Coordinated Work Schedules and the Gender Wage Gap

German Cubas, Chinhui Juhn and Pedro Silos*

Preliminary

October 2017

Abstract

Married women with kids that are full time workers work less and allocate more time to home production than their men counterparts. At the same time the labor market is characterized by occupations that differ in terms of the coordination of the work schedule. Workers that work in occupations that concentrate hours at peak times of the day are paid a higher wage, but relatively lower if they are women. The higher demand for family time women face restricts their occupational choice and thus drives a gap in their earnings relative to men. We incorporate these trade offs in an occupational choice model with home production in which workers have comparative advantages to work into different occupations. In the model, labor supply, the supply of family time and the occupational choice are intimately related. The effect of differences in household care responsibilities between men and women in their occupational choice explain half of the observed gender earnings gap.

Key words: Occupations, Coordination, Work Schedules, Time Use, Gender Wage Gap.

*Affiliation: University of Houston, University of Houston, and Temple University, respectively.

1 Introduction

Women have made remarkable gains in the labor market over the past five decades but the rate of convergence in female and male earnings has stalled since 2000. The slowdown appears to be even greater among highly educated women. This remaining gap has encouraged new lines of research that point to the demand for long hours of certain jobs that are men populated. Since women typically have more household responsibilities related to household and child care, they are both less likely to sort into these jobs and are penalized when they do work in these jobs.[1].

This paper examines the impact of work schedules on the gender wage gap but rather than focusing on the number of hours, we turn attention to the *timing of work* during the day, and the extent to which it conflicts with the demands of family time. We use time use data to show that married women bear more household care responsibilities than men. At the same time, we observe in the data that not all occupations are the same in terms of the concentration of hours worked during the day. Interestingly, we find that the concentration of working time at peak hours of the day is highly compensated in the labor market for both every worker but less so for women.

In our analysis, we characterize occupations by their need of concentrated working hours during the day. In our view, on one hand there are occupations that require workers to be present at the same time during the day in order to maximize productivity. These are the occupations that require coordination of the work schedules and absences at the required time result in productivity losses. On the other hand, there are occupations for which coordination is not important, and thus the present of workers at different times of the day do not affect their productivity. However, since women have higher demand for family time they experiment productivity losses more frequently than men. In addition, their relatively higher demand for family time restricts their occupational choice: working in an occupation that requires coordination

[1]Examples of papers in this line are Goldin (2014), Gicheva (2013), Cha and Weeden (2014), Cortes and Pan (2016b), Cortes and Pan (2016a) and Erosa, Fuster, Kambourov, and Rogerson (2017)

implies an extra cost for them relative to men. We incorporate these trade offs in an occupation choice model in which workers have comparative advantages to work into different occupations. In the model, we incorporate a coordination technology that is occupation-specific so that labor supply is intimately related to the supply of family time and the occupational choice of workers. Differences in household care responsibilities between men and women affect their occupational choice which drives a gap in their relative earnings.

We start by using the American Time Use Survey (ATUS) for 2003-2014 to document novel facts regarding patterns of daily time use for men and women. We focus on full time workers and in two activities– work and household care (which includes active child care and elder care). We find that the majority of workers who work full-time adhere to an 8 to 5 schedule with a break for lunch in the middle of the day. Summing hours worked by all full-time workers, we find that most of those hours worked (72 percent) occur between 8 to 5. Among married women and men with children, women have more "missing hours" from work and, correspondingly, women allocate more time to household care. In contrast, we find that household care for non-working parents tend to be much more evenly distributed across hours of the day. This contrast between the distributions of hours worked and hours of care provided by non-constrained parents provides the basic intuition behind our measure of work schedule flexibility. We sort occupations by the ratio of hours worked between 8 to 5 relative to total hours worked ($ratio8to5$), classifying higher ratios as occupations that require more coordination.

A higher ratio indicates that work is concentrated during the 8 to 5 period. Given our intuition that individuals with more care responsibilities such as mothers with young children would benefit from shifting care from the post 5 p.m. period to the 8 to 5 period, we view a higher ratio as indicating more coordination vis a vis working parents.[2] We compute this ratio for 94 different occupations and we find substantial

[2]One might argue that working parents may prefer an 8 to 5 schedule given the availability of day

variation across occupations. Among the more educated occupations the least flexible are "Lawyers, law clerks" and "Computer/software related". More flexible occupations are "Writers, authors, and news media" and "Physicians, therapists, nurses, dentists". Among the less educated occupations "Nursing, Psychiatric, and Home Health Aides" and "Cashiers, clerks, retail persons" are very flexible whereas "Secretaries and Administrative Assistants" is one of the least flexible occupations. We also examined the extent to which our measure of concentrated work day, *ratio*8*to*5, correlates with other occupational characteristics reported in the O*NET database. We find that our measure is positively correlated with characteristics such as "face to face discussions,""developing and building teams,"and "establishing and maintaining interpersonal relationships."

We use our measure of coordination to investigate how it is priced in the labor market, and how it impacts the gender wage gap. For that purpose we use the larger samples of the Current Population Surveys and regress individual earnings on our occupational-level measure of flexibility controlling for individual observed characteristics. Individuals (men and women) working in occupations (one standard deviation higher) that require coordination earn approximately 10 percent higher wages. Women who work in coordinated occupations are paid a higher wage but relatively less than men (about 4 percent). Interestingly, if we focus the analysis on single men and women, we find no penalty for women associated with coordination, while the penalty is stronger among married men and women with children.

While our regressions point to an earnings penalty associated with more flexible schedules, these results must be approached with caution. Even though we control for individual observable characteristics, both the occupational choice and the timing

care centers. However, Stewart (2010) shows that while married mothers who work full-time spend less time in "routine child care" they spend equal time in "other child care" which includes "organization and planning for household children, attending household children's events, picking up/dropping off household children, meetings and school conferences of household children, obtaining medical care for household children, travel related to caring for and helping household children," much of which takes place during the day.

of work schedules are endogenous objects. The coordination of schedules matter, but the sorting of workers across occupations also reflect occupation-specific skill requirements, i.e. workers' comparative advantage. Our point is that, given the family constraints, the occupational decision is not independent from home production and thus in order to understand the observed allocation of hours and the gender wage gap, we need a theoretical framework that analyzes the sorting of workers across occupations that incorporates these important trade offs that are salient in the data.

We build a model in the spirit of Roy (1951)) where agents have heterogeneous occupation-specific ability. Individuals obtain utility from consumption of market goods and home goods, the former which is obtained in competitive markets and the latter which is produced at home. Men and women differ in their preference for home goods and we assume that women derive more utility from home goods relative to men. Time is divided into two periods, "8 to 5" period which we call "prime time" and the "post 5" period which we call "home time" or "kids time". Occupations differ in workers' productivity during "prime time" and during "home time". There are some occupations in which workers' productivity is barely affected by the time of day. In other occupations, workers' productivity is much lower during "home time". The occupational choice decision of workers depends not only on their comparative advantage but also on possibility of balancing working time during the "prime time" and "home time". In addition, preferences for home goods affect the allocation of time and thus will also affect occupational choice. Individuals that end up working in inflexible occupation will have higher earnings than those working in flexible occupations and since women have a higher preference for home goods relative to men, everything else equal, they will sort into more flexible occupations and have a lower wage compared to men. The model endogenously generates how concentrated hours are across occupations as well as the distribution of earnings across gender and occupations.

We parameterize the model using the data used in the empirical analysis for mar-

ried men and women with children that are full time workers and compute the *ratio8to5* predicted by the model for each occupation as well as individual earnings for men and women. As in the data, the model predicts that men work more than women and allocate less time to household care. In addition, it predicts a positive correlation between the 8*to*5*ratio* and earnings as well as a lower 8*to*5*ratio* of women relative to men. The model produces a gender wage gap that closely resembles the one observed in the data. We then use the model to perform a set of counterfactual exercises. Interestingly, cross-occupation differences in coordination of the work schedules explain 30% of the observed gap. In addition, when eliminating the women disparity in terms of the family care responsibilities, the average earnings wage gap decreases by 65%. In this case, women do not face the same constraints that men face and for this reason they can enjoy a better sorting in the labor market by selecting relatively more the coordinated occupations and thus reduces the gender earnings gap. Finally, we consider the case in which women are the same as men in terms of ex-ante average ability levels. If this is the case, although women still face the family time constraint they ones that choose coordinated occupations are more able than before and that reduces the average gender earnings gap by 50%. In other words, half of the observed gender gap in earnings is due to the family time constraint.

Related Literature The literature on flexible work schedules is large and there is an active debate regarding policies which may help promote work-life balance (see CEA (2010) and CEA (2014)). A challenge in this literature is to clearly define and measure "flexibility." One approach is to use a dichotomous variable based on workers' self-reports of whether they can set their own schedules. According to May CPS survey supplements conducted in 1997, 2001, and 2004, the fraction of workers who report setting their own schedules has increased over time (Beers (2000)). Papers often find that wages of workers who set their own schedules are actually higher than wages of workers who do not have this option, pointing to the general challenge of parsing out

the compensating wage premium for a workplace amenity. The ability to set flexible schedules often go hand in hand with workplace authority and autonomy, so that managers are more likely to report having this option than clerical workers. Even if managers do have this option on paper, however, it is not clear that they always exercise this option.

We take a different approach in this paper and focus on the coordination of work schedules. Since we analyze the observed timing of work at the occupational level our approach is related to Cardoso, Hamermesh, and Varejao (2012), Hamermesh, Myers, and Pocock (2008) and Eden (2017). It is also related to but distinct from a large literature on non-standard work schedules and shift work. Some papers have found that evening shifts, night shifts, and weekend shifts have deleterious effects on marital stability, family relationships, and children's cognitive outcomes (Presser (2000), Han (2005), Strazdins, Clements, Korda, Broom, and DSouza (2006)). At the same time, Presser (2000) also finds that non-standard schedules do not uniformly have bad outcomes and that some women opt for these schedules in order to juggle work and child care.[3] The same scheduling conflicts discussed in this literature also apply to higher wage workers who are not explicitly working shifts. We view our approach as a general approach that can also incorporate workers who are not explicitly on shift work schedules.

