0.0144	-0.204***
			(0.0159)	(0.0230)	(0.0185)	(0.0267)
Married=1					0.0316***	0.215***
					(0.00866)	(0.0125)
Female × Married					0.0329	-0.211***
					(0.0195)	(0.0280)
Dependents × Married					0.0430*	-0.347***
					(0.0204)	(0.0294)
Female × Dependents × Married					-0.119*	0.764***
					(0.0475)	(0.0687)
Constant	-0.0446**	1.176***	-0.0340	1.160***	-0.0288	1.145***
	(0.0170)	(0.0238)	(0.0178)	(0.0261)	(0.0179)	(0.0262)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.133	0.073	0.096	0.060	0.096	0.063
Observations	129,318	141,414	110,446	120,357	110,446	120,357

Table 5: Women are less likely to take both preplanned and short-notice overtime. We define preplanned overtime to be log hours of preplanned overtime worked per month, where preplanned overtime is selected a quarter (three months) in advance. Short-notice overtime captures log hours of short-notice overtime worked per month, where short-notice overtime is offered a day in advance or on the same day as the overtime shift. We restrict short-notice overtime to being 2 hours of overtime or more to ensure it is a proper shift rather than overtime that results from being caught in traffic, for example. Controls include age, tenure, seniority decile, and garage fixed effects. Standard errors in parentheses. * = p<0.05, ** = p<0.01, *** = p<0.001.

Figure 1: The Gender Earnings Gap Across Seniority

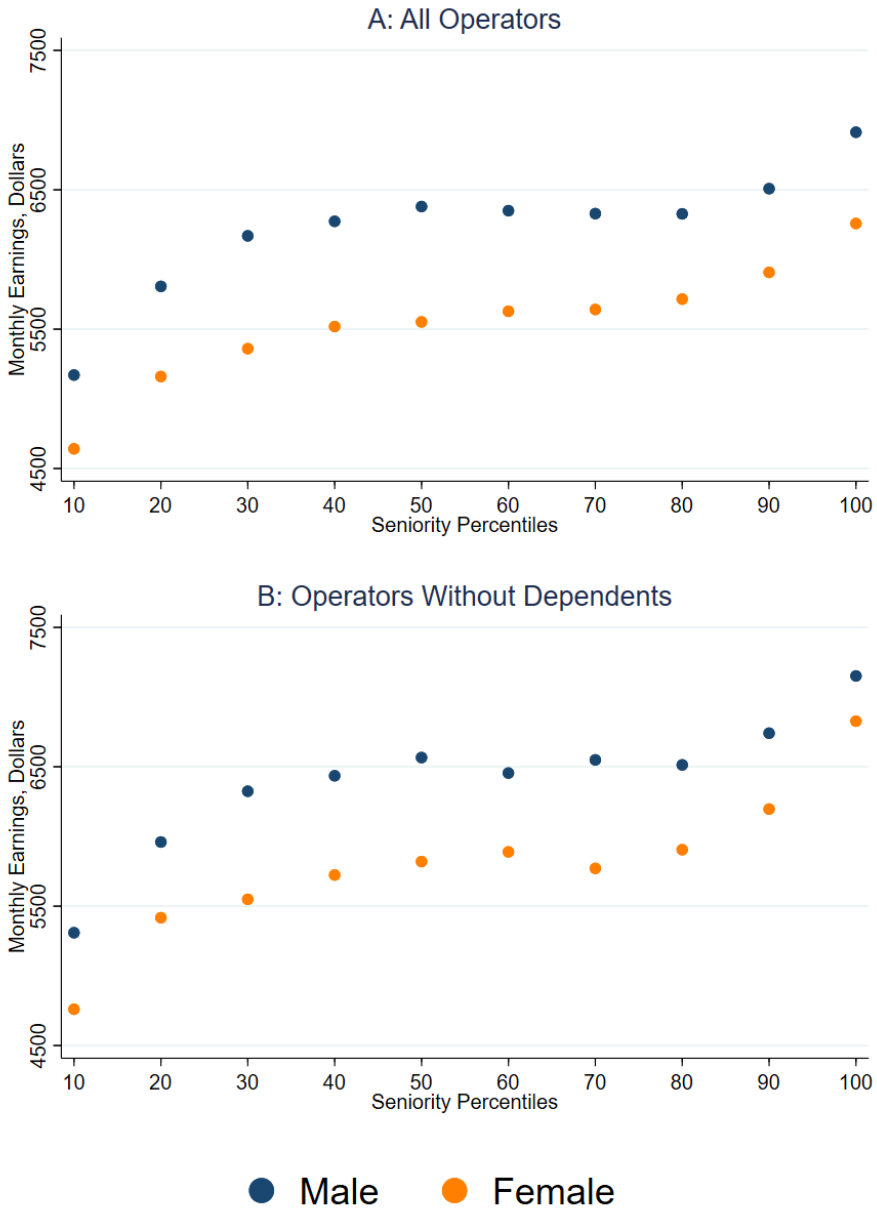

Figure 1: We plot average monthly earnings (y axis) for bus and train operators in each seniority decile (x axis). Seniority is determined for full time operators based on which operator has the longest tenure within his or her garage each quarter. Seniority determines the order in which routes, schedules, and holidays are picked, as well as who has first access to overtime opportunities. Across the seniority spectrum, women earn less than men (Panel A). At the lowest seniority level (10), women make about $4,600/month while men earn about $5,200/month. At the highest seniority level (100), women make about $6,300/month, while men earn almost $7,000/month. Panel B shows the same relationship for operators without dependents. Female operators without dependents earn less than male operators without dependents across the seniority ladder, suggesting the presence of dependents cannot fully account for the gap in earnings.

Figure 2: Accounting for the Gender Earnings Gap

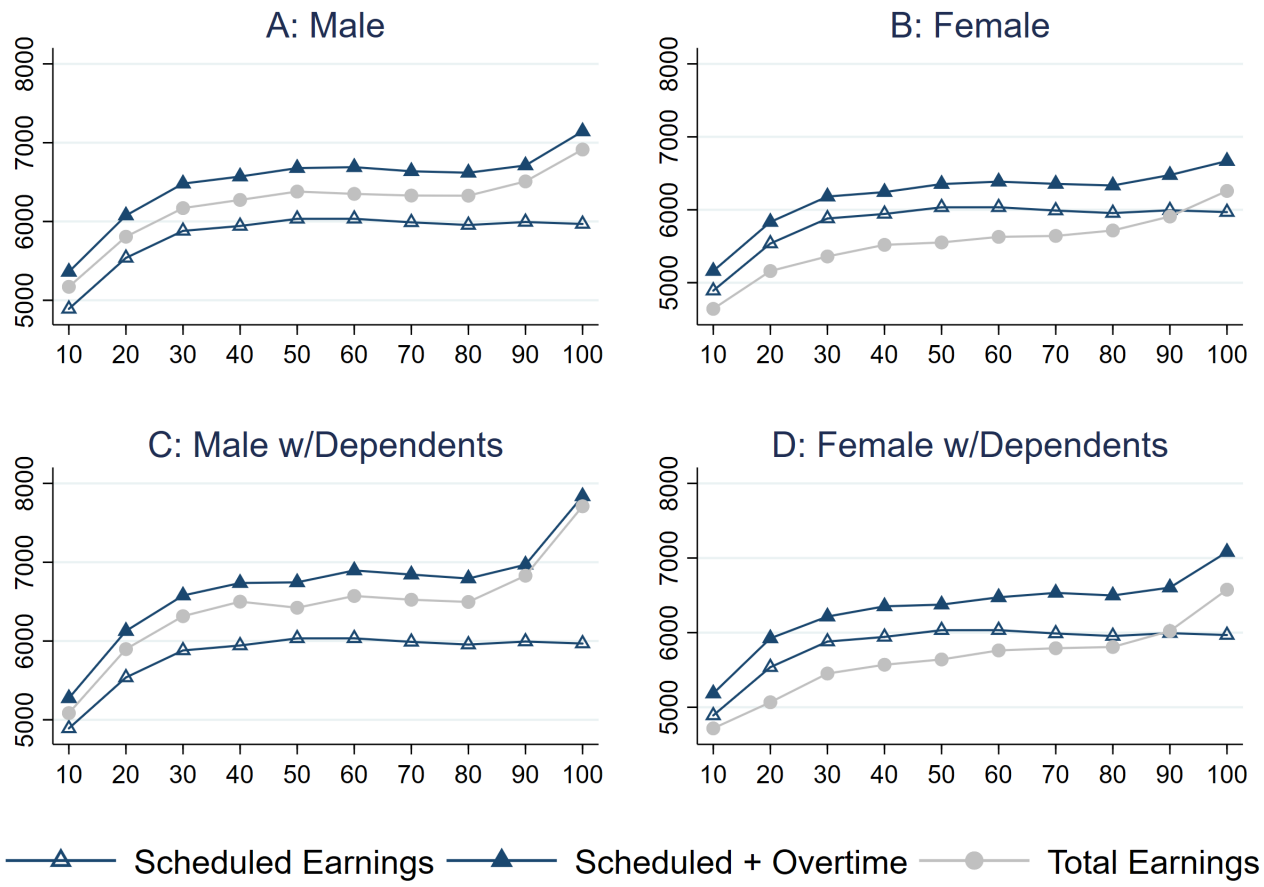

Figure 2: We perform an accounting exercise to understand the gender earnings gap. We calculate scheduled earnings based on the hours each operator is scheduled to work at his/her regular wage. We then add in the overtime hours (planned and last-minute) that the operator actually works at 1.5 times his/her regular wage. Total earnings are scheduled earnings plus overtime earnings, less the earnings forgone due to unpaid leave (FMLA and unexcused). The x axis shows seniority deciles, while the y axis shows monthly earnings in dollars. Each point is the average for operators in a given seniority decile. Panel A plots the series for male operators, Panel B for female operators, Panel C for male operators with dependents, and Panel D for female operators with dependents.

