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Telecommuting and Earnings Trajectories Among American Women and Men 1989–2008

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Abstract

While flexibility in the location of work hours has shown positive organizational effects on productivity and retention, less is known about the earnings effects of telecommuting. We analyze weekly hours spent working from home using the 1989–2008 panels of the National Longitudinal Study of Youth. We describe the demographic and occupational characteristics of the employees engaged in telecommuting, then track their earnings growth with fixed-effects models, focusing on gender and parental status. Results show substantial variation in the earnings effects of telecommuting based on the point in the hours distribution worked from home. Working from home rather than the office produces equal earnings growth in the first 40 hours worked, but “taking work home” or overtime telecommuting yields significantly smaller increases than overtime worked on-site. Yet most observed telecommuting occurs precisely during this low-yield overtime portion of the hours distribution. Few gender or parental status differences emerged in these processes. These trends reflect potentially widespread negative consequences of the growing capacity of workers to perform their work from any location. Rather than enhancing true flexibility in when and where employees work, the capacity to work from home mostly extends the work day and encroaches into what was formerly home and family time.

Keywords

telecommuting; flexible work; overtime; earnings; gender

Telecommuting has taken center stage as businesses and policy makers recognize American workers’ desire for more flexibility, whether they are parents squeezed for time for family care or millennials expecting more time for personal needs. Surveys of employers show an increasing number offering such flexibility in the United States (Beers 2000; Sweet, et al. 2014). Yet how telecommuting factors into employee productivity and compensation is still much contested and little understood. On one side, scholars predict that employees using flexible work arrangements will pay a steep price in foregone earnings and promotions as employers differentiate between traditional workers and those using flexible work options (Thompson, Beauvais, and Lyness 1999; Williams 2000). Hours spent on-site increasingly

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mark employee commitment and productivity (Beninger and Carter 2013; Elsbach, Cable, and Sherman 2010), with large firms like Yahoo and Best Buy recently recalling their telecommuting workers based on the belief that innovation increases with the amount of face-to-face interaction (Italie 2013). Other scholars, however, suggest that employees who use flexible work practices are in fact “favored” workers in high performance workplaces where autonomy and schedule control increase worker productivity and promote wage growth (Gariety and Schaffer 2007; Osterman 1995; Weeden 2005). Here we address whether such earnings penalties or bonuses exist for employees performing work for their employers at home, explore theoretical reasons why effects of both types might exist, and whether they differ depending on the gender and parental status of the worker. We evaluate how telecommuting operates over time *with the same employer* to affect employee earnings using high quality longitudinal data.

The precise definition of telecommuting varies, but is generally defined as the performance of work tasks from home. Telecommuting holds substantial promise as a work strategy that simultaneously increases worker’s control over the location and timing of work tasks, and reduces travel time, costs, and environmental pollution. With growth in the number of occupations dependent on information technology (Autor, Levy, and Murnane 2003), the possibility of working from home has increased significantly. Recent estimates suggest that 31 percent of employers allow at least some employees to regularly work part of the workweek from home (Bond, et al. 2005). In the 2004 American Time Use Study, approximately 13 percent of employees reported actually working from home or away from their primary worksite at least some of the time (Eldridge and Pabilonia 2007).

As a workplace accommodation, telecommuting is less likely than others forms of flexibility to create a direct monetary cost for employers, unlike paid leaves for caregiving or childcare assistance. In fact, telecommuting could decrease employer costs by improving productivity and morale, and reducing health-related absences. Because the cash outlay for telecommuting work schedules is minimal for employers, the earnings impact of telecommuting is unlikely to be contaminated by higher business costs for employers. It thus provides a good test of how the perceived productivity of employees working from home affects their compensation.

At the same time, managers may devalue the labor of those working off-site because of the indirect costs or burden of supervising employees using flexible schedules. Moreover, this process may not be gender neutral – women may be more heavily penalized for telecommuting than men since such practices signal women’s reproductive status and competing commitments to family (Heilman and Okimoto 2008). [endnote ¹] We therefore compare the earnings effects of telecommuting by gender and parental status in a large nationally representative sample.

Telecommuting is not randomly distributed across the labor force, however. The vast majority of telecommuters are salaried employees exempt from the Fair Labor Standards

¹Others suggest that penalties may be greater for men either because their wage profiles are generally steeper or because men are deviating more heavily from norms about masculine work commitment than women when they use flexible work practices.