A recent paper by Mas and Pallais (2016) conducts a field experiment to elicit willingness to pay for flexible schedules among on-line call center job applicants. The paper finds that most workers are quite happy with a standard 9 to 5 schedule and are not willing to pay for flexible work schedules. At the same time, there is a large right tail of the "willingness to pay" distribution which implies that some workers are willing to pay a substantial portion of their wage for this amenity. These workers are

[3]As pointed out by McCrate (2005) and McCrate (2012), flexibility could be a good or a bad for workers depending on who is setting the schedules. Employer-driven flexible scheduling which results in unpredictable work schedules for workers clearly lead to worse outcomes and have been shown to lead to stress and unhappiness for families (Henly and Lambert (2014)).

more likely to be women. To the extent that wages are set at the margin, their results imply that the equilibrium compensating differential for flexible work schedules could still be large.

2 Time Allocation, Gender, and Occupational Choice

2.1 Data

We base our analysis on the 2003-2014 American Time Use Surveys (ATUS). One respondent per household is drawn from the Current Population Survey samples and the interviews are conducted approximately three months after the last CPS interview. Time diary information over the previous day is recorded and respondents report their activities and starting and ending times. There are 17 aggregate activities and we focus on two activities, "work and work-related activities" and "caring for and helping household members". For each individual we calculate minutes spent on these activities by each hour of the day using information on starting and ending times. We restrict our sample to adults who are 18 to 65 years old. For examining patterns of time allocation by gender, work status, marital and parental status, we include all individuals in this age range in the analysis. To construct ratio of hours worked in the 8 to 5 time interval at the occupation level we include only full-time workers who worked a minimum of 35 hours. Our main sample of time-diary respondents consist of 108,426 observations or approximately 9000 observations per year. The full-time worker sample consists of 67,134 observations. For the regression analysis where we explore the impact of occupation-level $8to5ratio$ on wages, we include all individuals in the CPS, including those who are not time-use survey respondents. For this the sample sizes are considerably larger, with the sample consisting of 287,326 individuals who are full-time workers aged 18 to 65. Since the time use surveys are conducted 3 months after the main CPS interviews we use variables such as age and work status that are collected at the time of the time use survey whenever possible. Some of the

information, however, such as education, is available only in the main CPS data.

2.2 Timing of Work and Household Care

In this section we describe patterns of time use over the course of a single day for individuals differentiated by gender, work status, marital and parental status. These patterns offer intuition for our measure of coordinated work schedules and motivate the rest of our analysis. Figure 1 explores *when* work happens. The top picture graphs the average number of minutes worked by one-hour time bin for married individuals, men and women, with kids that are full-time workers. The figure shows that most (72 percent) of work occurs during the time interval 8 to 5 with a break during the interval 12 to 1 p.m. Even among full-time workers, average minutes worked per hour is well below 60 which may reflect the fact that we are averaging over all 7 days of the week including weekends.[4] The other picture show patterns by gender for singles. Even among full-time workers, women work less than men, with the gap being largest among those married with children. Among this group, women work approximately 55 minutes less than men over the course of the day. However, at least among full-time working men and women, the gap does not appear to have a notable temporal pattern.

Figure 2 graphs the temporal pattern of household care among full time workers with children and singles without children.[5] Note the graph is on two different scales due to the fact that the total number of hours devoted to work and household care differ substantially. The differences in the temporal pattern of work and household care, however, is notable. Household care does increase in the afternoon, but it does not fall to zero, however, during the 8 to 5 interval. Both women and men with children report household care with noticeable bumps up in the early morning and

[4]We have also used weekdays only and found similar patterns except for differences in levels, so we do not report those results here.

[5]Household care includes active child care and elder care where respondents report these activities as the primary activity. We do not include passive child care where it is reported as a secondary activity.

evening hours. The temporal pattern of care for full-time workers with children are negatively related to the temporal pattern of work, with the least number of minutes devoted to care activities during the 8 to 5 interval. Comparing men and women with children, there is a gap of about 20 minutes of household care over the course of the day. Single workers do very little household care. We can further disaggregate by the age of children, grouping women with only less than school-age children (younger than 6 years old) and women with only school-aged children (6 to 17 years old). Mothers with young children who work full-time provide 52 minutes less household care relative to non-working mothers with the difference largely coming during the 8 to 5 period. Mothers with school-aged children who work full-time provide 23 minutes less care relative to their non-working counterparts.

We also analyze the gap in hours between men and women with a regression analysis. In the baseline case we regress the time allocated to work in a weekday reported in ATUS of each individual on dummy variable that takes the value one if the individual is a female. The coefficient associated with the gender dummy is the one we are interested in, it is reported in Table A.4. In addition, in the same table we report the same estimate for different specifications of the same regression. In these alternative specifications we allow for working on the weekends, we control for the day of the week and the year, education, race and age as well as the usual hours of work. As can be observed the coefficient on the female dummy is significantly negative and robust to all the specifications considered. We perform the same regression analysis to document the differences in hours of household care between men and women. The results are reported in Table A.5. It is clear from the table that women significantly allocate more time to household care than men, this is also robust to the different specifications.

2.3 Measure of Coordinated Work Schedules

Building on the insight from the previous section, we build our measure of coordinated work schedules for different occupations. Call the time intervals between 12 a.m. and 8 a.m., between 8 a.m. and 5 p.m. and, between 5 p.m. and 12 a.m. A, B and C, respectively. A_{ij}, B_{ij}, and C_{ij} then refer to the sum of minutes worked by individual i in occupation j in those respective intervals. We sum over individuals to get occupation-level equivalents where w_i refers to the survey weight of the individual.

$$A_j = \sum_{i=1}^{N_j} w_i A_{ij}, B_j = \sum_{i=1}^{N_j} w_i B_{ij}, C_j = \sum_{i=1}^{N_j} w_i C_{ij}$$

Our measure of coordinated work schedules at the occupation level is the ratio of minutes worked in the 8 to 5 interval relative to total minutes worked.

$$ratio8to5_j = \frac{B_j}{A_j + B_j + C_j}.$$

We include only full-time workers in calculating this ratio. A higher ratio indicates that a greater amount of work in the occupation occurs during the standard 8 to 5 work day. Given our intuition that individuals with more care responsibilities such as mothers with young children would benefit from shifting care from the post 5 p.m. period to the 8 to 5 period, we view a higher ratio as indicating less flexibility vis a vis working parents. We also standardize this measure by subtracting the mean and dividing by the standard deviation.

Tables 3 and 4 report the occupation level ratios for 94 different occupation categories sorted from low to high ratios distinguishing between less educated and more educated occupations by classifying these categories based on the share of workers with at least a college degree. We highlight some well-known occupations in Figure 3. Among the occupations with relatively high ratio we have "Lawyers, law clerks" and "Financial Analyst" which have standardized ratios of 0.913 and 0.963, respec-

tively. "Computer/software related" occupations have a standardized ratio of 0.730 and "Writers, authors, and new media" have a relatively low ratio, it is equal to 0.325. "Physicians, therapists, nurses, dentists" have the lowest ratios at -0.461. On the group of less educated workers we have that "Nursing, Psychiatric, and Home Health Aides" has a very low ratio, it is -1.958. Then we have "Cashiers, clerks, retail persons" with a ratio of -0.182. Occupations in this group with relatively high ratio are "First-Line Supervisors of Retail , non retail Sales Workers" (0.125) and "Computer Operators" (0.841), being "Secretaries and Administrative Assistants" ones with the highest ratio (1.459).

Table 5 reports correlations of our measure of coordinated work schedules, *ratio8to5*, with other occupational characteristics reported in the O*NET data base. The table shows that our measure points to the need for coordination with others in the workplace. Our measure is positively correlated with "developing and building teams," "establishing and maintaining interpersonal relationships," and "face to face discussions." On the other hand, it is negatively correlated with "assisting and caring for others."

One can view this measure a rather arbitrary way to think about the concentration of working hours during a day as the fraction of 8 to 5 is fixed. As an alternative one could think of how concentrated the hours are during the day without pre-establishing the times of the day. In the Appendix we provide an alternative measure of the concentration and show that is positively correlated to the *ratio*8*to*5. An additional concern has to do with the possibility of doing shift work for workers in some occupations. The reason is that due to the possibility of shift work some work schedules can look less concentrated since different workers would be picking different shifts of the day to work resulting in a relatively low fraction of workers work from 8 to 5. This issue is also addressed in the appendix.

3 Coordinated Work Schedules and the Gender Gap

In this section we analyze how our measure of coordinated work schedules is priced in the labor market, and how it impacts the gender wage gap. Specifically, we estimate the following regression at the individual level:

$$lnW_i = \beta_0 + \beta_1 * female_i + \beta_2\, ratio8to5_j + \beta_3\, female_i * ratio8to5_j + \beta_4\, X_i + \varepsilon_i \quad (1)$$

where lnW_i is the log of individual weekly earnings, $female_i$ is the female dummy, $ratio8to5_j$ is ratio of hours worked in the 8 to 5 interval which varies at the occupation level j, X_i are other observable characteristics including a quartic function in age, race, and education dummies. We also control for (log) hours worked last week. Our sample includes only full-time workers. β_1 measures the impact of the female dummy, β_2 measures the impact of working in occupations with more concentrated work day, and β_3 captures how being female interacts with working in these occupations.