Figure 3: Difference Between Male and Female Operators in Probability of Accepting Any Overtime Opportunity

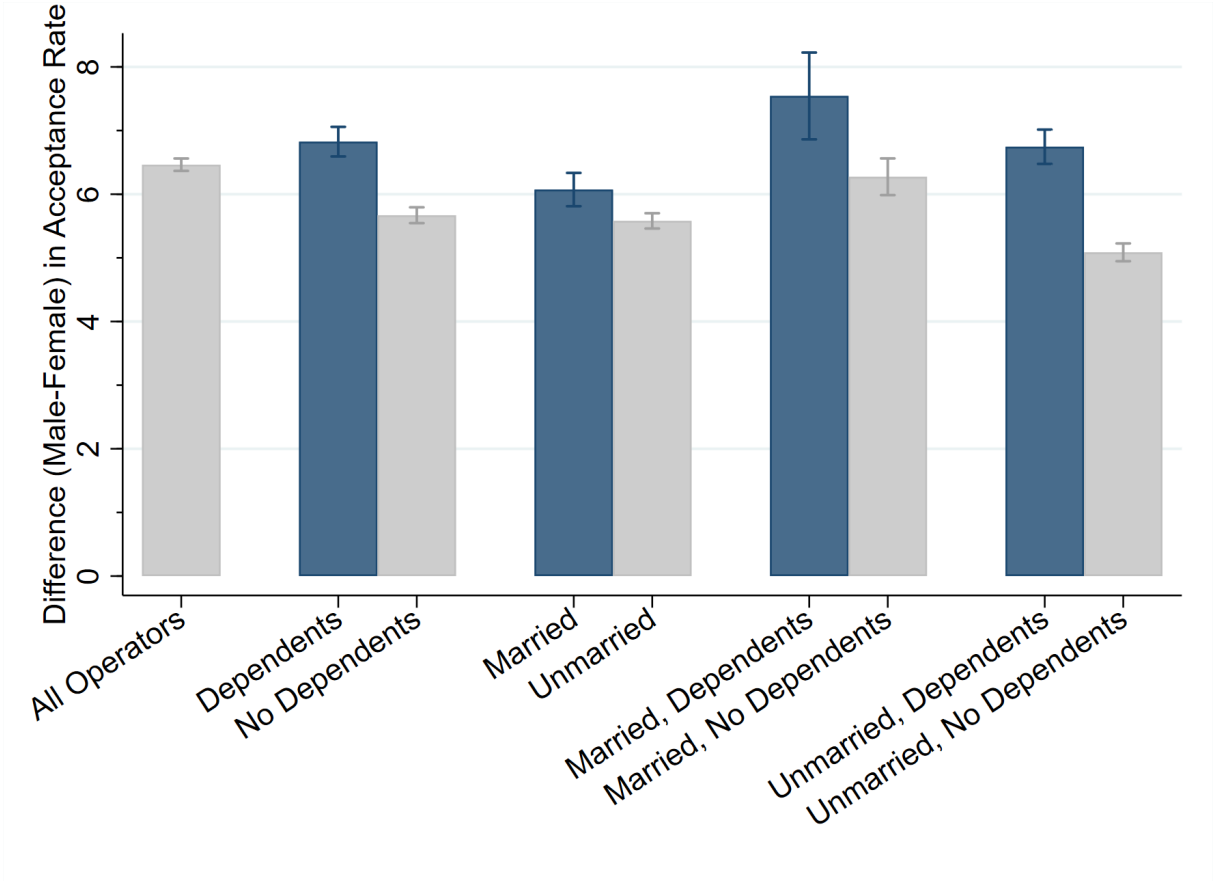

Figure 3: The arrival of overtime opportunities for any individual operator is a Poisson process, allowing us to use the seniority system by which overtime is offered to measure male and female operators' probabilities of accepting overtime. To obtain the difference between male and female operators' probabilities of accepting overtime, we regress a dummy variable for accepting overtime conditional on it being offered on a dummy variable for female and controls for age, tenure, seniority, and garage fixed effects. Each bar reflects the coefficient on the female dummy from a separate regression; 95% confidence intervals are shown. We find a 6.4 pp difference between male and female operators' acceptance rates of overtime. The difference is slightly greater for those who have dependents (6.8 pp). The smallest gap in acceptance rates occurs between male and female operators who are unmarried and without dependents (5.1 pp) and the greatest gap arises between male and female operators who are married with dependents (7.5). The male acceptance rate means for each bar are: 40.1% (All Operators), 38.2% (Dependents), 41.1% (No Dependents), 39.5% (Married), 41.1% (Unmarried), 27.1% (Married, Dependents), 42.1% (Married, No Dependents), 40.3% (Unmarried, Dependents), 41.4% (Unmarried, No Dependents).

Figure 4: Probability of Unconventional Shifts for Male and Female Operators

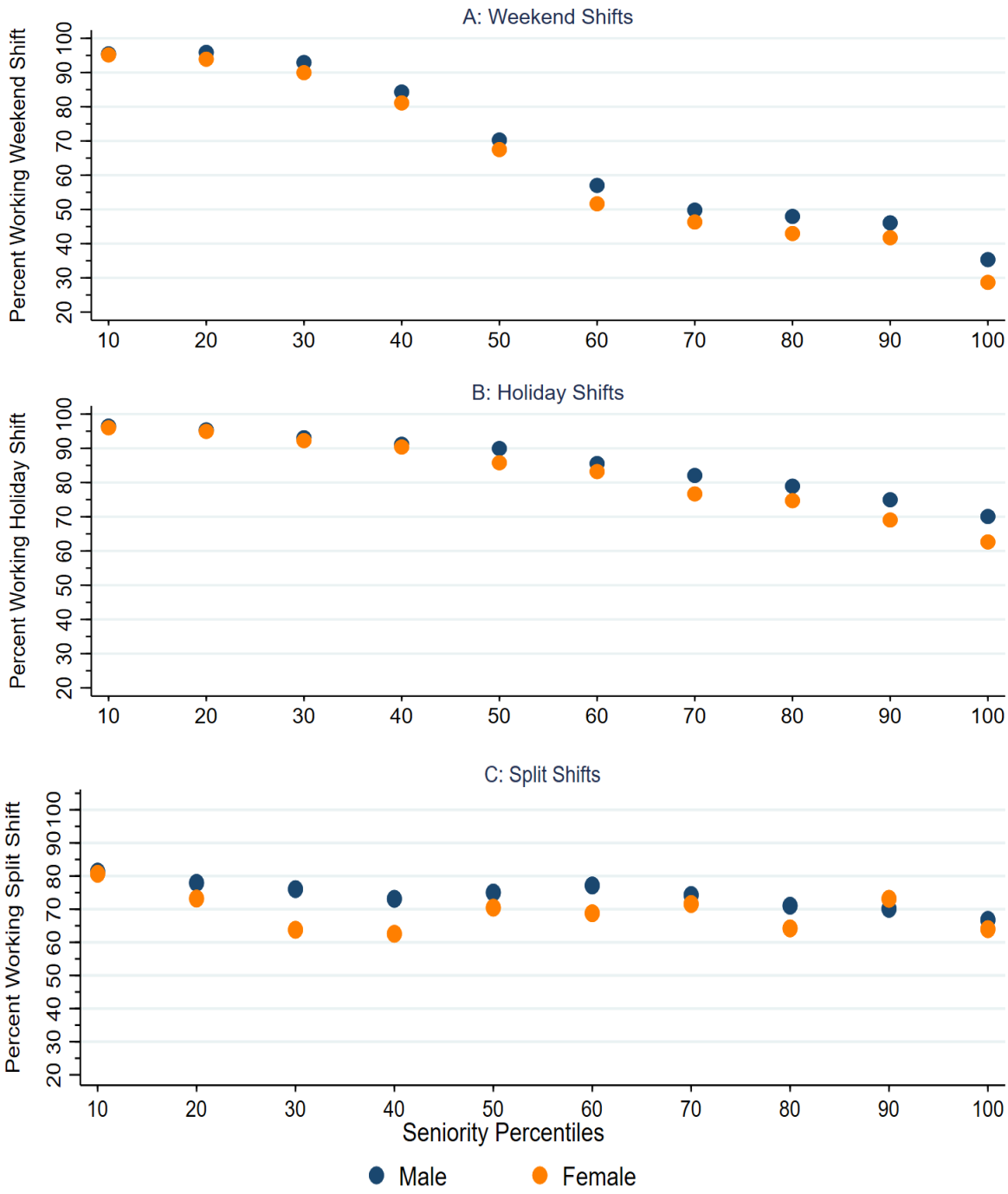

Figure 4: The binscatters display the average probability that an operator has to work an unconventional shift (y-axis) for each seniority decile (x-axis). Panel A shows this relationship for weekend shifts. Panel B shows the relationship for holiday shifts at some point over the 2011-2017 period, and Panel C shows it for split shifts in any given day. The least senior operators are most likely to schedule themselves one of these unconventional shifts, while the most senior operators, around the 100th percentile, are the least likely to have one of these shifts. These patterns suggest that weekend, holiday, and split shifts are unconventional. Conditional on seniority, which is the same as conditioning on the same choice set of schedules and routes, female operators try to avoid scheduling these shifts more than men. Data for the split shift chart are only available for July through December, 2017.

Figure 5: Difference in Behavior Between Conventional and Unconventional Shifts

Figure 5: This chart shows how FMLA and overtime hours taken by male and female operators differ on weeks when they are scheduled to work an unconventional shift from those weeks when they are not scheduled to work an unconventional shift. For Panels (a) and (b) we run person-week regressions of FMLA hours taken per week on a dummy variable for whether or not a weekend or holiday shift was scheduled in a particular week, as well as controls for age, tenure, seniority, and operator and month fixed effects. For Panel (c) we do the same, but at the day level. We run these regressions separately for male and female operators. Point estimates for the coefficient on the dummy variable and 95% confidence intervals are presented here. The chart shows that during weeks with unconventional shifts, male operators take more unpaid FMLA hours off and work similarly more overtime, in essence substituting pay at base wage for pay at the overtime rate of 1.5 X base wage. Female operators take considerably more unpaid FMLA hours of leave during weeks/days with unconventional shifts. While they also work more overtime, the additional unpaid time off exceeds the additional overtime. Thus, during weeks/days with unconventional shifts, male operators earn more than during weeks without unconventional shifts, while female operators earn less.