Act, and most work less than 10 hours per week from home since few employees work *completely* off-site without supervision (Clear and Dickson 2005). Firms may use independent contractors who exclusively telecommute, but rarely allow permanent employees to work completely from home (Torpey 2007). For these reasons, and because our methodology requires the comparison of earnings effects from hours worked at home and hours worked at the office, we focus on salaried workers who do not exclusively work from home. We conduct sensitivity analyses comparing hourly workers who telecommute to salaried workers who telecommute to check the robustness of our findings.

Employer resistance to telecommuting generally stems from the possibility that workers will be unavailable when needed. However, telecommuting does not necessarily reduce face time at work if telecommuting in practice simply extends the workday beyond standard business hours. Technologies enabling telecommuting could merely facilitate the ability of workers to “take work home”, increasing hours of employment overall. To distinguish between the *extension* effects of telecommuting on total work hours from the *replacement* effects of telecommuting that substitutes on-site work hours, we differentiate between telecommuting hours that occur among employees who perform less than 40 hours per week on-site from telecommuting hours that occur among employees who perform at least 40 hours per week on-site. Telecommuting replacing time at the office during the statutory 40-hour work week should have a greater effect on earnings growth than telecommuting that occurs as overtime. The regulatory frame of the 40-hour workweek still shapes employer expectations and employment benefits, and most analyses of “overtime” work among salaried employees (see Cherry 2004 for example) measure overtime as work hours above 40 per week. [endnote ²] There is widespread cultural acceptance of the idea that 40 hours represent the standard for “full-time work” and any hours over 40 are “overtime” hours, whether paid with additional compensation or not. Moreover, we believe there is more casual acceptance of “taking work home” without additional compensation after working at least 8 hours on-site than telecommuting as part of a regular 8-hour work day.

Our analysis improves on earlier research in a number of ways, but most importantly by considering the full extent of telecommuting both as substitution and extension of hours worked on-site, and by controlling the effects of endogeneity in the sample of workers who telecommute. We use longitudinal data that follows the earnings trajectories of employees rather than static cross-sections that confound telecommuting with higher job quality and firm profitability. We employ fixed-effects models to control for unmeasured stable characteristics of workers (whether positive such as high performance, or negative such as low work commitment) that could impact both the likelihood of telecommuting and earnings. Because of substantial evidence that work hours are increasing among salaried workers while wage penalties for working part-time persist (Jacobs and Gerson 2004; Lambert 2008), we test nonlinear impacts of telecommuting across the range of work hours from 20–120 per week. Finally, we explicitly model any gender or parental differences in the impact of telecommuting on earnings.

²There are substantial differences in the regulatory treatment of overtime work hours between hourly and salaried workers under the FLSA of 1936. “Exempt” workers receive no direct compensation for hours worked above the first 40.

BACKGROUND AND THEORETICAL APPROACH

The spread of flexible work is occurring alongside increasing inequality in wages and work hours in the U.S. (Kalleberg 2011). At the bottom of the wage hierarchy are low-skilled hourly sales and service jobs where part-time schedules are concentrated (Tilly 1995), characterized by lower wages, few benefits, and little job security (Kalleberg, Reskin, and Hudson 2000; Webber and Williams 2008). Meanwhile salaried full-time jobs, particularly those with benefits, increasingly require more than 40 hours of work (Jacobs and Gerson 2004).

In the competitive labor markets for salaried managers and professionals in particular, both work hours and total compensation packages have grown dramatically in recent years (Cha and Weeden 2014). The price of career advancement has become a willingness to abandon the 40-hour work week and put in as many hours as necessary to outperform peers. These “rat race” effects (Landers, Rebitzer, and Taylor 1996) have combined with increased workloads to create upward pressure on work hours. Empirical analyses show that employer demands are driving these increases in work hours, and that full-time workers mostly desire shorter work hours but are unable to obtain them (Clarkberg and Moen 2001; Golden and Gebreselassie 2007; Reynolds and Aletraris 2010).