Table 3 reports the results of the regression. Panel A reports the results for all workers. Column (1) presents the baseline results. All full-time workers are included in the top panel. Women earn on average 22 percent less than men. Individuals in occupations with higher *ratio8to5* earn higher wages, with one standard deviation higher ratio leading to approximately 13 percent higher wages. The interaction term indicates that women suffer about a 5 percent higher penalty in these occupations. In column (2) we control for occupation-level education which reduces the size of the wage premium associated with these occupations and also the female-specific penalty. In column (3) and column (4) we also control for the fraction of workers who report being shift workers, as well as measure of "overwork" used by Cortes and Pan (2016b).[6] The coefficient on the concentration measure and female-specific penalty are further reduced and are no longer significant.

[6]The measure for "overwork" is the share of men who work 50 or more hours per week.

The bottom two panels report results separately by marital and parental status. Panel B reports results for single men and women. Notably the interaction terms are all insignificant pointing to the fact that there is no penalty for women associated with coordinated work schedules. Panel C reports results for married men and women with children. The female interaction terms are larger and significant which suggests that the results pooling over all workers reported in the top panel was largely due to the married with children group. In the appendix tables, we report results where we use detailed occupations, up to 563 total. We drop occupations which have less than 100 ATUS respondents in constructing our $ratio8to5$ measure, however, so that the actual number of occupations used in the regression is lower. The results using these detailed occupation categories are even stronger.

These regressions indicate that workers in occupations where most in the occupation adhere to a standard 8 to 5 schedule are paid a higher wage. However, the gender gap in these occupations is larger. This pattern is particularly pronounced when we restrict our sample to married men and women with children, strongly suggesting that conflicts related to work and family time play an important role.

These results must be approached with caution, however. Even though we are able to control for observable characteristics of individuals, both the occupational choice and the timing of work schedule are endogenous objects. As suggested by our empirical results it seems some occupations offer the possibility of work-home production balance while others not, which as discussed above, is important for married workers with children but not so much for single individuals. Thus, it seems clear that the interplay between work schedules and the need of home production greatly affect the occupational choice of individuals. In addition, there are other important factors that affect the choice of occupation, most notably the human capital of individuals, a substantial part of which may be occupation-specific. Moreover, workers have different skills to work in different occupations, in other words, comparative advantage. More importantly, abilities are valued differently across occupations. For instance, a

woman with a law degree with children may find it optimal to work as a lawyer even though she has to pay a penalty for working in a very inflexible occupation provided her skills to work as a physician are sufficiently low. Additionally, considering all women with law degrees, it may be that only the best end up working as a lawyer while the others choose more flexible occupations. Therefore, in order to understand the sorting of workers across occupations as well as to correctly measure the price of flexibility we need a theoretical framework that incorporates these important trade offs that are salient in the data. In the next section we introduce a general equilibrium occupational choice model.

4 The Model

4.1 The Benchmark Economy

Environment In what follows we provide a description of the model environment. The economy is populated by a continuum of male and female workers who derive utility from the consumption of a market good. In addition they derive utility from a home good and allocate time for home production. Workers live for 1 period and finance consumption through earnings from the provision of labor services in a competitive market at two different times of the day, 1 and 2. Based on our empirical evidence we can think of 1 as the time of the day from 8am to 5pm, "prime" time; and "home" time as the rest of the day.

Everyone values consumption of a market good, denoted by c, and from a home good denoted by h. Workers rank levels of them according to a Cobb-Douglas utility function which is given by

$$u(c,h) = (h)^{\nu^s}(c)^{1-\nu^s} \tag{2}$$

where ν^s represents the weight of market goods in utility for gender s with $s = f, m$. Workers do not value leisure and hence, supply that unit of time inelastically in

a labor market that features J occupations available for them and which are labeled using the integer j. Occupations are mutually exclusive; workers can only work in one occupation. Workers receive a wage w_j (earnings per unit of human capital they bring to the market) but their amount of human capital or ability varies.

Prior to the occupational choice, each individual draws a value for an occupation-specific skill or ability from a given distribution (common to men and women). Thus each individual i can be represented by a vector Ω_i

$$\Omega_i = \{\theta_{i,1}, \ldots, \theta_{i,J}\}$$

where the logarithm of each value $\theta_{i,j}$ is drawn from a distribution $F(\theta_j)$. If the individual is a female, the draw is multiplied by a factor $\lambda < 1$ which is a parameter that reflects the gender wage gap that comes from forces that are not represented in this framework. Once the individual makes her occupational choice, only the θ corresponding to the chosen occupation affects her labor earnings.

Workers decide how to split their time between home and market production, h^i and l^i, respectively as well as the division of their working and home production time between the "prime" time (l_1^i and l_2^i) and the "home" time (h_1^i and h_2^i). The total number of hours during the period is set to one, that means

$$h_{j,1}^i + l_{j,1}^i + h_{j,2}^i + l_{j,2}^i = 1 \tag{3}$$

and time can be allocated to either the prime time or the home time subject to the following constraints

$$h_{j,2}^i + l_{j,2}^i = 0.5. \tag{4}$$

In addition, occupations differ in an important dimension. In some occupations workers get penalized for not working during prime time and postponing work for home time. These occupations value coordination of schedules across workers. In

other occupations workers can choose their own schedule with barely any resulting loss in productivity. A reduced form way of capturing the importance of coordinating workersâĂŹ schedules is given by a reduction in the effective hours of work when labor is not supplied during prime time, this means that

$$l_j^i = l_{j,1}^i + l_{j,2}^i - (0.5 - l_{j,1}^i)^{\alpha_j} \quad with \quad \alpha_j => 0 \quad \text{for} \quad j = 1, ..., J \tag{5}$$

where α_j reflects the cost of transferring labor hours from the "prime" part of the day to the "home" time in occupation j. Note that a larger α implies a lower loss of effective hours and thus productivity, as the cost vanishes when that parameter is large. The maximum amount of time the worker (male of female) can work in the "prime" time is 0.5, given an α, the further away the allocation of time in this part of the day is from 0.5 the costlier it is in terms of workerâĂŹs productivity.

An occupation with a relatively low α means that working on prime time or home time greatly affects worker's productivity, that means, the more the person favors working at home time with respect to prime time the less productive she will be. Although α is exogenous and thus our model is silent with respect to the source of these differences we can think of these occupations as the ones in each workerâĂŹs productivity is increased when all the workers are present at the same time.

Additionally, home goods are produced by allocating hours both at prime and home time according to a Cobb-Douglas technology:

$$h^i = (h_1^i)^{\rho}(h_2^i)^{(1-\rho)}, \tag{6}$$

where ρ is the parameter that governs the share of prime time in the production of home goods.

On the production side of the economy there is a set of J intermediate good producers indexed by j (that we associate with occupations) each specializing in the production of an intermediate good X_j. The production of this intermediate good

employs a linear technology in effective units of labor N_j; that is, $X_j = N_j$. Markets are competitive and the producer faces prices for her good p_j and wages w_j.

The producer of intermediate good j solves the following maximization problem:

$$\max_{N_j} p_j X_j - N_j w_j \tag{7}$$

subject to the available technology $X_j = N_j$. The solution to the problem is $p_j = w_j$. Intermediate good producers sell to a final goods producer. The technology for producing a certain amount Y of the final good from a vector of quantities of intermediate goods $\{X_1, \ldots, X_J\}$ is described by,

$$Y = \prod_{j=1}^{J} \left\{ X_j^{\kappa_j} \right\}. \tag{8}$$

with $\sum_{j=1}^{J} \kappa_j = 1$ (Cobb-Douglas). We assume no capital in this version but it is an easy-to-add feature.

The final good producer solves the following maximization problem:

$$\max_{\{X_1,\ldots,X_J\}} \prod_{j=1}^{J} \{X_j\}^{\kappa_j} - \sum_{j=1}^{J} p_j X_j. \tag{9}$$

Note that in equilibrium $X_j = N_j$ and $p_j = w_j$, so that this maximization problem implicitly defines labor demand functions $\left\{ N_j = N_j^d(w_j, N_{-j}) \right\}_{j=1}^{J}$

Individual's Decision Problem The amount of effective labor supplied by worker of gender s in occupation j is $\exp(\theta_j^s) l_j^s$. The supply of a unit of effective labor is compensated at a rate w_j.

The value of occupation j for an individual of gender s reads as follows

$$V_j^s(\theta_j^s) = \max_{c^s, l_{j,1}^s, l_{j,2}^s, h_{j,1}^s, h_{j,2}^s} \{u(c^s, h^s)\} \tag{10}$$

$$s.to. \tag{11}$$

$$c^s = l_j^s \exp(\theta_j^s) w_j \tag{12}$$

$$h_{j,2}^s + l_{j,2}^s = 0.5 \tag{13}$$

$$h_{j,1}^s + l_{j,1}^s + h_{j,2}^s + l_{j,2}^s = 1 \tag{14}$$

$$l_j^s = l_{j,1}^s + l_{j,2}^s - (0.5 - l_{j,1}^s)^{\alpha_j} \quad with \quad \alpha_j \geq 0 \tag{15}$$

$$h_j^s = (h_{j,1}^s)^{\rho} (h_{j,2}^s)^{(1-\rho)} \tag{16}$$

Each individual chooses from a set of J occupations the one that yields the highest utility.

$$\widehat{j^s} = argmax \left\{ W_1^s, \ldots, W_J^s \right\} \tag{17}$$

where $W_{\widehat{j}}^s$ for an individual i of gender s is defined as

$$W_{\widehat{j}}^s = \left\{ V_{\widehat{j}}^s | \Omega_i \right\}. \tag{18}$$

The occupational choice determines an endogenous distribution of male and female workers across occupations. Let μ_j^s denote the mass of gender s workers in occupation j then, $\sum_{k=1}^{J} \mu_k^s = 1$ for $s = m, f$.

Aggregation and Equilibrium Given wages, individuals solve the optimization problem yielding value functions $\left\{ V_j^s \right\}_{j=1}^{J}$.