Figure 6: Number of FMLA Hours, Per Quarter

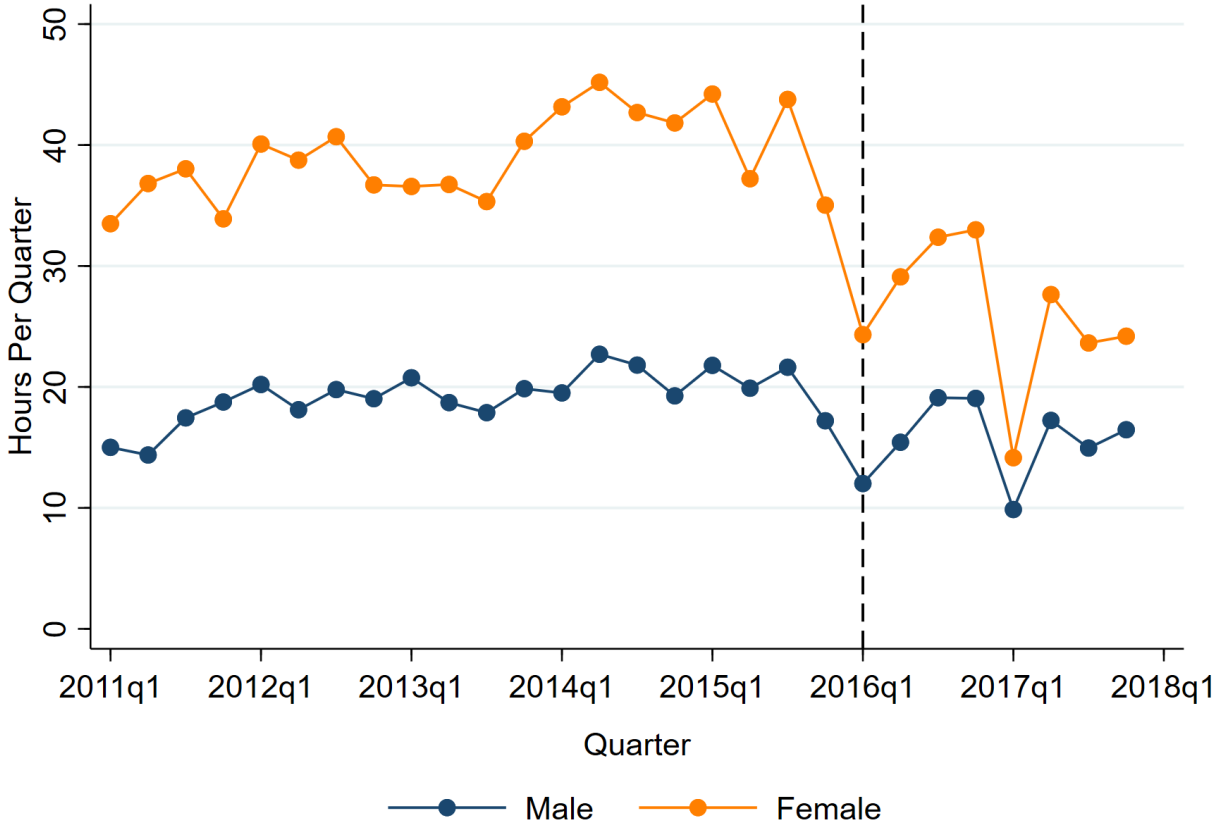

Figure 6: The average number of hours that operators take of FMLA per quarter is fairly constant from 2011 through 2016. In March of 2016 (vertical dashed line), the MBTA hired UPMC Work Partners to be a third-party administrator in charge of making sure that FMLA certification was obtained and used properly. UPMC ensures that doctors' notes certifying FMLA eligibility are legitimate and that operators take FMLA leave in the way that the doctor deemed necessary. This policy change took the active FMLA certification rate at the MBTA down from 45% to 27% of all operators. As the chart shows, the drop in FMLA usage was most pronounced for female operators, but also present for male operators.

Figure 7: Hours of Unexcused Leave, By Quarter and Gender

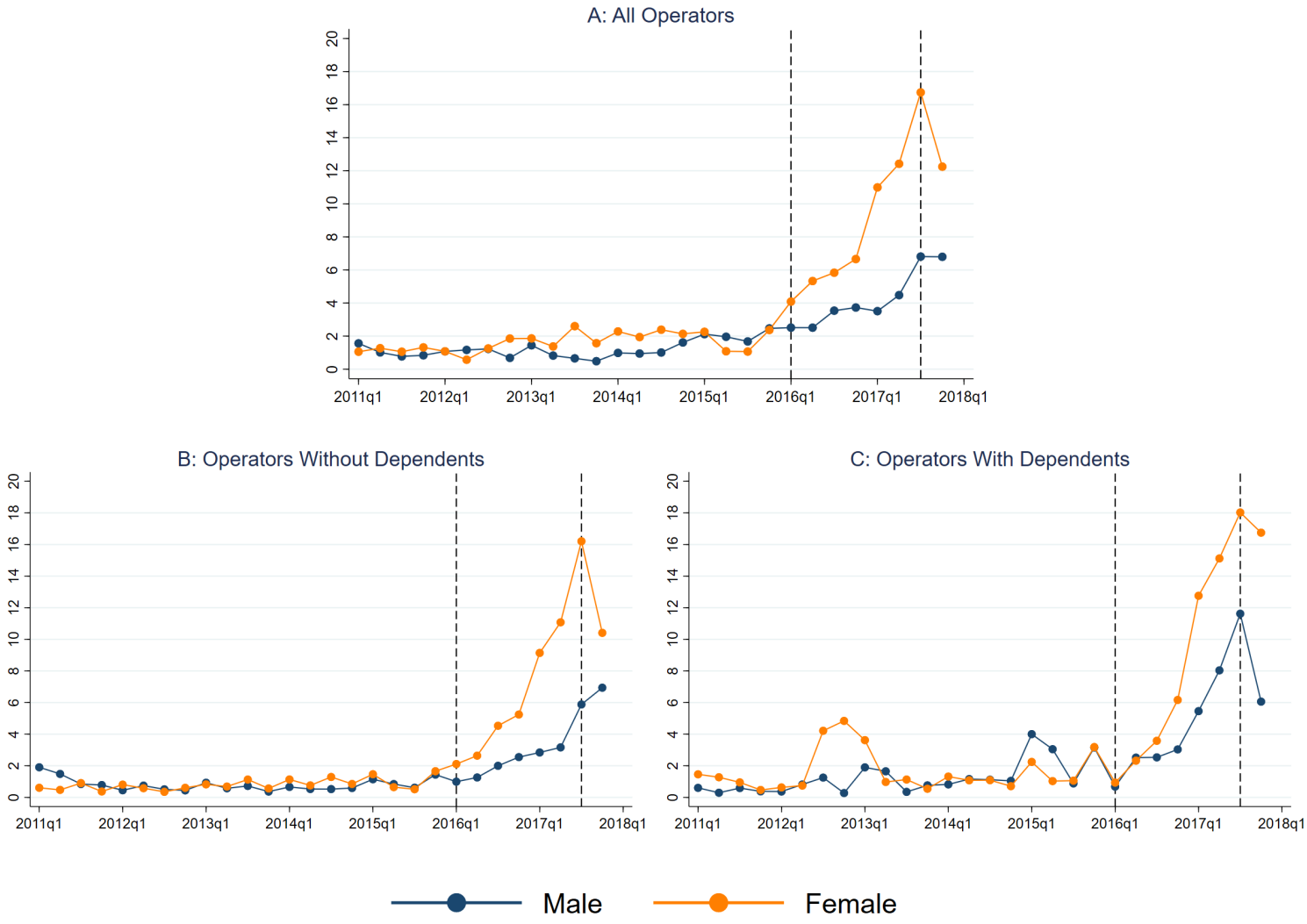

Figure 7: From the first quarter of 2011 to the last quarter of 2017, the average number of hours of unexcused leave taken by operators of each gender (Panel A). The left-most dashed vertical line denotes the introduction of the FMLA policy (March 2016) and the right-most dashed vertical line denotes the introduction of the overtime policy (July 2017). Panel B plots the series for male and female operators without dependents. Panel C depicts male and female operators with dependents.