In this context, considerable pressures exist for employees to engage in overtime work either on-or off-site. In particular, technologies such as smart phones and personal computers enable white-collar workers to maintain almost continuous connectivity to work tasks and work colleagues (Kossek, Eaton, and Lautsch 2006; Perlow 2012). Yet these trends collide with changes in the labor force, particularly the growth of dual-earner and single parent households. The pressure to work long hours among employees increasingly likely to have dependent care responsibilities structures how telecommuting is used to manage work and family (Drago, Wooden, and Black 2009).

Theoretical Links between Telecommuting and Wage Growth

The impact of flexible work hours on wage growth must be theorized within this context of work hours bifurcation. One viewpoint optimistically frames telecommuting as productivity enhancing, since its use should decrease work-family incompatibility and increase employee commitment, satisfaction, and attachment to the firm. A plethora of studies attest to the greater productivity of workers taking advantage of flexible work practices (see Baltes, et al. 1999; DuBrin 1991; Hill, Ferris, and Martinson 2003; Shephard, Clifton, and Kruse 1996). Certainly, telecommuting can make managerial direction and control more difficult, and team production problematic (Baltes, et al. 1999), but telecommuting can also make employees more productive per hour and reduce turnover. Kelliher and Anderson (2010) report that employees allowed to work remotely value this flexibility enough to intensify their work production from home and take extra steps to maintain their availability to on-site staff. The ability to telecommute may also enable employers to attract more qualified workers who seek this amenity (Osterman 2005). The net effects of productivity gains and declines in unintended turnover should enable firms to pay higher wages.

The dominant perspectives, however, predict negative consequences of telecommuting on earnings. Economists generally frame the issue as one of compensating wage differentials (Goldin 2014; Felfe 2012; Heywood, Siebert, and Wei 2007; McCrate 2005) in which work amenities desired by workers but costly to employers have the effect of reducing wages. If workers on average are less productive at home, or their work team is less productive when some members work from home, then telecommuting workers should earn less in proportion to their productivity decline. Statistical discrimination could generalize this process to *all* telecommuting workers since the average telecommuting worker is less productive. Without significant signaling information that a particular worker is an exception to this pattern, they would be subject to the bias produced by prior telecommuters. Analysts in this tradition expect to find wage penalties for flexibility and are surprised at positive wage returns for flexibility in empirical surveys (Heywood, et al. 2007; Schroeder and Warren 2005; Weeden 2005). Yet this framework (a) ignores positive selection among telecommuters, (b) assumes the costs of telecommuting are uniformly high across jobs, and (c) ignores the possibility of net increases in profits from employee telecommuting (see Pabilonia 2006).

The organizational literature on signaling and stigma suggests a different but related explanation for negative wage returns from telecommuting – one based on workplace norms and expectations rather than *actual* productivity or costs of providing flexibility (Blair-Loy 2003; Konrad and Yang 2012; Williams 2000). Explaining their reluctance to use schedule flexibility or telecommuting policies, managers cite the importance of “face time” as an indicator of work commitment to others in the workplace, including subordinates (Hochschild 1997). Blair-Loy’s (2003) financial executives describe their devotion to work and its expression in their visible presence at work and continuous availability to the firm. These valued but difficult to observe characteristics of workers (productivity and commitment) get signaled to employers through time spent on-site and willingness to expand those hours whenever necessary (Landers, et al. 1996). Williams (2000) labels these “ideal worker norms” that police employees into long hour schedules but do not necessarily improve productivity or retention (Cech and Blair-Loy 2014; Clarkberg and Moen 2001). Conversely, limiting hours on-site by working from home signals questionable work commitment to employers, even the possible shirking of responsibilities (Casper and Harris 2008). (endnote ³) Experimental research shows that telecommuting workers do face a serious “flexibility bias” in the evaluation of their competence and commitment (Munsch, Ridgeway, and Williams 2014), even when raters were told that senior managers also telecommute. Positive wage returns to telecommuting seem remote using this organizational culture framework as well. Indeed, many qualitative accounts exist of workers afraid to use employer’s flexibility policies because they believe their work careers, but not their productivity, would suffer as a result (Hochschild 1997; Williams 2000).