For an occupation j, its population satisfies $\mu_j^s = Prob(W_j^s > W_{-j}^s)$ where we define the vector W_{-j}^s to be equal to $\left\{ W_1^s, \ldots, W_{j-1}^s, W_{j+1}^s, \ldots, W_J^s \right\}$. The cumulative distribution of θ_j in a given occupation j is defined by,

$$G_j^s(\theta_{0,j}^s) = \frac{\int_{\Theta_{-j}^s} \int_{\left\{\theta_j^s \in \Theta_j^s : \theta_j^s < \theta_{0,j}^s\right\}} \chi^s_{\left\{\theta_j^s : W_j^s > W_{-j}^s | \theta_{-j}\right\}} dF(\theta_j) dF(\theta_{-j})}{\int_{\Theta_{-j}^s} \int_{\Theta_j^s} \chi^s_{\left\{\theta_j^s : W_j^s > W_{-j}^s | \theta_{-j}\right\}} dF(\theta_j) dF(\theta_{-j})} \tag{19}$$

where Θ_j^s is the support of θ_j^s and Θ_{-j}^s is the support of θ_{-j}^s and $\chi^s_{\left\{\theta_j^s : W_j^s > W_{-j}^s\right\}}$ is and indicator function that takes the value 1 when an individual with gender s with ability θ_j^s chooses industry j. Finally, $F(\theta_j)$ is the c.d.f of θ_j before sorting of agents.

We can now define the amount of labor in efficiency units in each occupation is found by aggregating the respective productivity of workers in each occupation. Thus, for occupation j, the total labor input is defined as,

$$\begin{aligned} N_j = \mu_j^m \int \{(l_{j,1}^m(\theta_j^m) + l_{j,2}^m(\theta_j^m) - (0.5 - l_{j,1}^m(\theta_j^m))^{\alpha_j})\} \exp(\theta_j^m) dG_j^m(\theta_j^m) + \\ \mu_j^f \int \{(l_{j,1}^f(\theta_j^f) + l_{j,2}^f(\theta_j^f) - (0.5 - l_{j,1}^f(\theta_j^f))^{\alpha_j})\} \exp(\theta_j^f) dG_j^f(\theta_j^f) \end{aligned} \tag{20}$$

In addition, in equilibrium

$$w_j = \kappa_j N_j^{\kappa_j - 1} \prod_{-j} \left\{ X_{-j}^{\kappa_{-j}} \right\} \tag{21}$$

The model has predictions in for the sorting of workers into different occupations and thus for equilibrium wage rates which together with workers abilities determine model generated individual earnings. In addition, given individuals occupational and hours choices our model predicts *ratio*8*to*5's for working hours which we denote as $ratio8to5W_j^s$ for $s = f, m$. Following the definition of these indicators presented above, their model counterparts are given by

$$ratio8to5W_j^s = \mu_j^s \frac{\int l_{j,1}^s(\theta_j^s) dG_j^m(\theta_j^m)}{\int (l_{j,1}^s(\theta_j^s) + l_{j,2}^s(\theta_j^s)) dG_j^s(\theta_j^s)}, \tag{22}$$

Therefore

$$ratio8to5W_j = \mu_j^m ratio8to5W_j^m + \mu_j^f ratio8to5W_j^f, \tag{23}$$

and thus the model can be estimated to then compare its outcomes with the data. This is done in Section in which we present our quantitative analysis. Before that and in order to to illustrate the mechanisms present in the model we resort to a simpler version of the general model described above, this is done next.

4.2 Model Mechanics in a Simple Case

We restrict attention to an economy with only two occupations. We analyze three environments which differ in the degree of heterogeneity among workers. We provide more details below. There is a set of parameters that are common across these economies. Earnings in each occupation represent an equal share in final aggregate income, i.e $\kappa_1 = \kappa_2 = 0.5$. The parameters that govern the productivity penalty due to the coordination of workers are $\alpha_1 = 0.9$ and $\alpha_1 = 1.8$. As for the home production technology, we assume $\rho = 0.3$. Tables 8 and 9 summarize the results of each of the experiments that are described below.

Economy 1: Homogeneous Agents without Gender Differences This economy features a mass of size 1 of workers with the same ability level (normalized to 1). We assume workers have the same weight for market consumption. In other words, the preferences for household care by gender are the same i.e $\nu_m = \nu_f = 0.8$. The results are shown in Panel A of Table 8.

Consumption goods and household care are substitutable. More market consumption implies more market time and less time allocated to household care. The equilibrium features sorting into both occupations, with a larger mass of workers choosing the occupation with the high α. Although it is less costly to work in occupation 2, the technology to produce output rule out an equilibrium in which all the workers work in that occupation. The differences in the value of κ and in the value of α determine the mass of workers in each occupation. Given that it is more costly to work in occupation 1, and in order to keep the same level of utility, workers supply more labor.

That is why $l_1 + l_2$ is larger. However, they have to pay a higher penalty and as a result effective hours are equal. Due to the higher mass of workers in occupation 2, in equilibrium the wage rate and earnings are lower. The trade-off is more household care and less market consumption (occupation 2) as opposed to less household care an more market consumption (occupation 1). In the context of the coordination technology, working more means a higher l_1 and as a result a relatively higher bunching ratio.

Economy 2: Heterogeneous Agents without Gender Differences We now consider the case in which workers are heterogeneous in abilities. Abilities are occupation-specific; workers are born with two ability levels, one for each occupation. The distributions from which abilities are drawn are the same for the two occupations. We assume that log-abilities are distributed normal, with a mean of 0.5 and a standard deviation of 0.3. The results are shown in Panel B of Table 8. The results are similar as both ability distributions are the same. The main differences are in terms of the earnings of workers. As there is selection into occupations according to abilities, everything else equal, only workers in the tail of the distributions are choosing the occupations, the one they have a comparative advantage. This selection mechanism explain the increase in earnings if we compare to the previous case.

Economy 3: Homogenous Agents with Gender Differences We now turn to analyze the case of homogenous agents as before, but instead of having one type of workers, we have two different types. Half of the workers have $\nu = 0.7$ (women) and and half have $\nu = 0.9$ (men). The rest of the economy is the same as the Economy 1 described above. The results are presented in Panel A of Table 9. Since women have a relative higher preference for home goods they will sort into the occupation with the higher α since they will bear a relatively lower cost in the labor market. The mass of workers in Occupation 2 is 0.57 as it contains all the women in the market but also

some of the men. The parameters κ_1 and κ_2 govern the size of the occupations, in this case the assumed values implies some men are also in occupation 2. Similar to the previous cases, occupation 2 has a lower bunching ratio, lower $l_1 + l_2$ and lower earnings. We can easily calculate the gender wage gap: the ratio of average earnings of men with respect to women is 1.07.

Economy 4: Heterogenous Agents with Gender Differences Finally, we describe the case of an economy with men and women and as in Economy 3, agents are heterogeneous. This would be the economy that is represented in the general model described in the previous section. The results are presented in Panel B of Table 9. Due to the extra complexity, in this case we show the results for men and women separately. As it is clear in the table, women sort more in occupation 2, but there are also women that decide to work in occupation 1 even though they have to pay an extra penalty in terms of their productivity, the reason is they have a comparative advantage to work in that occupation. Although they prefer more home production, their relative higher ability more than compensate the cost. For this reason, the average ability of women that work in occupation 1 is higher than the average ability of those that work on occupation 2. The contrary happens for men, they prefer occupation 1 so there is more selection of those that go to occupation 2 and this is why their average ability is higher.

5 Quantitative Analysis

This section presents the quantitative analysis. For this purpose, we use the theoretical model developed above computed and calibrated to mimic the US economy. We restrict the analysis to 22 occupations (aggregating the 94 occupations already used by following their definition) and to married men and women with kids in the household. As already commented, the model predicts bunching ratios, as well as

earnings for men and women for each of the occupations considered. We will use the model predictions to compare with data, different from the data section, in this case the analysis is based on 22 occupations.

Parameter Values We need to pick values for 69 parameters. There are 22 of them that we take directly from the data, these are the labor shares $\{\kappa_1, ..., \kappa_2 2\}$ that are picked to match the share of total earnings in each occupation we observed in the data. The rest of the parameter values are chosen so that we minimize the distance between the moments in the data and the ones generated by the model. We have the parameters that govern the productivity losses due to coordination $\{\alpha_1, ..., \alpha_2 2\}$. In addition, we assume that the distribution of abilities are normal with mean μ_j (one per occupation) and standard deviation σ, common across occupations. Finally, we have the preference parameters ν_m and ν_f as well as ρ. In Tables - we show the moments we target as well as the values obtained for the parameters. The rest of moments moments we target are depicted in Table 6.

Earnings Penalty and the Gender Wage Gap We turn to analyze the baseline economy. In Table 15 we present the results. The total labor offered as well as the effective labor of women is substantially lower than the one for men. On the contrary, household care time is much higher for women. As women sort relatively more into the occupations with relatively high α then they will not be compensated as men. As a result, their earnings per hour is lower than men. The predicted ratio of earnings of men over women is 1.31, very close to its data counterpart. In what follows we perform a set of counterfactual exercises to analyze the change in the gender wage gap. They are described in Table 16.

Coordination of Schedules and the Gender Wage Gap In this experiment we have set all the α's equal to their average. That means, occupations are all the same in terms of the productivity penalty associated with the coordination of hours. Since women

still have a higher preference for home good, everything else equal, relative to men they will work less and allocate more hours to home production. However, compared to the baseline economy they will sort more into the occupations that had low α and thus on average the earnings are going to be more similar to men. As a result the earnings wage gap is lower as shown in the table.