Figure 8: FMLA Leave vs. Unexcused Leave, Before and After Policy Change

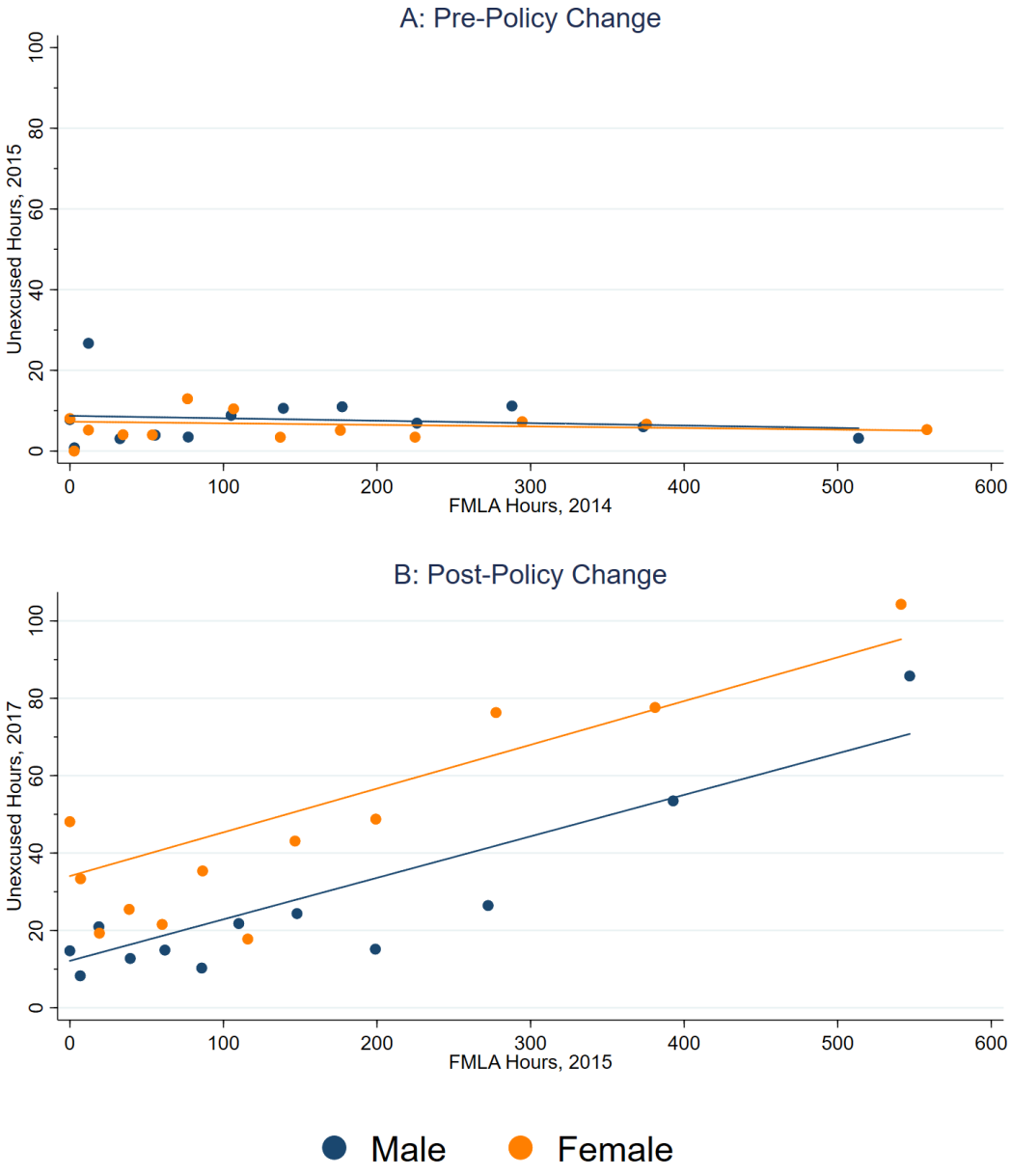

Figure 8: We explore whether there is a relationship between the amount of FMLA an individual takes in a given year and how much unexcused leave they take in a subsequent year. Between 2014 and 2015, when there is no intervening policy change, there is no relationship between FMLA leave and subsequent unexcused leave taken in the following year (Panel A). In contrast, those who took more FMLA in 2015 tended to take more unexcused leave in 2017, the year following the MBTA's policy change (Panel B), suggesting there is substitution from FMLA to unexcused leave. Observations are at the person-year level.

Figure 9: Lost Trips and Leave-Taking

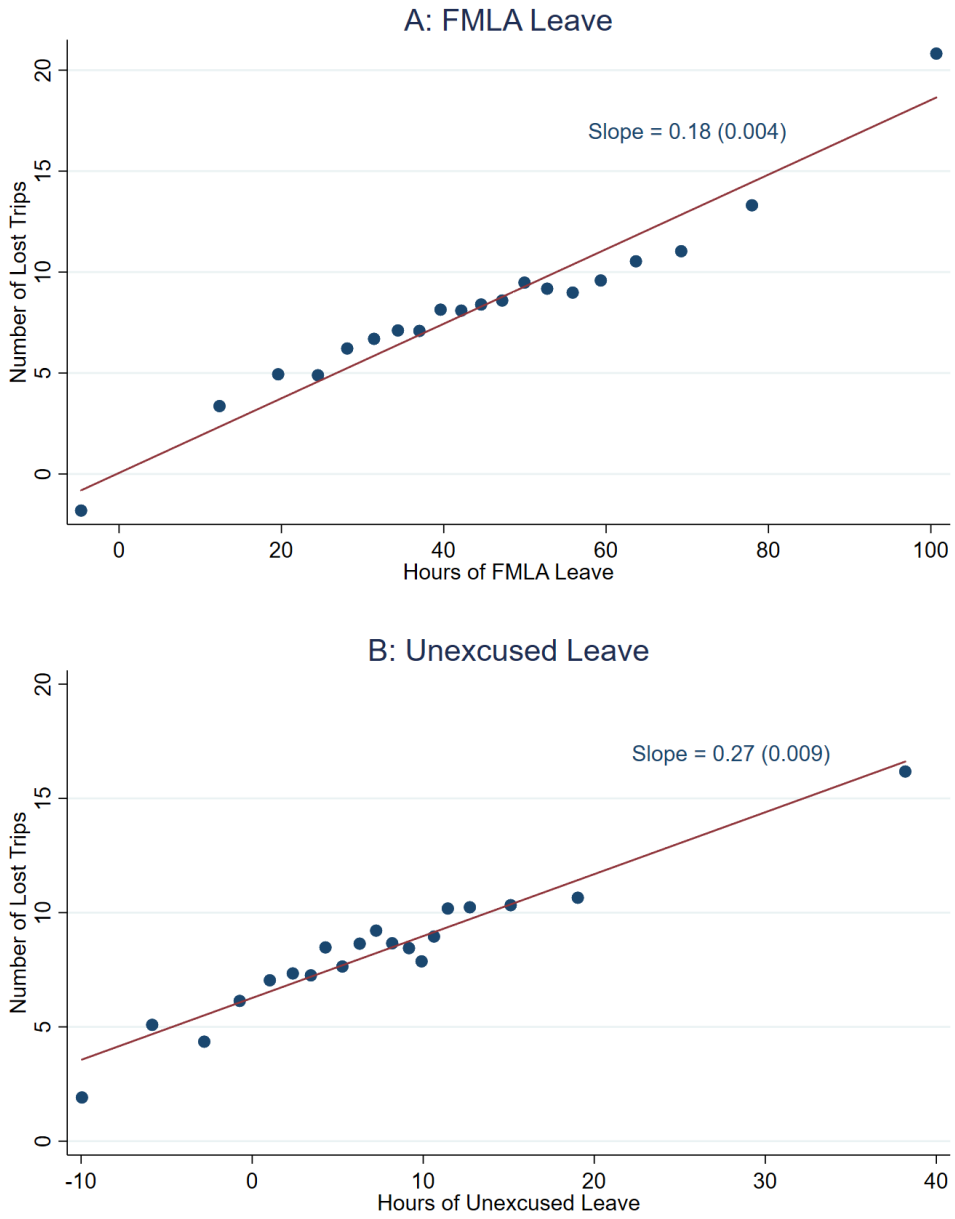

Figure 9: Unexcused leave tends to result in a greater number of lost trips than FMLA leave in part because they are harder for supervisors to plan for. The number of lost trips as a result of operator absence (y axis) is related to the total number of hours of leave taken by operators in the same garage on the same day (x axis). One hour of FMLA leave results in 0.18 of a lost trip (Panel A) whereas one hour of unexcused leave results in 0.27 of a lost trip (Panel B). Displayed are the residualized relationships (controlling for week and garage fixed effects), so some of the points show negative hours. The slopes of the unconditional relationships are similar. Standard errors are in parentheses. Lost trips data are available for 2014-2017.