The signaling function of telecommuting is especially important in those jobs with internal career ladders, where competition for promotion motivates displays of organizational commitment. Hence one would expect greater earnings depression from telecommuting among salaried workers than among hourly workers. Salaried workers are much more likely

³This seems to have been the dominant reason behind the Yahoo elimination of telecommuting among its employees (Italie 2013).

to report regularly working more than 40 hours per week (Jacobs and Gerson 2004) and working at least occasionally from home (Potter 2005). Organizational signaling theory also suggests that the consequences of deviating from “ideal worker” norms might not be gender neutral. To the extent that employers believe women telecommute to free up time and energy for family care, telecommuting should depress their wages more than men (Kmec, O’Connor, and Schieman 2014). The stigma placed on workers, disproportionately women, who openly display their family care responsibilities by being visibly pregnant, bringing a child to work, or leaving early for a school event, could contribute to lower earnings directly through evaluation bias and indirectly through assignment to less important work tasks.

Whether or not *real* productivity deficits exist among telecommuting workers with family care obligations, social psychologists have emphasized that even the expectation of lower productivity can create bias in supervisors’ performance evaluations and pay decisions (Ridgeway and Correll 2004). Telecommuting may activate stereotypes about the productivity of women and mothers in particular. Motherhood invokes negative stereotypes about competency, productivity, and commitment in the workplace much more than fatherhood (Correll, Benard, and Paik 2007). Fathers are less likely than mothers to admit that their need for workplace flexibility is family-related (Williams, 2010), suggesting employers will have greater difficulty connecting fathers’ telecommuting with family care. Indeed, experimental evidence suggests men avoid asking for family accommodations because they risk being “feminized” and punished at work by so doing (Vandello, et al. 2013). Since the signaling function of telecommuting is not as strong for men, women and mothers in particular should experience more negative earnings consequences for telecommuting than men.

Empirical Research on Telecommuting and Earnings

The empirical literature trying to evaluate these divergent theoretical perspectives has produced mixed results, and few of these studies have been able to escape the methodological conundrums of sample selection and endogeneity in the pool of workers who engage in telecommuting. Most analyses of the link between flexible work arrangements and earnings have shown positive associations for telecommuting (Gariety and Shaffer 2007; Johnson and Provan 1995) but early analyses in particular were almost exclusively cross-sectional and subject to two important sources of bias. First, the availability of work-family policies, like other fringe benefits, has been shown to be associated with high performance organizations that employ large proportions of knowledge workers (Deitch and Huffman 2001; Osterman 1995). So in cross-sectional data, workers using flexibility policies will have higher earnings on average because of their unique firm placement, even after controlling for an array of human capital and common firm characteristics. Winder (2009), in a study of within firm flexible work practices and employee wages, found a much smaller positive association between flexible work and wages once firm environment was controlled, and found some evidence of negative impacts for women in industries where flexible work was rare. In order to best estimate the effects of telecommuting on earnings trajectories, longitudinal data must account for the endogeneity of flexible work options.

Second, workers who telecommute within a sponsoring firm may be a subset of particularly high performance employees who are allowed greater flexibility as a reward for superior productivity. Thus, any positive association between telecommuting and earnings or earnings growth over time may simply reflect managerial discretion in approving flexible work requests, since employers rarely extend these policies to all workers within a firm (Bond, et al. 2005; Hornung, Rousseau, and Glaser 2008; Kelly and Kalev 2006; Sweet, et al. 2014). [endnote ⁴] Analyses that fail to control for stable individual characteristics that could affect both productivity and the likelihood of telecommuting risk positively biasing the estimated effect of telecommuting on earnings.

More recent research has looked at the wage effects of workplace flexibility using a broad sample of workers and various controls for differential selection into flexible work (Heywood, et al. 2007; Pabilonia 2006; Schroeder and Warren 2005; Weeden 2005). Heywood, et al. (2007) estimated the compensating wage differential paid by workers for employment in firms with various family friendly work options, and found that telecommuting proved to be the only flexible work option producing a significant wage increase. But this positive effect may represent the wage effect of simply being in a high performance firm that allows telecommuting. Weeden (2005), using two-waves of data and controls for selection into flexible jobs, found no wage effect for telecommuting. Pabilonia (2006) and Schroeder and Warren (2005) both report significant wage premiums for workers who perform at least some paid work at home. Both studies also find a higher premium for women telecommuters than men. However, measurement issues in identifying telecommuters and weak controls for endogeneity (using number of children as an identifying instrument) limit these analyses.