Absolute Advantages and the Gender Wage Gap In this case we eliminate the ex-ante differences in abilities between men and women. Specifically, we set λ, the parameter that shifts the ability distributions, to zero. In this way, there are no ex-ante differences in abilities between men and women. One could see this case as one representing the catch up of women in terms of education or general human capital abilities observed in the data. Relative to the baseline case women have more abilities to work in all occupations, and since they have the same preferences for home goods, they will sort more into occupations with a low α. For the same quantity of raw hour worked due their relative higher ability they can finance the same consumption as before but the effective hours are relatively lower and thus make less per hour than men. However, the earnings gap with men is substantially reduced.

Home Production and the Gender Wage Gap In this exercise we make men and women equal in terms of their preferences for home production by setting ν equal (to the average of the calibrated ν's) for both types of workers. The gender wage gap gets dramatically reduced as it is shown in the last row of Table 16, from 1.31 to 1.13. Relative to the baseline case women have less household care responsibilities and thus are less constrained to choose occupations. As a result they will work more and also they will sort more into the occupations with low α. At the same time, men will work relatively less than before and will sort relatively more into the occupations with high α. For these reasons, for the same ability earnings per hour are lower than men but compared to the baseline case the gap with respect to men is lower.

6 Final Remarks

The observed earnings gap is partially determined by a set of decisions done by workers. Household care responsibilities may condition the labor supply of women and men differently. Not only in terms of the amount of time to be allocated to market work versus home production but also in they type of occupations they choose to work for. In this paper we document new facts that show that the coordination of the work schedules during the day is highly valued in the labor market as it conflicts with the demands for family time. More importantly, it affects women more than men preventing them to realize their comparative advantage and thus driving a gap in their relative earnings.

We develop an occupational choice model that incorporate this important constraints faced by women due to their relatively high demand for family time. Besides the choice of occupation as well as the supply of market hours the worker chooses the particular time of the day to work. A calibrated version of the model is able to generate the patterns observed in the data. An important prediction is that the coordination friction together with the family constraint generates half of the observed gender earnings gap.

We see our analysis as an important step towards understanding the effect of the interaction of worker's skills and their home care needs on their career choice and performance. Therefore, it contributes to improve our understanding of central topics in labor and family economics, ranging from gender inequality to marriage and fertility decisions. We think our framework will be an important laboratory to analyze the effect of important policies such as parental leave policies and child care subsidies on males' and females' labor market outcomes. However, our framework does not address several forces that shape both individuals skills and their career choices, such as the interaction between marriage and fertility on human capital accumulation and occupational choice, but we hope our results help to motivate work to shed light on

these forces.

References

Beers, T. M. (2000): "Flexible Schedules and Shift Work: Replacing the âĂIJ9 to 5âĂİ Workday?," Discussion paper.

Cardoso, A. R., D. S. Hamermesh, and J. Varejao (2012): "The Timing of Labor Demand," *Annals of Economics and Statistics*, (105-106), 15–34.

CEA (2010): "Work-Life Balance and the Economics of Workplace Flexibility," Discussion paper.

——— (2014): "Work-Life Balance and the Economics of Workplace Flexibility," Discussion paper.

Cha, Y., and K. A. Weeden (2014): "Overwork and the Slow Convergence in the Gender Gap in Wages," *American Sociological Review*, 79(3), 457–484.

Cortes, P., and J. Pan (2016a): "Prevalence of Long Hours and Skilled WomenâĂŹs Occupational Choices," Discussion paper, Boston University, Questrom School of Business.

——— (2016b): "When Time Binds: Returns to Working Long Hours and the Gender Wage gap among the Highly Skilled," Discussion paper, Boston University, Questrom School of Business.

Eden, M. (2017): "The Week," Discussion paper, Brandeis University.

Erosa, A., L. Fuster, G. Kambourov, and R. Rogerson (2017): "Hours, Occupations, and Gender Differences in Labor Market Outcomes," NBER Working Papers 23636, National Bureau of Economic Research, Inc.

Gicheva, D. (2013): "Working Long Hours and Early Career Outcomes in the High-End Labor Market," *Journal of Labor Economics*, 31(4), 785 – 824.

Goldin, C. (2014): "A Grand Gender Convergence: Its Last Chapter," *American Economic Review*, 104(4), 1091–1119.

Hamermesh, D. S., C. K. Myers, and M. L. Pocock (2008): "Cues for Timing and Coordination: Latitude, Letterman, and Longitude," *Journal of Labor Economics*, 26(2), 223–246.

Han, W.-J. (2005): "Maternal Nonstandard Schedules and Child Cognitive Outcomes," *Child Development*, 76(1), 137–174.

Henly, J. R., and S. J. Lambert (2014): "Unpredictable Work Timing in Retail Jobs: Implications for Employee Work-Life Conflict," *Industrial and Labor Relations Review*, 67(3), 986–1016.

Mas, A., and A. Pallais (2016): "Valuing Alternative Work Arrangements," Discussion paper, Princeton University, Department of Economics.

McCrate, E. (2005): "Flexible Hours, Workplace Authority, and Compensating Wage Differentials in the U.S," *Feminist Economics*, 11(1), 11–39.

——— (2012): "Flexibility for Whom? Control over Work Schedule Variability in the U.S.," *Feminist Economics*, 18(1), 39–72.

Presser, H. (2000): "Non-standard Work Schedules and Marital Stability," *Journal of Marriage and Family*, 62, 93–110.

Roy, A. D. (1951): "Some Thoughts on the Distribution of Earnings," *Oxford Economic Papers*, 3(2), 135–146.

Stewart, J. (2010): "The Timing of Maternal Work and Time with Children," *Industrial and Labor Relations Review*, 64(1), 181–200.

Strazdins, L., M. S. Clements, R. J. Korda, D. H. Broom, and R. M. DSouza (2006): "Unsociable Work? Nonstandard Work Schedules, Family Relationships, and Children's Well-Being," *Journal of Marriage and Family*, 68, 394–410.