Figure 10: Number of Overtime Hours, Per Quarter

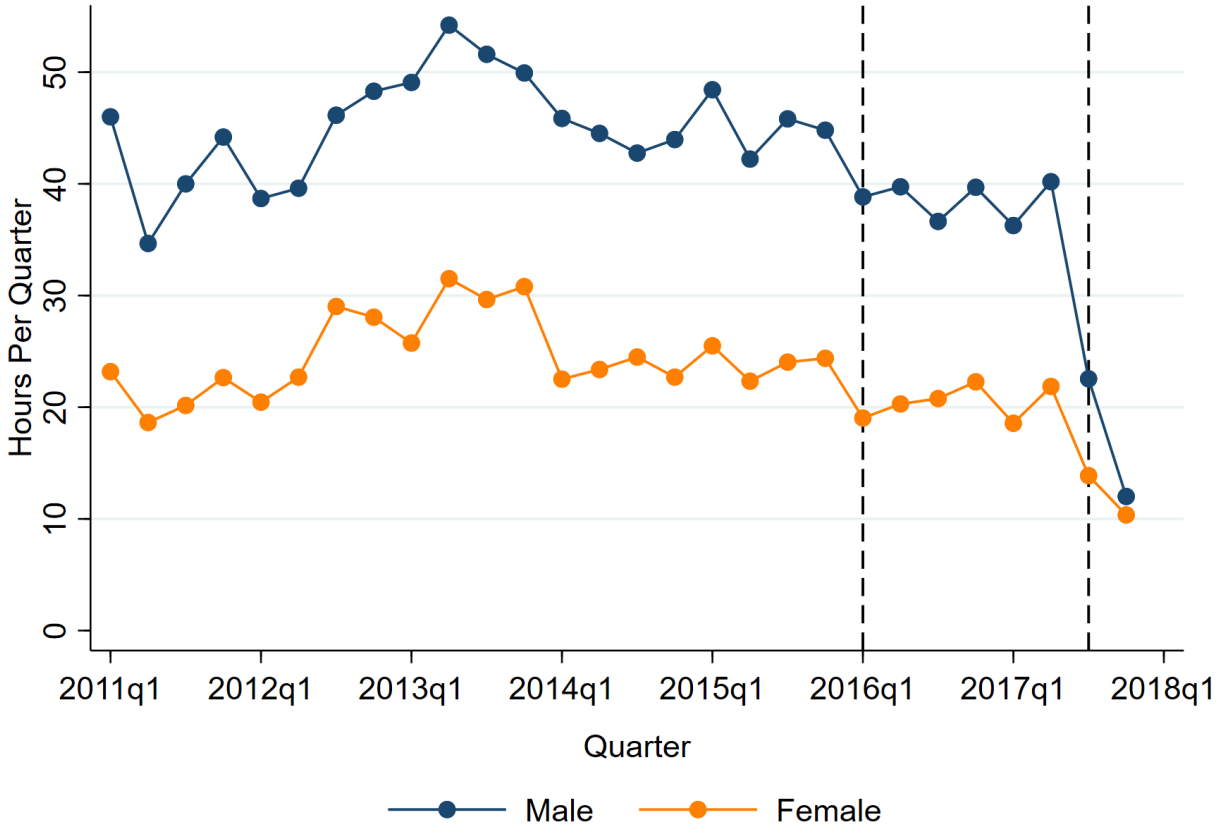

Figure 10: This chart shows how the average number of hours that operators take of overtime per quarter changes throughout our sample, from 2011 through 2017. The vertical dashed line at 2016Q1 represents the MBTA's policy change on FMLA. In March of 2016, the MBTA hired UPMC Work Partners to be a third-party administrator in charge of making sure that FMLA certification was obtained and used properly. UPMC would now ensure that doctor's notes certifying FMLA eligibility were legitimate and that, on a day-to-day basis, operators took FMLA leave in the way that the doctor deemed might be necessary. This policy change took the active FMLA certification rate at the MBTA down from 45% to 27% of all operators. The dashed line at 2017Q3 shows the timing of the introduction of the MBTA's new policy on overtime. Overtime went from being defined as any time in excess of 8 hours worked in a day to any time in excess of 40 hours worked in a week. The result was a drop in the average number of overtime hours worked by male operators from 40 hours per quarter to about 10 hours per quarter. Female hours dropped as well, but my a considerably smaller amount.

Figure 11: Weeks with Weekend Shifts vs. No Weekend Shifts, Before vs. After Policy Changes

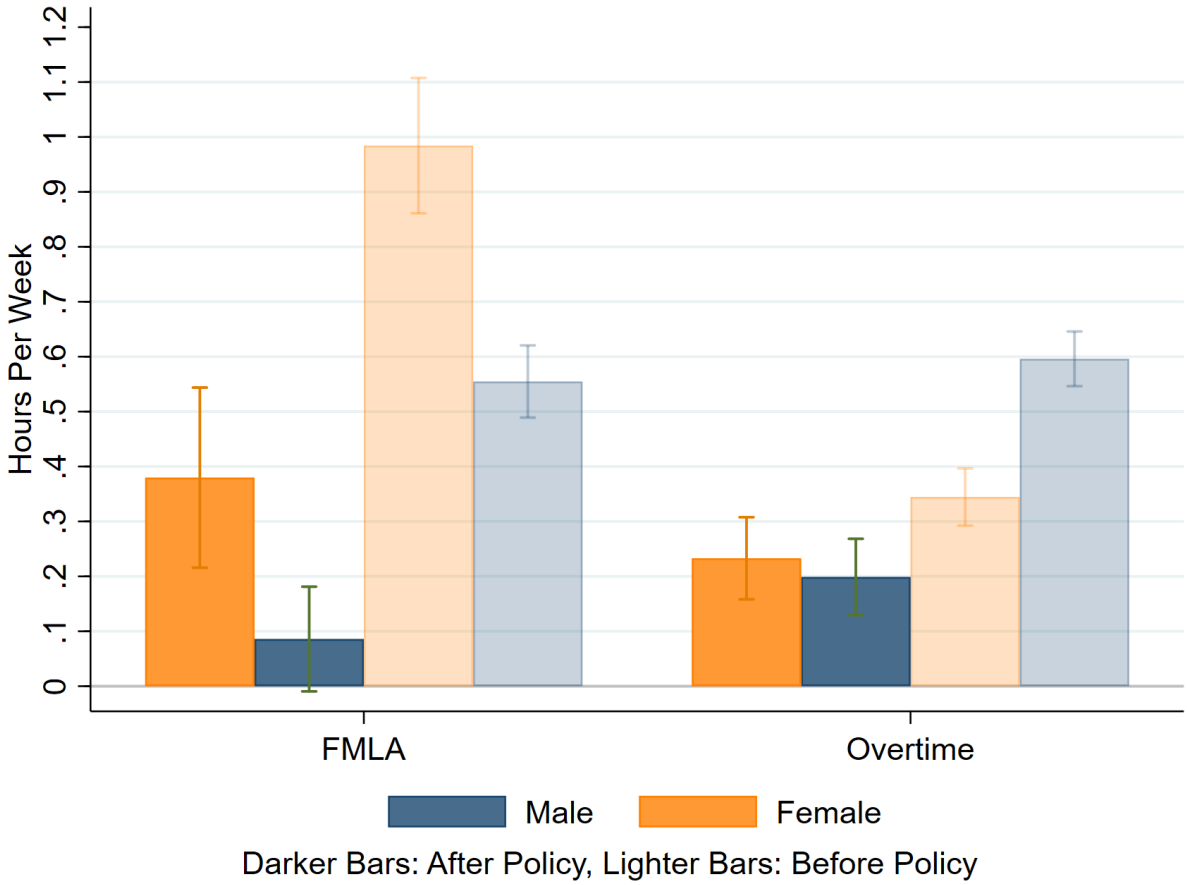

Figure 11: The policy changes enacted by the MBTA reduced how much control operators could exercise over their schedules using FMLA and overtime hours. After the policy changes, weekend shifts played a smaller role in exacerbating the earnings gap. In 2011-2015 (lighter bars), prior to the policy change, operators who had weekend shifts took considerably more FMLA and overtime hours in those weeks than in 2016-2017 (darker bars), after the policy change. These figures reflect the coefficients from person-week regressions of FMLA (overtime) hours taken per week on a dummy variable of whether the operator had a weekend shift scheduled, as well as controls for age, tenure, seniority, and operator and month fixed effects. We run these regressions separately for male and female operators and display the coefficients on the dummy variable in this chart, along with 95% confidence intervals.

APPENDIX

Table A.1: Gender Differences in Log Weekly Earnings

	(1)	(2)	(3)	(4)
Female	-0.0950***	-0.0942***	-0.0878***	-0.0838***
	(0.000828)	(0.000815)	(0.000981)	(0.00111)
Seniority Decile		0.00190***	0.00214***	0.00211***
		(0.0000130)	(0.0000141)	(0.0000141)
Dependents=1			-0.00315*	0.00982***
			(0.00127)	(0.00169)
Married=1				0.0293***
				(0.00110)
Female × Dependents			-0.0132***	-0.0242***
			(0.00202)	(0.00236)
Female × Married				-0.00329
				(0.00244)
Dependents × Married				-0.0389***
				(0.00260)
Female × Dependents × Married				0.0490***
				(0.00605)
Constant	7.273***	7.167***	7.173***	7.165***
	(0.000453)	(0.000854)	(0.000899)	(0.000947)
Adjusted R^2	0.020	0.051	0.059	0.060
Observations	654,849	654,849	555,148	555,148

Table A.1: Without any controls, female operators earn 9.5% less than male operators (Column 1), where the outcome of interest is log of total weekly earnings and we exclude those with zero earnings. Controlling for seniority, female operators still earn 9.4% less (Column 2). Female operators without dependents earn 8.8% less than male operators without dependents (Column 3). Unmarried female operators with dependents earn about 10.8% less than unmarried male operators with dependents — the biggest gap in our setting (Column 4). Standard errors are in parentheses. * = p<0.05, ** = p<0.01, *** = p<0.001.

Figure A.1: Service Map, Massachusetts Bay Transportation Authority

Figure A.1: A 2017 map of MBTA bus and train routes that service the Boston metropolitan area. Our data cover the bus and train operators that service these routes.

Figure A.2: Job Description, Bus Operator

Massachusetts Bay Transportation Authority

Part-Time Bus Operator

SALARY:	$19.72 hourly
UNION AFFILIATION:	Local 589
DEPT:	Bus Transportation
LICENSES/CERTIFICATIONS:	A valid Driver's License is required.
SAFETY SENSITIVE:	This is a Safety Sensitive Position. Incumbents will be subject to periodic random drug & alcohol testing.
ESSENTIAL CLASSIFICATION:	During declared States of Emergencies, employees working in this classification are required to report to work for their assigned work hours or as directed by supervisory personnel.

JOB SUMMARY:

The Part-time Bus Operator will operate an MBTA Surface Vehicle; be responsible for the safety of passengers and equipment; perform vehicle inspections to ensure proper operation; collect designated fares from passengers; assist in emergency situations and work under occasional supervision following MBTA guidelines and procedures.

DUTIES & RESPONSIBILITIES:

- Operate a surface line vehicle along assigned routes.
- Pick up passengers; collect fares; check passes and ID cards for validity.
- Protect revenue collected according to defined procedures.
- Inspect and/or test the vehicle (including but not limited to brakes, lights, signs, doors, mirrors, wipers, tires and horn) to ensure serviceable condition.
- Regularly climb onto side of bus and reach with hands and arms to adjust side view mirrors.
- Ensure the proper signs are displayed and changes as needed during each trip.
- Clearly announce destination at service stops and connecting points.
- Notify the Bus Control Center Dispatcher of any emergency, requesting additional assistance if needed; and evacuate passengers if the emergency situation warrants action and the Inspector is not available to make the decision.
- Refer disputes over ID validity or fare collection to the Official in charge of the station.
- Produce a written report to the Superintendent if the dispute is not resolved.
- Prepare accident reports as required.
- Respond to each inquiry, whether from a customer, vendor or co-worker in a courteous and professional manner.
- Be familiar with the MBTA Safety Plan as well as the Part-time Bus Operator job responsibilities as outlined.
- Work any and all shifts and/or locations as assigned or directed.
- Respond or report to work as directed by supervisory personnel for emergencies, extreme weather conditions or nay other abnormal conditions that impair service or safety of service, twenty-four (24) hours per day, seven (7) days per week.
- Adhere to the rules, regulations, collective bargaining agreements (if applicable) and policies of the Authority including EEO, Anti-Discrimination and Anti-Harassment and Anti-Retaliation policies.