In sum, research to date has generally shown neutral or positive earnings impacts of telecommuting, supporting the idea that telecommuting improves worker productivity, rather than negatively affecting employer perceptions and reducing earnings growth. Yet no studies to date have attended to both the endogeneity of telecommuting across firms and across workers within firms, precluding firm conclusions about the earnings effects of telecommuting among workers of various gender and parental statuses.

Nonlinearities in the Earnings Effects of Telecommuting

In addition to inadequate treatment of endogeneity in the distribution of telecommuting across individuals and firms, prior work has often assumed linearity in the impact of telecommuting hours on earnings as well. Yet organizational signaling suggests nonlinearities in the effects of telecommuting hours. Telecommuting can take two very different forms - taking work home after hours [what Venkatesh and Vitalari (1992) call “supplemental work at home”] or scheduling work from home during normal business hours. Taking work home after a standard 8-hour workday reduces the visibility of those hours to the employer, and serves as a particularly poor signal of competence and commitment unless other productivity metrics are easily available to the employer. This suggests hours worked from home beyond a standard weekly 40 hours on-site should have a

⁴The opposite may also be true; that is, workers using flexible work practices may have lower unobserved ability or motivation than other workers, which leads both to the request for flexible work and lower subsequent earnings growth (Schroeder and Warren 2005).

negligible effect on earnings; such hours worked from home lengthen the total workweek without being directly observable to the employer.

Overtime hours in general have less effect on workers' earnings than expected, especially for the salaried workers who are the overwhelming majority of telecommuting workers in the U.S. (Noonan and Glass, 2012). For salaried or exempt workers, overtime hours are generally not compensated directly (Morgan and Arthur 2005), though they may have indirect positive effects on earnings over time (Anger 2005; Cha and Weeden 2012; Cherry 2004). Examining the motivation to work overtime hours in salaried employment among American men, Kuhn and Lozano (2008) find that occupations experiencing greater within-occupation inequality in earnings show higher proportions of workers putting in 48 hours or more per week. This suggests one motivation for increasing overtime hours is competition for future promotions and possible protection from future layoffs or downsizing. Observing wages and hours since 1980, Kuhn and Lozano never find a year in which the earnings effect for overtime hours exceeds the earnings effect per hour of the first 40 hours worked per week. Though the earnings effects of overtime grew noticeably larger between 1980 and 2005, in 2005 male workers still earned only about 2/3 per overtime hour of what they would have earned for an hour in the first 40 per week. Anger (2005) provides additional support from German workers, noting only weak future earnings effects for overtime among salaried workers, and no increases in job security. In sum, previous work supports the notion that telecommuting will have weaker earnings effects in the "overtime" portion of the hours distribution, since overtime hours in general produce weaker earnings growth.

Hours worked from home during the standard workday are much more noticeable for their deviance. While workers who reduce their face time by working from home could be signaling their organizational importance or independence from supervision, their departure from ideal worker norms could also produce negative evaluations from supervisors. The preferences of employers for long work hours on-site make shorter on-site workweeks (less than 40 hours per week) particularly non-normative and potentially damaging for earnings growth.

To summarize our principal hypotheses, we expect:

- I.** The earnings gains from telecommuting hours will be smaller than on-site hours in analyses in which individual ability and commitment are held constant. Economic theories of compensating wage differentials predict such an outcome, as do cultural theories based on workplace norms.
- II.** Changes in work location in the first 40 hours of labor per week will be more salient than changes in work location in overtime hours. Thus, we predict stronger earnings penalties from telecommuting in the first 40 hours of labor than in telecommuting after 40 hours are worked on-site.
- III.** Telecommuting may not produce uniformly smaller earnings increases for all workers. Theories of cognitive bias suggest that women, especially mothers, should experience more negative earnings consequences from telecommuting than other workers, particularly in the first 40 hours worked per week.

METHODS

Data and Sample

In this analysis we use the National Longitudinal Survey of Youth (hereafter NLSY) begun in 1979 among a representative sample of over 12,686 youth. The NLSY 79 is a national probability sample of women and men living in the United States and born between 1957 and 1964. The sample was interviewed annually from 1979–1994 and biennially thereafter. By the 2008 survey wave, the total sample size was 7,757 with a retention rate across all years of 77 percent. We use sampling weights to account for the use of minority and economically disadvantaged oversamples. The NLSY is the ideal data for this research because it contains information on telecommuting, gender and parental status, and occupation, enabling tests of employee characteristics on the size and direction of any telecommuting-earnings relationship.