Figures

Figure 1: Work by Hour of Day

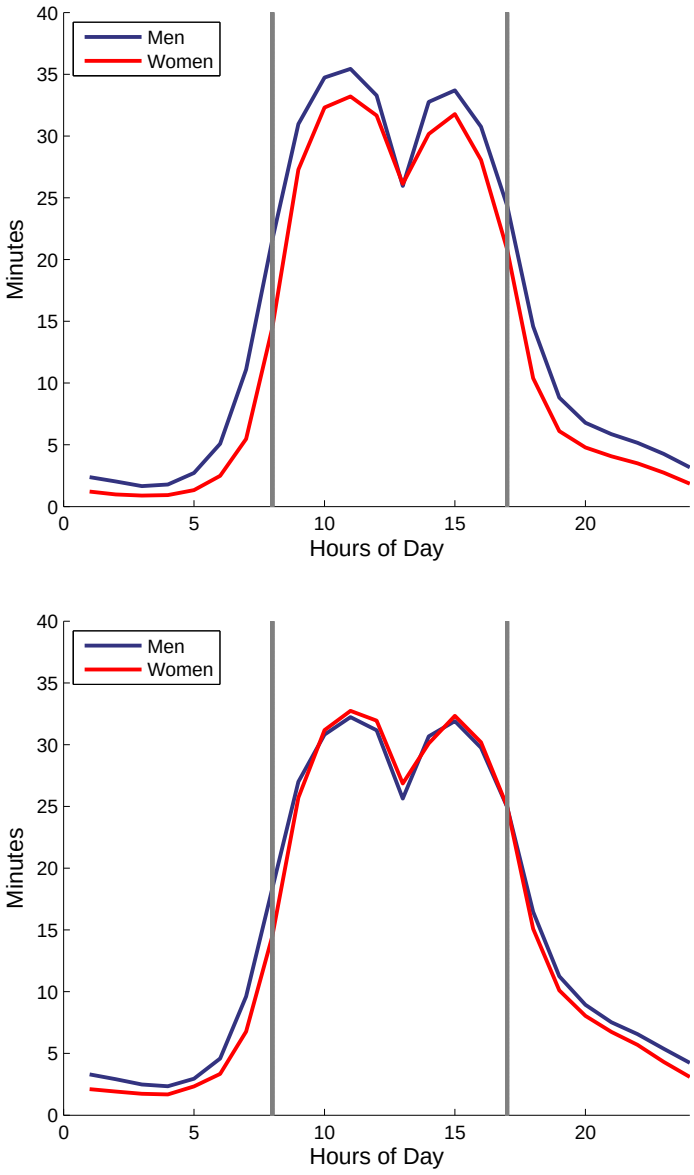


Figure 2: Household Care for Full-Time Workers

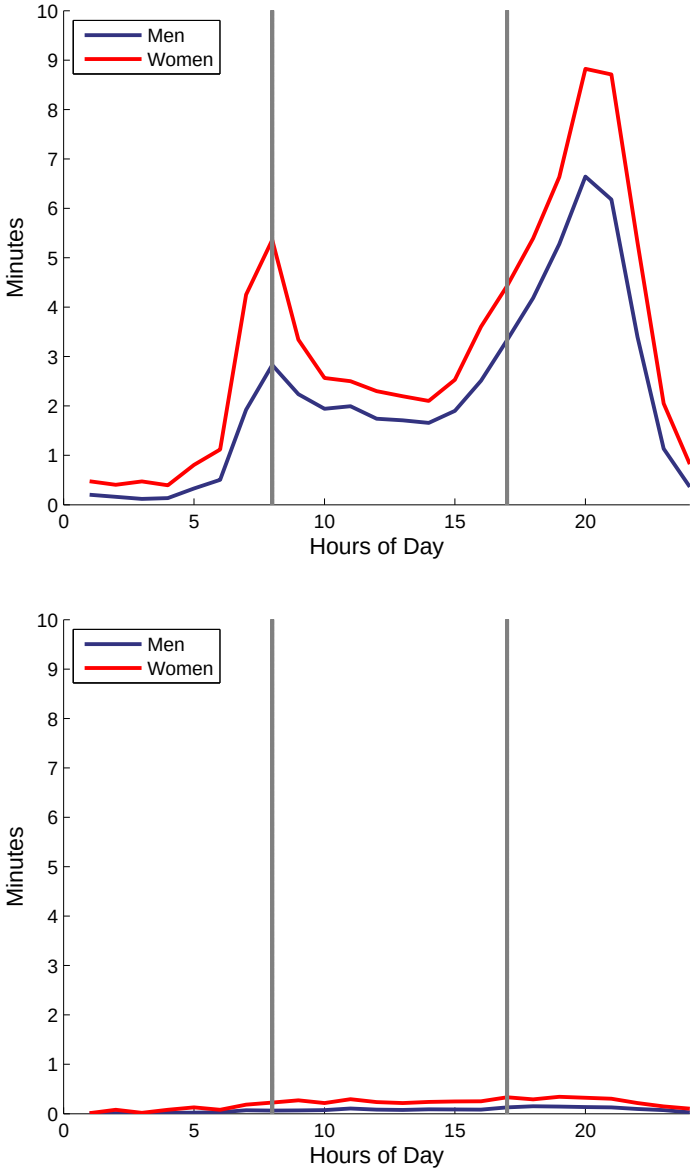
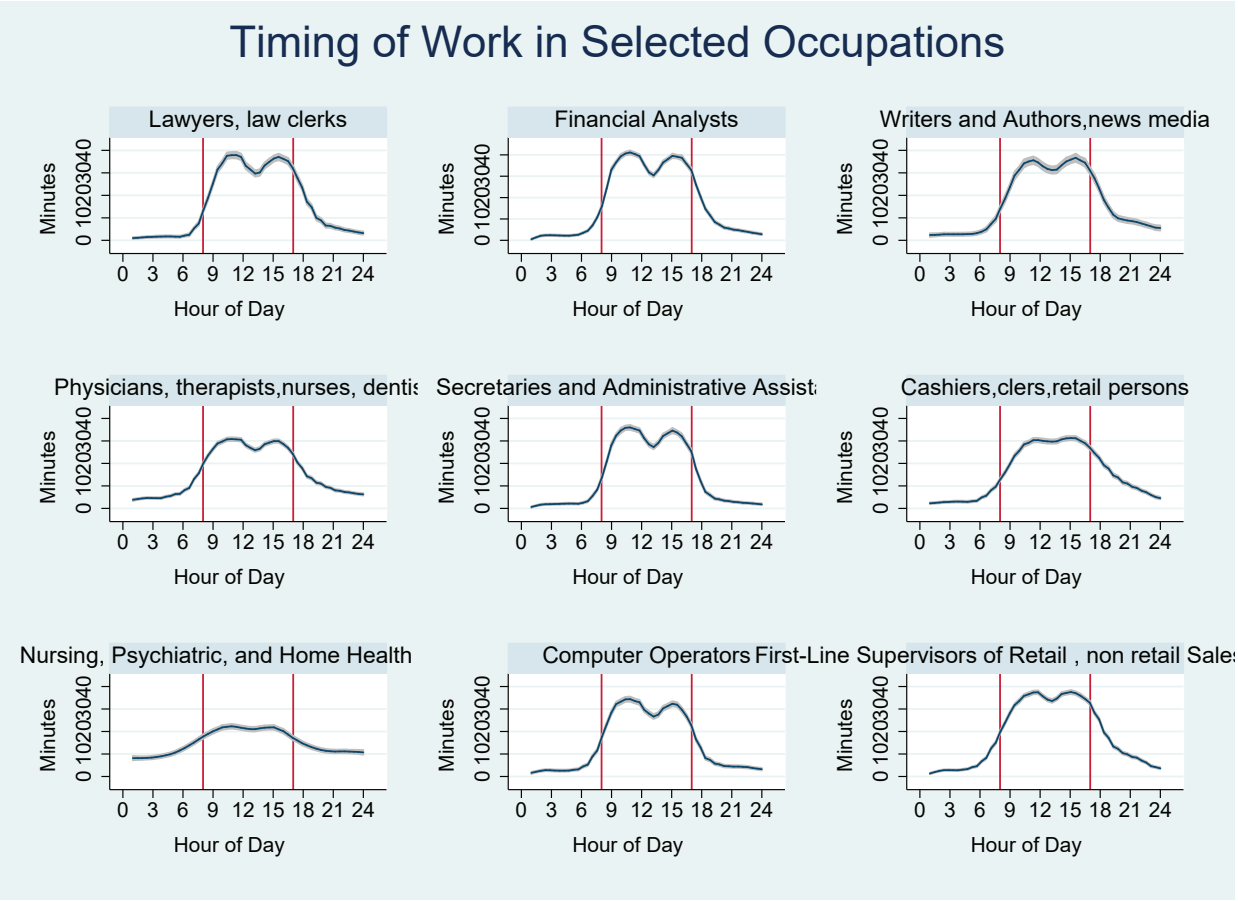


Figure 3: Ratio8to5 for Assorted Occupations



Tables

Table 1: Work FT Workers

	Weekday	Weekend	Weekday	Weekday		
Female Gap in Hours	-0.896***	-0.731***	-0.906***	-0.902***	-0.687***	-0.447***
	(0.0722)	(0.0709)	(0.0720)	(0.0730)	(0.0725)	(0.0800)
Observations	11339	11438	11339	11339	11339	7863
Day of Week and Year			x	x	x	x
Education ,Age and Race				x	x	x
Usual Weekly Hours					x	x
Usual Weekly Hours less than 50						x
Average Hours, Men	7.915	2.177				
Average Hours, Women	7.019	1.445				

Table 2: Household Care for FT Workers

	Weekday	Weekend	Weekday	Weekday		
Female Gap in Household Care	.456***	.266***	.455***	.363***	.334***	.275***
	(0.0291)	(0.0354)	(0.0291)	(0.0285)	(0.0287)	(0.0348)
Observations	11339	11438	11339	11339	11339	7863
Day of Week and Year			x	x	x	x
Education ,Age and Race				x	x	x
Usual Weekly Hours					x	x
Usual Weekly Hours less than 50						x
Average Hours, Men	.819	1.013				
Average Hours, Women	1.275	1.279				

Table 3: Ratio8to5 For Occupations With Fraction Of College $\leq .4$

	Occupations	# Workers	# Full Time Workers	Work	Work_Standardized
1	Fishers and Related Fishing Workers	16	6	0.304	-4.468
2	Forest and Conservation Workers,logging	43	27	0.501	-2.301
3	Firefighters	182	172	0.502	-2.291
4	Dishwashers,hosts,hostesses	459	126	0.517	-2.124
5	Nursing, Psychiatric, and Home Health Aides	1265	779	0.532	-1.958
6	Wardens,jailors,correctional officers	777	736	0.545	-1.816
7	Combined Food Preparation and Serving Workers, Including Fast Food	1325	452	0.549	-1.769
8	Police and Detectives,protective service	209	194	0.550	-1.755
9	Ushers, Lobby Attendants, and Ticket Takers	198	73	0.551	-1.747
10	Railroad Brake, Signal, and Switch Operators	75	72	0.563	-1.614
11	Crossing Guards,animal control, lifeguards etc	682	472	0.570	-1.538
12	extraction,mining related	91	78	0.573	-1.511
13	Transportation Attendants, except Flight Attendants	111	76	0.593	-1.288
14	Baggage Porters, trans.attendants	90	47	0.600	-1.206
15	Ship and Boat Captains and Operators	22	19	0.603	-1.177
16	Miscellaneous Assemblers and Fabricators	660	590	0.605	-1.158
17	Laborers and Freight, Stock, and Material Movers	1842	1380	0.611	-1.089
18	Molders and Molding Machine Setters, Operators, and Tenders, Metal and Plastic	1054	992	0.611	-1.088
19	Cooks,Food Preparation Workers	1313	661	0.614	-1.060
20	Miscellaneous Plant and System Operators	168	156	0.616	-1.035
21	Chefs Head Cooks	456	353	0.616	-1.030
22	Helpers, Construction Trades	43	30	0.619	-0.998
23	Inspectors, Testers, Sorters, Samplers, and Weighers	1644	1417	0.624	-0.943
24	Motor Vehicle Operators, All Other	2262	1664	0.631	-0.873
25	First-Line Supervisors of Production and Operating Workers	525	498	0.633	-0.847
26	Maids and housekeeping cleaners	2226	1285	0.637	-0.807
27	Dispatchers,office clerks , cargo agents	2000	1569	0.646	-0.707
28	Food Processing Workers, All Other	347	257	0.648	-0.677
29	Telephone and related Operators	59	46	0.649	-0.674
30	Bookbinders and Bindery Workers, printing press operators	167	144	0.649	-0.670
31	Agricultural Inspectors, animal breeders etc	558	400	0.662	-0.528
32	First-Line Supervisors of Gaming Workers,personal service	182	134	0.672	-0.414
33	Medical Records and Health Information Technicians	1387	1000	0.680	-0.332
34	Supervisors of Transportation and Material Moving Workers	132	119	0.686	-0.261
35	First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	39	35	0.692	-0.197
36	Cashiers,clers,retail persons	3228	1460	0.693	-0.182
37	Personal Care and Service Workers, All Other	1875	852	0.695	-0.161
38	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	310	236	0.707	-0.030
39	Tailors, Dressmakers, and Sewers etc	400	296	0.713	0.029
40	First-Line Supervisors of Retail , non retail Sales Workers	2632	2257	0.721	0.125
41	Carpenters,woodworkers	117	99	0.725	0.163
42	installation, maintenance workers	1253	1124	0.732	0.237
43	First-Line Supervisors of Mechanics, Installers, and Repairers	216	212	0.750	0.441
44	First-Line Supervisors of Office and Administrative Support Workers	1026	904	0.751	0.447
45	Grounds Maintenance Workers	709	396	0.756	0.500
46	Mechanics	970	852	0.758	0.527
47	Plasterers and Stucco Masons, repair works	3240	2627	0.759	0.543
48	Door-to-Door Sales Workers, News and Street Vendors, and Related Workers	989		0.761	0.556
49	First-Line Supervisors of Construction Trades and Extraction Workers	462	416	0.761	0.565
50	Engineering and related Technicians	433	389	0.763	0.577
51	other Construction and Related Workers	204	185	0.776	0.724
52	personal appearance workers	554	271	0.779	0.759
53	Medical Assistants	702	404	0.779	0.761
54	Animal Trainers,Nonfarm Animal Caretakers	129	78	0.780	0.764
55	Computer Operators	1762	1319	0.787	0.841
56	Eligibility Interviewers, Government Programs, other clerks	2853	2041	0.788	0.855
57	Electronic Equipment Installers and Repairers, Motor Vehicles	420	372	0.797	0.960
58	Clerks	1723	1239	0.812	1.126
69	Audio-Visual and Multimedia Collections Specialists, lib. Workers	713	375	0.839	1.413
60	Secretaries and Administrative Assistants	2125	1598	0.843	1.459
61	Occupational Therapy Assistants and Aides	50	37	0.923	2.343
62	Morticians, Undertakers, and Funeral Directors	16	6	0.925	2.359
63	Tour and Travel Guides	16		0.960	2.746