Figure A.2: A job posting for the 2017 bus operator lottery. The posting is for part-timers because all operators start working as part-timers. They are promoted to full-time depending on need and the availability of full-time spots. Seniority ranks for full-time and part-time operators are determined separately.

Figure A.3: Job Requirements, Bus Operator

MINIMUM REQUIREMENTS/QUALIFICATIONS:

- Possession of a high school diploma or its equivalent (G.E.D.).
- Must be at least eighteen (18) years of age.
- Ability to successfully complete validated selection exam.
- Possession of a valid driver's license.
- Possession of a valid Class B Massachusetts Commercial Driver's License (CDL) permit with General Knowledge, Air Breaks, and Passenger endorsements at the time of hire.
- A satisfactory driving record for at least two (2) years prior to the date of hire.
- A satisfactory non-renew display for tickets report from the Massachusetts Registry of Motor Vehicles.
- Ability to pass background screenings including criminal background check, driving record check, educational verification, employment verification and references.
- Ability to pass selection interview.
- Ability to meet the MBTA medical qualifying standards established for this position, including a drug and alcohol test.
- Ability to pass the Department of Telecommunications and Energy (DTE) skill performance and road test.
- Ability to read, write, comprehend, speak and respond to instructions, posted signs, and inquiries in English.
- Ability to effectively communicate with customers, employees, and vendors.
- Successful completion of the required probationary period of 120 working days.
- Availability to work twenty four (24) hours per day, seven (7) days per week.

Figure A.3: Minimum job requirements for the 2017 bus operator lottery. Drivers are required to be high school graduates, who are at least 18 years old with a valid driver's license. Additionally, they must have availability to work at any time of the day, any day of the week.

Figure A.4: Job Description, Heavy Rail Operator

Massachusetts Bay Transportation Authority

Part-Time Motorperson

SALARY:	$19.72 hourly
UNION AFFILIATION:	Local 589
DEPT:	Heavy Rail Transportation
LICENSES/CERTIFICATIONS:	A valid Driver's License is required.
SAFETY SENSITIVE:	This is a Safety Sensitive Position. Incumbents will be subject to periodic random drug & alcohol testing.
ESSENTIAL CLASSIFICATION:	During declared States of Emergencies, employees working in this classification are required to report to work for their assigned work hours or as directed by supervisory personnel.

JOB SUMMARY:

The Part-time Motorperson will ensure the timely and safe operation of subway trains by reporting to work on-time to ensure established service schedules are met and by opening and closing train doors to ensure the safe boarding and unloading of passengers at various MBTA locations.

DUTIES & RESPONSIBILITIES:

- Operate a heavy rail vehicle along assigned line.
- Operate signal systems according to Authority guidelines.
- Report mechanical problems to the appropriate personnel.
- Make stop announcements during runs and collect any lost articles on trains.
- Prepare accident reports, vehicle and wayside defect reports when necessary and distribute to the proper Authority personnel.
- Assist the line officials in rectifying problems with his/her train when emergency conditions warrant this action.
- Work under occasional supervision.
- Follow MBTA guidelines and procedures, referring any problems or unusual occurrences to their supervisor.
- Be familiar with the MBTA Safety Plan as well as the Part-time Motorperson job responsibilities as outlined.
- Respond to each inquiry, whether from a customer, vendor or co-worker in a courteous and professional manner.
- Be familiar with the MBTA Safety Plan as well as the Part-time Motorperson job responsibilities as outlined.
- Work any and all shifts and/or locations as assigned or directed.
- Adhere to the rules, regulations, collective bargaining agreements (if applicable) and policies of the Authority including the EEO, Anti-Discrimination and Anti-Harassment and Anti-Retaliation policies.
- Perform related duties and projects as assigned.

Figure A.4: A job posting for the 2017 heavy rail operator lottery. The posting is for part-timers because all operators start working as part-timers. They are promoted to full-time depending on need and the availability of full-time spots. Seniority ranks for full-time and part-time operators are determined separately.

Figure A.5: Job Requirements, Heavy Rail Operator

MINIMUM REQUIREMENTS/QUALIFICATIONS:

- Possession of a high school diploma or its equivalent (G.E.D.).
- Must be at least eighteen (18) years of age.
- Ability to successfully complete validated selection exam.
- Possession of a valid driver's license.
- A satisfactory driving record for at least two (2) years prior to the date of hire.
- A satisfactory non-renew display for tickets report from the Massachusetts Registry of Motor Vehicles.
- Ability to pass background screenings including criminal background check, driving record check, educational verification, employment verification and references.
- Ability to pass selection interview.
- Ability to meet the MBTA medical qualifying standards established for this position, including a drug and alcohol test.
- Ability to read, write, comprehend, speak and respond to instructions, posted signs, and inquiries in English.
- Ability to effectively communicate with customers, employees, and vendors.
- Availability to work twenty four (24) hours per day, seven (7) days per week.

Figure A.5: Minimum job requirements for the 2017 heavy rail operator lottery. Drivers are required to be high school graduates, who are at least 18 years old with a valid driver's license. Additionally, they must have availability to work at any time of the day, any day of the week.

Figure A.6: Share of Female Operators and Share of Operators Working Weekends, By Garage

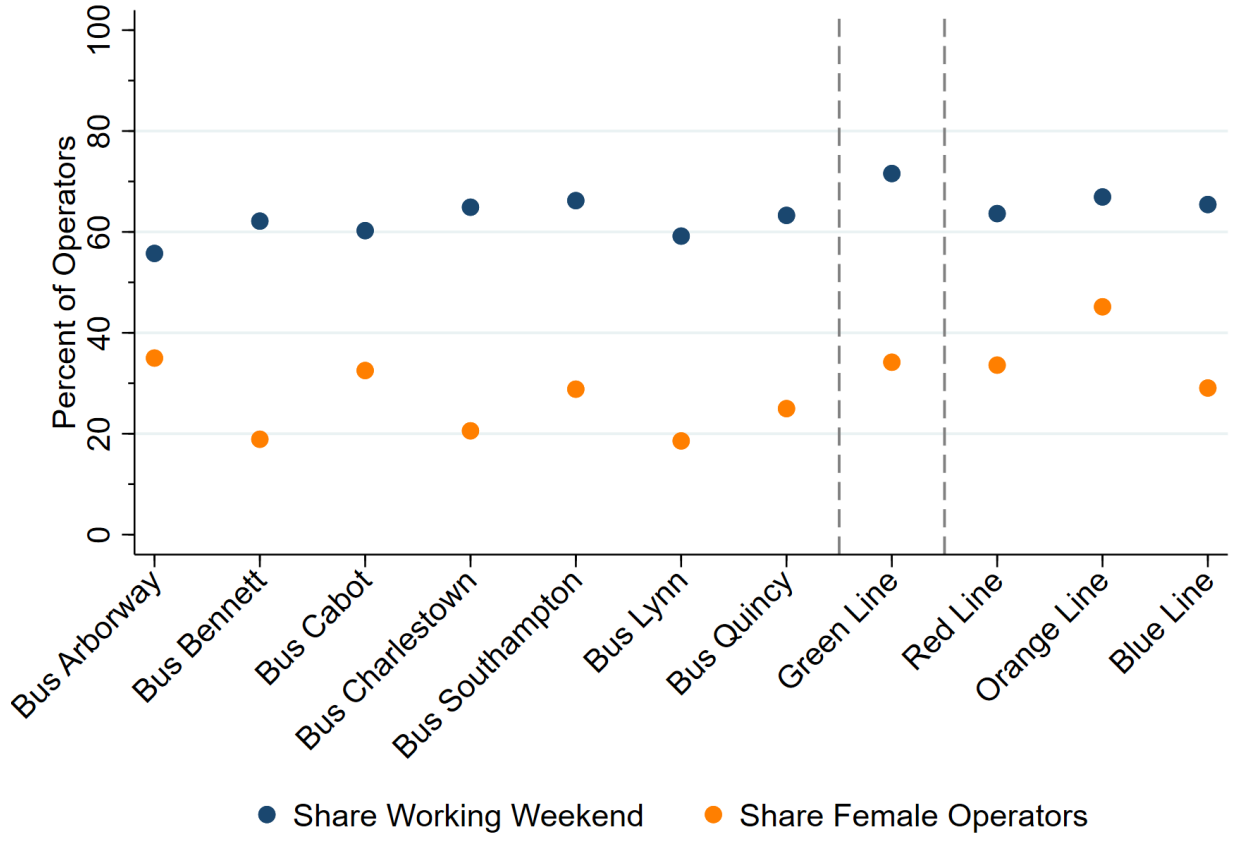

Figure A.6: The share of operators working weekends is constant across garages. There are slightly elevated shares of women in rail garages relative to bus garages, but the difference is not statistically significant. The first dashed vertical line separates the bus garages from the light rail garage (Green Line), the second dashed line distinguishes the light rail garage from the heavy rail garages.