Beginning in the 1989 wave of the NLSY, the survey included questions on respondents' hours worked at home per week at their current job. Since this question is our key independent variable, our analytic sample is restricted to survey years 1989–2008. Respondents were between their late twenties and late forties during this period, years of peak earnings growth for those continuously in the labor force. Macroeconomic conditions were also favorable during this period; excepting brief recessions in 1991 and 2002. We end the time series with the 2008 wave to avoid wage effects from the Great Recession.

For each year and for each individual, the NLSY collects employment-related data on up to five jobs. For those respondents who hold multiple jobs, we restrict our analysis to the respondent's main job in each survey year; typically the job where s/he works the largest number of hours. The survey provides an employer code that allows us to match employers across survey years. For each respondent, all survey years spent working at a given employer are grouped into what we term a person-job spell. We use the term "job spell" instead of "employer spell" for simplicity sake. However, the coding in the NLSY is based on the employer not the job or position; if an individual changes positions with the same employer, we do not consider this a new job spell. We group our data by the person-job instead of more generally by the person because we believe an employee's telecommuting practice will primarily affect earnings at the current job. Telecommuting in a previous job does not empirically show an association with an individual's earnings at their current job (Glass 2004).

Our analytical sample is restricted to primarily salaried respondents [endnote ⁵] working for pay 20 hours per week or more, with at least one hour worked on-site (22 exclusively home-based employees are excluded since our analyses require that hours worked on-site and hours worked from home be compared within individuals' jobs over time). Hourly workers are excluded both because the statutory treatment of their overtime work requires supplemental pay and because they so infrequently report hours worked from home. Self-

⁵Within each person-job we examine the type of payment the respondent reports each year (hourly or salary). We include respondents who are consistently salaried workers and respondents who report a mix of salary and hourly payment. If a respondent is consistently an hourly worker, he/she is excluded from the analysis.

employed workers are excluded since they presumably control both their work practices and pay. Respondents in the active military or currently enrolled in school *and* working part-time are also excluded from the sample, as are those with missing or outlying data on key variables. After these restrictions, we exclude any person-job spells with only one observation because the estimation technique we use requires at least two observations for each person-job spell.

Finally, within each person-job spell we keep only those observations that form an uninterrupted string of annual surveys. Reasons for a “gap” in a job spell are numerous; the respondent may not have answered the survey, may not have been employed, or may not have met one of our other eligibility criteria. We decided not to use discontinuous spells for two reasons: (1) some of our sensitivity analyses incorporate lagged variables which would be missing for some years if we included discontinuous spells and (2) we would be missing potentially important information on respondents’ telecommuting history during the gap (i.e., the NLSY collects retrospective data on work status and total work hours during the gap, but not telecommuting status). If a respondent has more than one string of uninterrupted survey years with the same employer (e.g., years ‘89, ‘90, ‘91 and years ‘02, ‘04, ‘06, ‘08), we keep the longest string, and if there are multiple strings of the same length, we keep the first string only. [endnote ⁶]

Our final sample size is 3,621 respondents (1,683 women and 1,938 men) contributing an average of 5.4 person-years of data, resulting in 19,633 person-years of data in total (See Appendix 1 for complete details on sample selection). Each of the 3,621 respondents is observed at an average of 1.6 separate jobs for an average of 4.1 person-years per job, resulting in a total of 4,778 person-job episodes. The person-job year is the unit of analysis.

Measures

The primary dependent variable is current weekly earnings in the respondent’s primary job. We created this measure by calculating the respondent’s weekly pay from self-reported weekly, monthly, or annual earnings, converted into 2000 dollars using the Consumer Price Index. We opted to use untransformed weekly earnings instead of hourly wage for a number of reasons. Using hourly wage assumes that compensation over some period is a linear function of hours worked; this is unlikely in the case of full-time salaried workers who are usually paid at a constant rate per week or month, regardless of the number of hours worked (Morgan and Arthur 2005). Prior work has shown that among professionals the monetary returns to hours worked varies across the weekly hours distribution (Goldin 2014; Morgan and Arthur 2005). The earnings measure is unlogged despite the right skew in the earnings distribution because we estimate spline functions at 40 hours of work that would distort the calculation of percentage changes above this node. Thus, our models capture the raw dollar impact of telecommuting hours on weekly earnings compensation over time. We check the