This table shows the ratio of time spent on work between 8 am to 5 pm relative total time spent on work by individuals in the 94 occupations. Column 'work' refers to non standardized ratios and work _standardized shows standardized ratios. Panel A shows the ratio for the occupations where the fraction of workers with a college degree is $\leq .4$. Panel B shows the ratio where the college share is $> .4$.

Table 4: Ratio8to5 For Occupations With Fraction Of College >.4

	Occupations	# Workers	# Full Time Workers	Work	Work_Standardized
1	Geological, chemical, natural scienceTechnicians	182	144	0.619	-1.006
2	Air Traffic Controllers and Airfield Operations Specialists	96	71	0.626	-0.927
3	Photographers, sound and light technicians	172	103	0.637	-0.808
4	sports ,entertainment	444	200	0.663	-0.513
5	Physicians, therapists,nurses, dentists	3502	2510	0.668	-0.461
6	Directors, Religious Activities and Education	407	282	0.669	-0.449
7	other miscellaneous managers	6086	4931	0.736	0.284
8	Writers and Authors,news media	557	402	0.740	0.325
9	Archivists, Curators, and Museum Technicians	518	222	0.741	0.339
10	Preschool and Kindergarten Teachers	1012	649	0.745	0.386
11	Chief Executives, general managers	1702	1526	0.766	0.619
12	Surveyors, Cartographers, and Photogrammetrists	171	141	0.767	0.627
13	scientists	280	259	0.773	0.692
14	Secondary, middle School Teachers	3607	2968	0.776	0.724
15	computer/software related	2348	2167	0.776	0.730
16	Sales Representatives, Wholesale and Manufacturing	827	722	0.783	0.806
17	Engineers	1315	1238	0.788	0.854
18	Social sciences	297	235	0.789	0.863
19	Designers, artists	621	427	0.792	0.904
20	Lawyers, law clerks	778	672	0.793	0.913
21	Miscellaneous Community and Social Service Specialists	1273	1065	0.794	0.921
22	Public Relations, Fundraising, advert, marketing	733	666	0.794	0.925
23	Financial Analysts	2143	1850	0.798	0.963
24	Transportation, industrial, admin managers	1939	1828	0.800	0.989
25	Travel,sales Agents	1058	899	0.801	1.005
26	Training and development specialists,business operations	2158	1848	0.805	1.047
27	Other Healthcare Practitioners and Technical Occupations	51	44	0.819	1.202
28	natural science, biology	217	200	0.838	1.410
29	Librarians, teacher assistatns	207	152	0.840	1.434
30	Math,stats, operations research, actuaries	122	110	0.860	1.644
31	Judges, Magistrates, and Other Judicial Workers	371	307	0.882	1.889

Table 1 shows the ratio of time spent on work between 8 am to 5 pm relative total time spent on work by individuals in the 94 occupations. Column 'work' refers to non standardized ratios and work _standardized shows standardized ratios. Panel A shows the ratio for the occupations where the fraction of workers with a college degree is $\leq .4$. Panel B shows the ratio where the college share is $> .4$.

Table 5: Rank Correlation Between Importance of Occupational Characteristics and Bunching Ratios

Assisting and caring for others	-0.1826
Coaching and developing others	0.1124
Developing and Building Teams	0.1472
Establishing and Maintaining_Interpersonal Relationships	0.365
Face-to-Face Discussions	0.2802
Social orientation	0.0876
Training and Teaching Others	-0.0129
Guiding Directing and Motivating Subordinates	0.1014

This table shows the correlations between importance of ONET defined occupational characteristics and our standardized bunching ratios for 94 occupations. ONET defines the importance of occupational characteristics for detailed SOC occupations. We aggregate the indexes to our 94 occupations by taking a weighted average where the weights are the total number of workers in each SOC defined occupation.

Table 6: Regression Results Based on 94 Occupations

	Baseline	Baseline+Agg Educ	Baseline+Agg Educ +Overwork
Panel A: All			
female	-0.218***	-0.253***	-0.245***
	(0.0220)	(0.0160)	(0.0173)
ratio8to5	0.128***	0.0693**	0.0724**
	(0.0254)	(0.0268)	(0.0271)
femaleXratio8to5	-0.0529*	-0.0443**	-0.0371*
	(0.0266)	(0.0217)	(0.0215)
Observations	259756	259756	259756
Panel B:Single Without Children			
female	-0.137***	-0.169***	-0.166***
	(0.0183)	(0.0158)	(0.0167)
ratio8to5	0.114***	0.0607**	0.0616**
	(0.0215)	(0.0297)	(0.0293)
femaleXratio8to5	-0.0168	-0.0146	-0.0118
	(0.0214)	(0.0221)	(0.0221)
Observations	72287	72287	72287
Panel C: Married With Children			
female	-0.262***	-0.296***	-0.288***
	(0.0257)	(0.0183)	(0.0195)
ratio8to5	0.124***	0.0726**	0.0763**
	(0.0289)	(0.0271)	(0.0292)
femaleXratio8to5	-0.0683**	-0.0607**	-0.0514**
	(0.0338)	(0.0253)	(0.0249)
Observations	108981	108981	108981

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .001$
Regression results are based on 94 occupations. Occupations where less than 100 ATUS respondents were used to calculate the ratio, as well as those with ratios beyond 2 standard deviations from the mean, have been dropped.

Table 7: Regression Results Based on 94 Occupations - Only Men

	Baseline	Baseline+Agg Educ	Baseline+Agg Educ +Overwork
Panel A: All			
wifemore	-0.416***	-0.412***	-0.411***
	(0.0141)	(0.0129)	(0.0126)
ratio8to5	0.133***	0.0864***	0.0872***
	(0.0281)	(0.0234)	(0.0246)
wifemore X ratio8to5	-0.0474**	-0.0454**	-0.0453**
	(0.0160)	(0.0152)	(0.0149)
male_overwork			0.196
			(0.130)
Observations	59023	59023	59023
Panel B: with Children			
wifemore	-0.405***	-0.402***	-0.402***
	(0.0145)	(0.0132)	(0.0130)
ratio8to5	0.124***	0.0834**	0.0838**
	(0.0309)	(0.0266)	(0.0277)
wifemore X ratio8to5	-0.0456**	-0.0448**	-0.0448**
	(0.0187)	(0.0180)	(0.0179)
male_overwork			0.137
			(0.131)
Observations	40993	40993	40993

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .001$
Regression results are based on 94 occupations. Occupations where less than 100 ATUS respondents were used to calculate the ratio, as well as those with ratios beyond 2 standard deviations from the mean, have been dropped.

Table 8: Table: A Simple Case - No Gender Differences

	% Workers	Bunching Ratio	Earnings	$l_1 + l_2$	l	Av. Ability
Panel A: Homogeneous Workers						
Occ. 1	0.49	0.57	0.41	0.84	0.80	
Occ. 2	0.51	0.56	0.38	0.81	0.80	
Panel B: Heterogeneous Workers						
Occ. 1	0.49	0.57	0.82	0.84	0.79	2.02
Occ. 2	0.51	0.56	0.79	0.81	0.80	2.03

Note:

Table 9: A Simple Case with Gender Differences

	% Workers	Bunching Ratio	Earn.	$l_1 + l_2$	l	% Women	Ability
Panel A: Homogeneous Workers							
Occ. 1	0.43	0.61	0.36	0.75	0.70	0	
Occ. 2	0.57	0.60	0.34	0.72	0.71	0.5	
Gender Earnings Gap	1.07						
Panel B: Heterogeneous Workers							
Occ. 1 Men	0.26	0.53	0.91	0.92	0.90		2.0
Occ. 1 Women	0.23	0.61	0.73	0.75	0.70		2.1
Occ. 2 Men	0.24	0.52	0.90	0.90	0.90		2.1
Occ. 2 Women	0.27	0.60	0.68	0.72	0.71		2.0
Occ. 1	0.49	0.57	0.83	0.84	0.81	0.46	2.0
Occ. 2	0.51	0.56	0.78	0.80	0.80	0.54	2.1
Gender Earnings Gap	1.29						

Note:

Table 10: Labor Shares and $8to5$ Ratios

Occupation no.	Occupation	κ	$8to5$
1	Management	0.185	0.043
2	Business and financial operations	0.062	0.087
3	Computer and mathematical	0.053	0.066
4	Architecture and engineering	0.042	0.066
5	Life, physical, and social science	0.014	0.053
6	Community and social service occupations	0.016	0.045
7	Legal	0.021	0.107
8	Education, training, and library	0.069	0.060
9	Arts, design, entertainment, sports, and media	0.014	0.021
10	Healthcare practitioners and technical	0.068	-0.041
11	Healthcare support	0.009	-0.082
12	Protective service	0.030	-0.166
13	Food preparation and serving related	0.012	-0.124
14	Building and grounds cleaning and maintenance	0.017	-0.038
15	Personal care and service	0.008	-0.006
16	Sales and related	0.091	0.021
17	Office and administrative support	0.085	0.051
18	Farming, fishing, and forestry	0.004	-0.058
19	Construction and extraction	0.055	0.038
20	Installation, maintenance, and repair	0.042	0.036
21	Production	0.057	-0.086
22	Transportation and material moving	0.045	-0.092

Note: The table presents the labor shares calculated by dividing the compensation of .