Figure A.7: Share of Women Across Seniority Percentiles

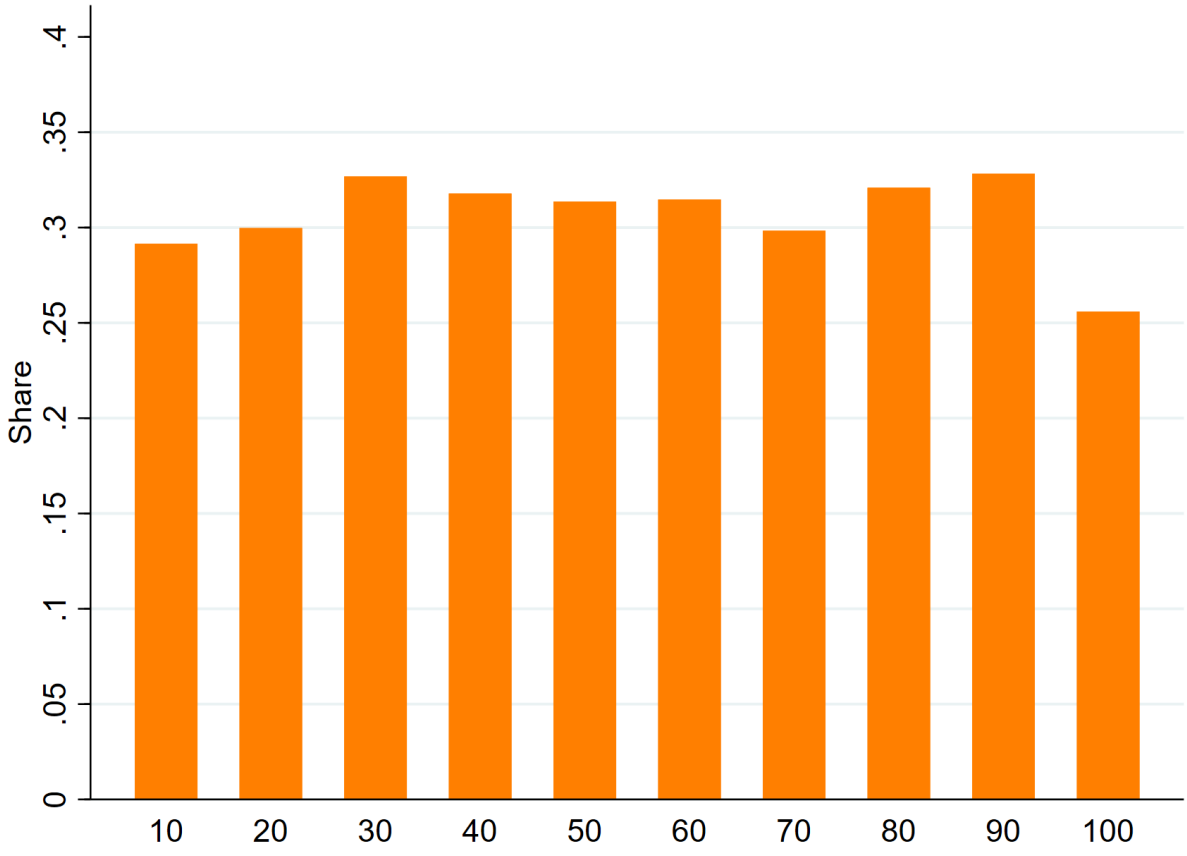

Figure A.7: Women make up a fairly consistent share of workers across seniority percentiles.

Figure A.8: Operator Age Across Seniority

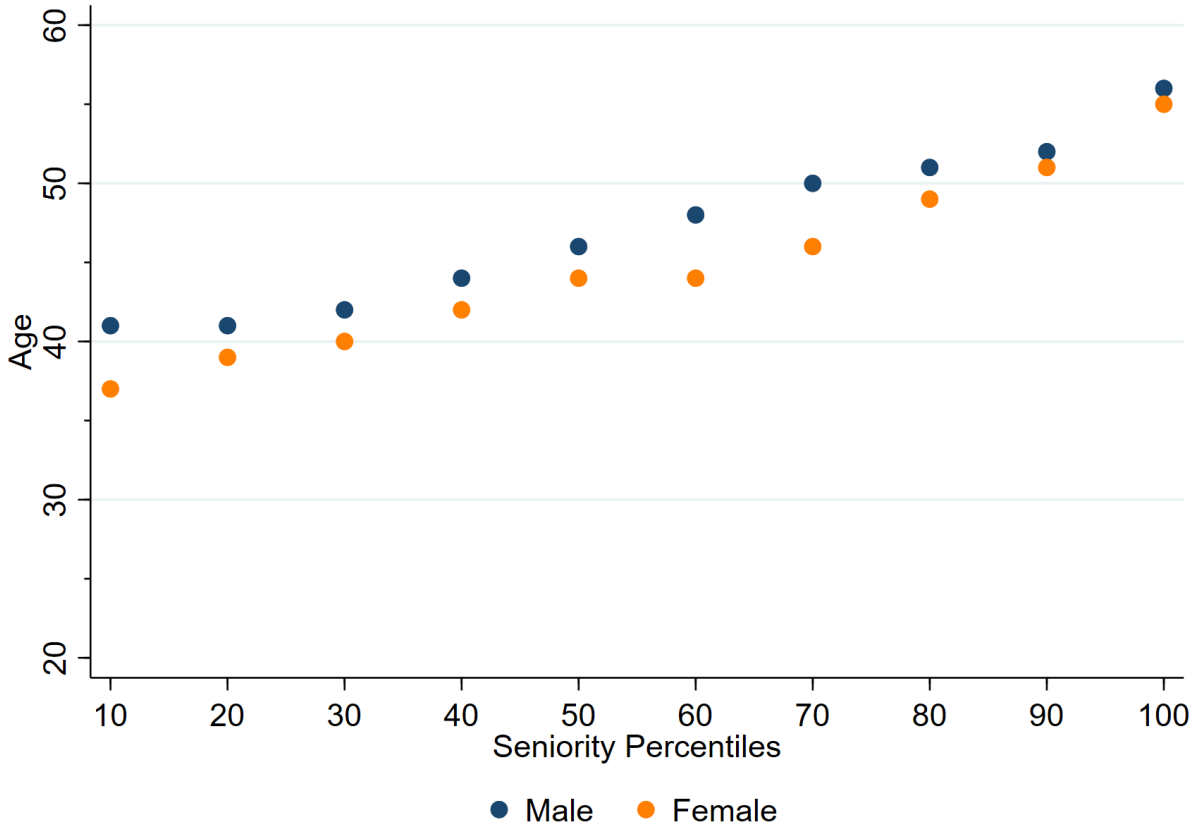

Figure A.8: Female operators are, on average, slightly younger than male operators at each level of seniority. The least senior operators are on average about 40 years old, while the most senior operators are about 55 years old.

Figure A.9: CDF of Tenure at Termination

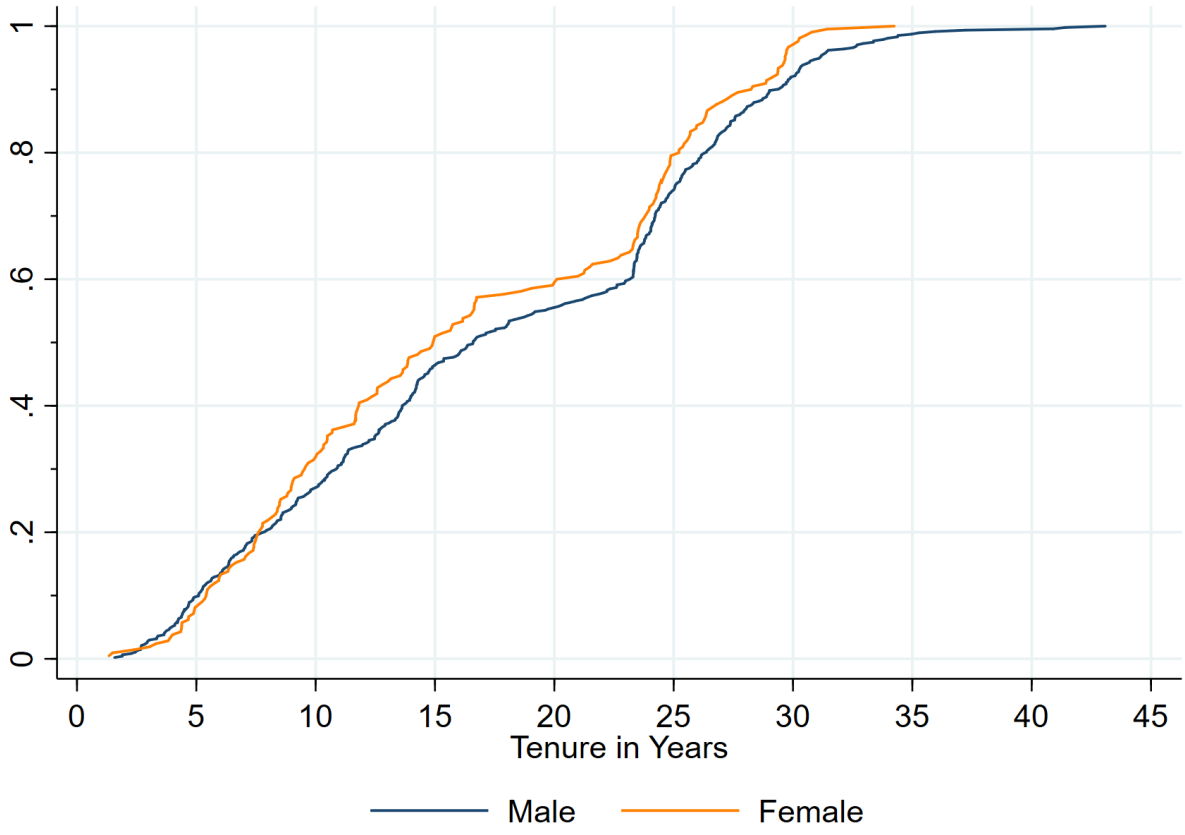

Figure A.9: This chart shows the cumulative distribution function (CDF) of operator tenure upon exiting the MBTA. The vast majority of these exits are voluntary. Discharge can occur for egregious misbehavior or frequent unexcused absenteeism. About 1% of the operators were discharged in 2016-2017 as a result of a new discipline policy that made absenteeism a just cause of suspensions and recommendations for discharge. The data presented here show the CDF for 2011-2017 and include voluntary exits and discharges based on the new discipline policy.