Table 11: Mean Earnings by Occupation

Occupation no.	Occupation	Mean Relative to Occ. 1
1	Management	1
2	Business and financial operations	0.845
3	Computer and mathematical	0.997
4	Architecture and engineering	0.966
5	Life, physical, and social science	0.894
6	Community and social service occupations	0.619
7	Legal	1.084
8	Education, training, and library	0.660
9	Arts, design, entertainment, sports, and media	0.778
10	Healthcare practitioners and technical	0.819
11	Healthcare support	0.365
12	Protective service	0.693
13	Food preparation and serving related	0.340
14	Building and grounds cleaning and maintenance	0.359
15	Personal care and service	0.381
16	Sales and related	0.702
17	Office and administrative support	0.480
18	Farming, fishing, and forestry	0.327
19	Construction and extraction	0.574
20	Installation, maintenance, and repair	0.599
21	Production	0.480
22	Transportation and material moving	0.493

Note: The table presents.

Table 12: Remaining Calibration Targets

Av. Gender Earnings Gap	1.35
Av. Household Care Men	0.177
Av. Household Care Women	0.246
Av. 8*to*5 Ratio Household Care	0.395
Sd. Dev. of Earnings	0.59

Note: The table shows .

Table 13: α and Mean Ability

Occupation no.	Occupation	α	μ_j
1	Management	0.765	0.1
2	Business and financial operations	0.940	1.366
3	Computer and mathematical	0.586	0.896
4	Architecture and engineering	0.590	0.467
5	Life, physical, and social science	0.576	0.609
6	Community and social service occupations	1.426	1.226
7	Legal	0.417	1.490
8	Education, training, and library	1.551	0.968
9	Arts, design, entertainment, sports, and media	0.860	0.473
10	Healthcare practitioners and technical	0.921	3.171
11	Healthcare support	4.212	0.371
12	Protective service	1.404	2.084
13	Food preparation and serving related	6.489	0.513
14	Building and grounds cleaning and maintenance	4.084	0.873
15	Personal care and service	3.831	1.593
16	Sales and related	1.499	1.238
17	Office and administrative support	2.730	0.420
18	Farming, fishing, and forestry	4.633	1.332
19	Construction and extraction	1.969	0.349
20	Installation, maintenance, and repair	1.627	0.210
21	Production	4.589	0.954
22	Transportation and material moving	4.414	1.084

Note: The table presents the labor shares calculated by dividing the compensation of .

Table 14: Remaining Parameters

ρ	0.65
ν_f	0.42
ν_m	0.10
λ	-0.09
σ	0.71

Note: The table shows .

Table 15: Model Predictions - Baseline

	Men	Women
Total Labor	0.80	0.53
Effective Labor	0.72	0.44
Hours HH Care	0.20	0.47
$8to5$ Ratio	0.49	0.44
Earnings	0.54	0.39
Earnings Gap	1.38	

Note: The table shows .

Table 16: Gender Earnings Gap - Counterfactuals

	Ratio Earnings Men over Women
Baseline	1.38
Same α's	1.27
$\lambda = 0$	1.19
Same ν's	1.13

Note: The table shows .

Appendix

.1 Regressions College and Non-College

In this section we run separate regressions for those college-educated (Bachelor's degree or higher) and for those non-college educated.

Table A.1: Regression Results Based on 94 Occupations - College and Non-College

	Baseline	Baseline+Agg Educ	Baseline+Agg Educ +Overwork
Panel A: College			
female	-0.175***	-0.217***	-0.220***
	(0.0383)	(0.0253)	(0.0285)
ratio8to5	0.160***	0.0895**	0.104**
	(0.0446)	(0.0403)	(0.0473)
femaleXratio8to5	-0.167**	-0.120**	-0.0832**
	(0.0571)	(0.0418)	(0.0400)
Observations	42987	42987	42987
Panel B: Non-college			
female	-0.287***	-0.327***	-0.325***
	(0.0203)	(0.0201)	(0.0206)
ratio8to5	0.121***	0.0783**	0.0784**
	(0.0287)	(0.0314)	(0.0317)
femaleXratio8to5	-0.0551*	-0.0648**	-0.0633**
	(0.0295)	(0.0280)	(0.0280)
Observations	65994	65994	65994

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .001$
Note:

.2 Shift Work

In this section we use the 2004 May CPS Work Schedule Supplment to run earnings regressions separately including shift workers and excluding shift workers. "Shift work-

ers" are workers who report working "evening shift," "night shift," "rotating shift," "split shift," "irregular schedule," and "some other shift."

Table A.2: Regression Results using 2004 Work Schedule Supplement

	Baseline	Baseline+Agg Educ	Baseline+Agg Educ +Overwork
Panel A: Married Women with Children - Including Shift-Workers			
female	-0.322***	-0.354***	-0.344***
	(0.0275)	(0.0221)	(0.0222)
ratio8to5	0.120***	0.0674**	0.0729**
	(0.0289)	(0.0256)	(0.0242)
femaleXratio8to5	-0.0521	-0.0560*	-0.0430
	(0.0372)	(0.0315)	(0.0311)
Observations	3291	3250	3250
Panel B Married Women with Children - Excluding Shift-Workers			
female	-0.324***	-0.357***	-0.345***
	(0.0284)	(0.0226)	(0.0225)
ratio8to5	0.128***	0.0705**	0.0791**
	(0.0316)	(0.0274)	(0.0267)
femaleXratio8to5	-0.0634	-0.0607*	-0.0480
	(0.0383)	(0.0317)	(0.0321)
Observations	2909	2876	2876

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .001$
Note:

.3 Concentration Index

Let $work_j^k$ be the total weighted time spent working in each day of the week-hour time bin k in occupation j,

$$work_j^k = \sum_{i=1}^{N_j} work_{ijk}.w_i$$

where i denotes individual in occupation j and w_i denotes weight of individual i.

Let $share_j^k$ be the fraction of the total time spent in each occupation in each time bin and each day.

$$share_j^k = \frac{work_j^k}{\sum_k work_j^k}$$

Our Concentration Index measure is the Herfindahl index defined as:

$$cr_j = \sum_k (share_j^k)^2$$

Table A.3: Regression Results Based on 94 Occupations - Concentration Ratios

	Baseline	Baseline+Agg Educ	Baseline+Agg Educ +Overwork
Panel A: All			
female	-0.284***	-0.300***	-0.286***
	(0.0249)	(0.0324)	(0.0330)
conc ratio	0.442***	0.209*	0.241**
	(0.0938)	(0.113)	(0.114)
femaleXconc ratio	-0.295**	-0.196*	-0.171
	(0.114)	(0.106)	(0.104)
Observations	259756	259756	259756
Panel B: Single Without Children			
female	-0.166***	-0.190***	-0.184***
	(0.0253)	(0.0354)	(0.0357)
conc ratio	0.415***	0.216	0.232*
	(0.0870)	(0.130)	(0.129)
femaleXconc ratio	-0.139	-0.0880	-0.0758
	(0.109)	(0.115)	(0.114)
Observations	72287	72287	72287
Panel C: Married With Children			
female	-0.344***	-0.360***	-0.345***
	(0.0272)	(0.0340)	(0.0342)
conc ratio	0.426***	0.220*	0.256**
	(0.102)	(0.111)	(0.118)
femaleXconc ratio	-0.369**	-0.269**	-0.239**
	(0.129)	(0.113)	(0.113)
Observations	108981	108981	108981

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .001$
Regression results are based on 94 occupations. Occupations where less than 100 ATUS respondents were used to calculate the ratio, as well as those with ratios beyond 2 standard deviations from the mean, have been dropped.

.4 Hours of Men with Wifemore

In this section we examine hours of work in the ATUS for married men who earn more than their wives and married men who earn less than their wives. "Wifemore" is an indicator for married men whose weekly earnings are lower than their wives.

Table A.4: Work FT Workers

	Weekday	Weekend	Weekday		Weekday		
Wifemore Gap in Hours	-0.286**	0.0141	-0.269*	-0.249*	-0.215	-0.234	
	(0.139)	(0.142)	(0.139)	(0.140)	(0.137)	(0.159)	
Observations	3810	3782	3810	3810	3810	2553	
Day of Week and Year			x		x	x	x
Education ,Age and Race					x	x	x
Usual Weekly Hours						x	x
Usual Weekly Hours less than 50							x

Table A.5: Work FT Workers

	(1) Weekday	(2) Weekend	(3) Weekday	(4) est4	(5) est5	(6) est6	(7) est7
Gap in Household Hours	0.0359	0.0209	0.0358	0.0518	0.0471	-0.0219	0.0491**
	(0.0522)	(0.0683)	(0.0523)	(0.0511)	(0.0510)	(0.0659)	(0.0187)
Observations	3810	3782	3810	3810	3810	2553	3810
Day of Week and Year			x		x	x	x
Education ,Age and Race					x	x	x
Usual Weekly Hours						x	x
Usual Weekly Hours less than 50							x