Figure A.10: Base Wage by Seniority

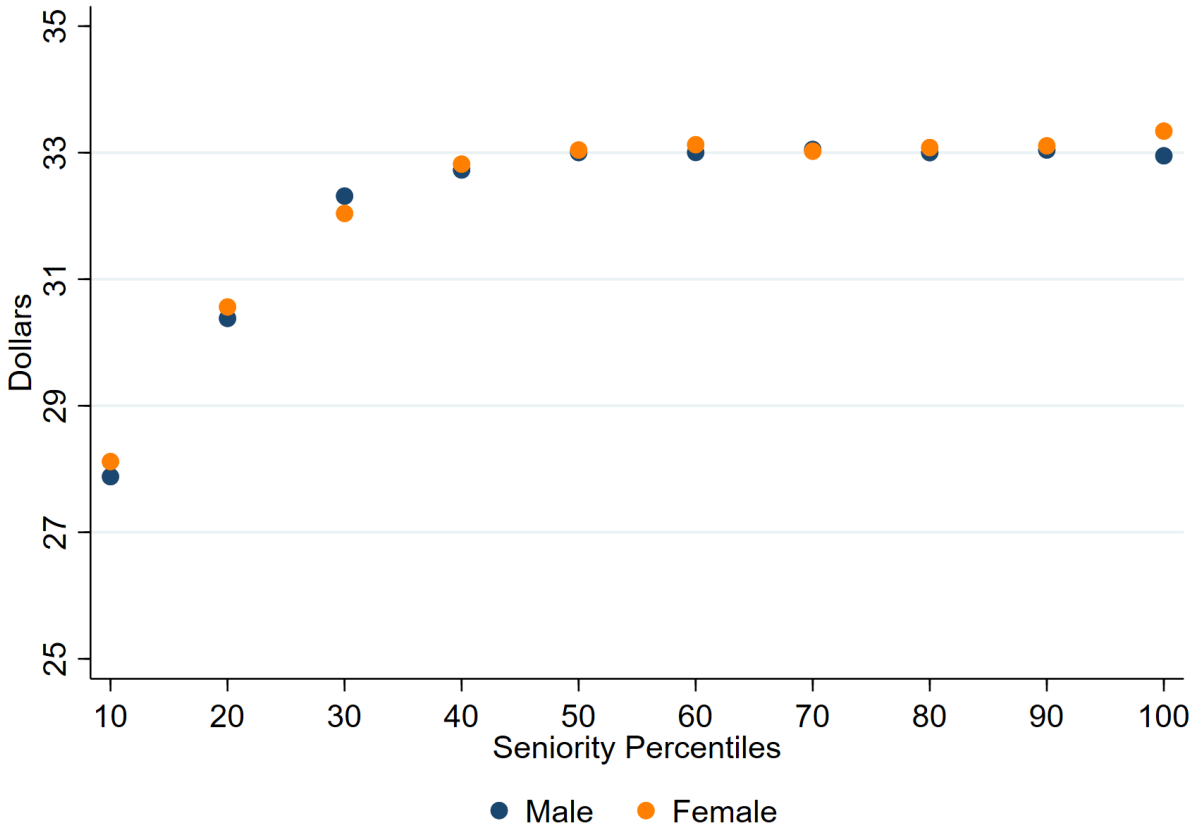

Figure A.10: The average base wage for each seniority decile is fairly similar for male and female operators. Operator wages rise until year 4 on the job and then increase modestly with inflation for every year thereafter. Starting wages and wage increases can differ based on an operator's start date, due to changes in the collective bargaining agreement that gets renegotiated every 4 years. Moreover, seniority is defined within each garage so some operators who were hired earlier or later may be in the same seniority decile.

Figure A.11: Base Wage by Tenure

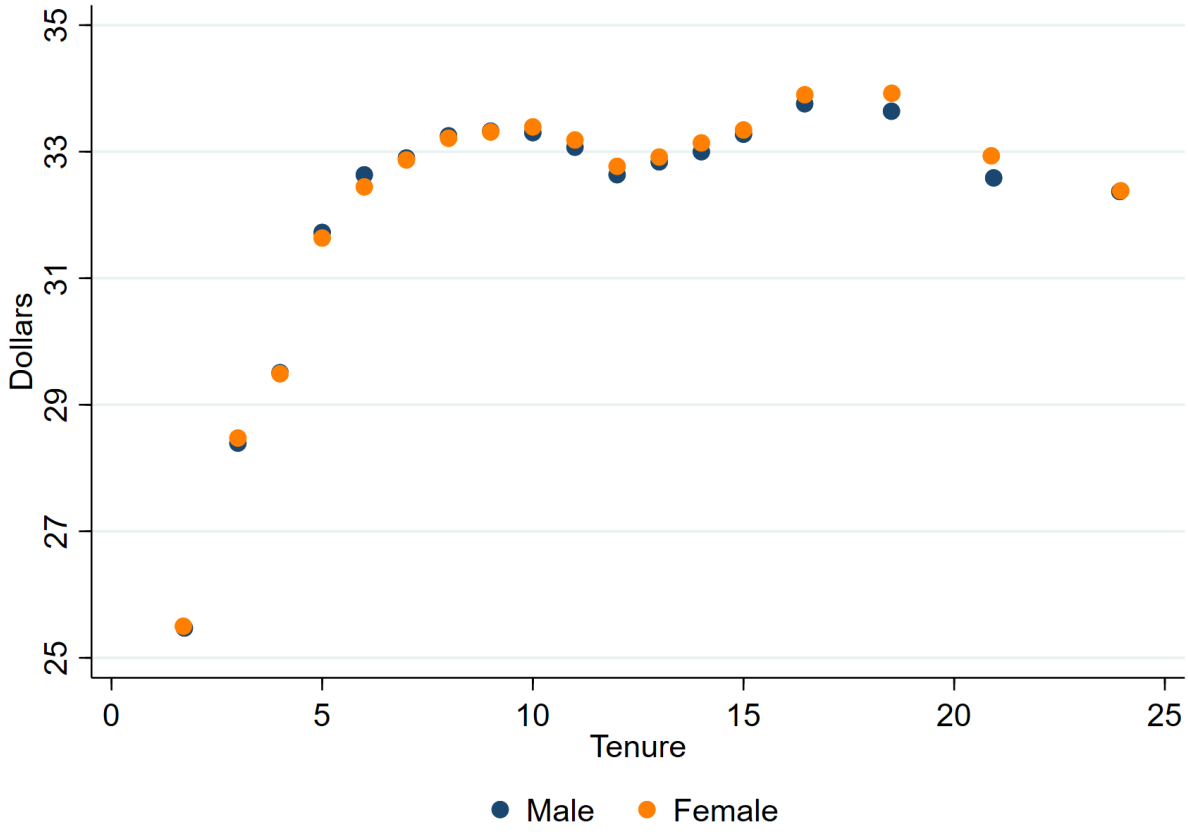

Figure A.11: The average base wage for each year of tenure does not differ considerably between male and female operators. Operator wages rise until year 4 on the job and then increase modestly with inflation for every year thereafter. Starting wages and wage increases can differ based on an operator's start date, due to changes in the collective bargaining agreement that gets renegotiated every 4 years.

Figure A.12: Probability of Taking FMLA, By Day and Gender

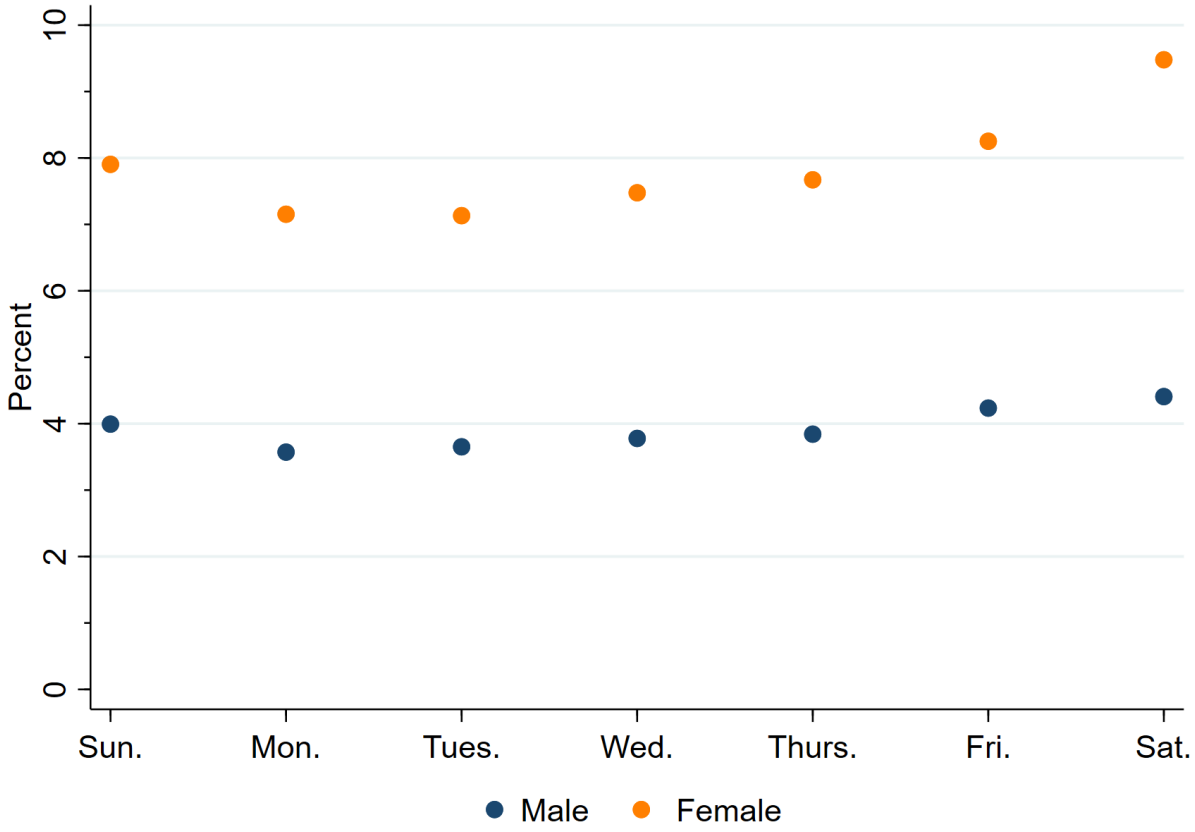

Figure A.12: On any given day, female operators are more likely to take FMLA than male operators. Saturday, Friday, and Sunday, in that order, are the likeliest of all days of the week to see an operator take some unpaid time off, especially women. The increase in FMLA usage around weekends suggest FMLA is used for something other than medically-necessary time off.