⁶We conducted a supplementary analysis using a sample that includes person-job spells *with interruptions*, in case person-job spells with interruptions differ from others in their use of telecommuting. In the supplementary analysis (results not shown, but available upon request), the coefficients change slightly in magnitude but retain the same statistical significance as in the main analysis (the only exception is that standard on-site hours for men is significant in the supplementary analysis). Most importantly, the general pattern of findings in the two sets of analyses are the same.

impact of this decision by re-estimating our models with the natural log of weekly earnings as a sensitivity analysis.

The survey items used for the independent variables can be divided into work amount and location, employee characteristics, and occupation/firm characteristics.

Work amount and location—To measure telecommuting practices, we focus on the location and number of hours worked per week as reported by the respondent. We use two indicators of work hours in each survey wave: (1) total hours usually worked per week at the respondent's main job, and (2) responses to the survey question: "How many hours per week do you usually work at this job at home?" We combine responses to create two continuous measures: (1) *standard telecommuting hours* and (2) *overtime telecommuting hours*. We define standard telecommuting hours as the number of hours worked at home that replace hours at the worksite in the first 40 hours worked each week (such that, regardless of the day or time worked, these telecommuting hours do not raise total work hours above 40) and overtime telecommuting hours as the number of hours worked at home that extend the total hours worked per week above 40. Since we have no information on the time of day work was performed at home or on-site, we assume that any work done from home that does not raise work hours above 40 per week is work that substitutes for time spent at the office. [endnote ⁷] We create two analogous measures of hours worked per week on-site: *standard on-site hours* and *overtime on-site hours*. We expect the coefficients generated for each of the four types of work hours will be positive; our hypotheses test the *relative sizes* of these positive effects when they are worked on-site versus at home and when they are standard versus overtime hours. This approach allows us to test whether hours worked in different locations, and in different parts of the hours distribution (Morgan and Arthur 2005), have different impacts on earnings growth.

Employee characteristics—We control for a variety of employee characteristics and human capital variables. Gender and race are not included since they are fixed characteristics that do not vary over time; they are implicitly controlled in fixed-effects modeling. We do, however, run our models separately for women and men since we hypothesize different evaluative processes for women and men who work from home. All other measured characteristics in our models are potentially time-varying as required for a fixed-effects analysis. *Year* is a control variable measured with thirteen dummy variables, using 1989 as the reference year. Other variables indicating *health status* (=1 if R reports a health limitation), *region of residence* (= 1 if South), and *urban/rural residence* (=1 if urban) are also included.

Parental status is a dummy variable indicating the presence of dependent children under 18 in the respondent's household; we also measure the *number of children* respondents report to capture new children entering the household. *Marital status* is measured with three dummy

⁷More specifically, we calculate standard and overtime telecommuting hours by subtracting the number of hours worked at home from the total number of hours worked per week in the given job. The result is the number of hours worked on-site. If on-site work hours are less than 40, we divide the hours worked at home into those that push total work hours to 40 (standard telecommuting hours) and, if necessary, those that push total work hours beyond 40 (overtime). If the respondent works more than 40 hours on-site, all telecommuting hours are considered overtime telecommuting hours.

variables indicating whether the respondent is married, never married, or divorced/widowed. *Educational attainment* is measured with four dummy variables indicating whether the respondent has less than a high school diploma, a high school diploma, some college, or a college degree or more. Respondents' work history is operationalized with two variables: *years of full-time work experience* and *years of part-time work experience* since leaving school. We do not control for tenure (years at current job) because changes in tenure are perfectly correlated with changes in work experience in our person-jobs spells.

Occupation/firm characteristics—We include a set of four dummy variables indicating the respondent's current *occupation*: upper white-collar (e.g. managerial and professional occupations such as financial managers, teachers, engineers, pharmacists, etc.), lower white-collar (e.g. technical, sales, and administrative support occupations such as bookkeepers, insurance claims processors, and clerks), upper working-class (e.g. precision production, repair, and service occupations such as plumbers, childcare workers, and police), and lower working-class (e.g. operator, fabricator, and laborer occupations).

We include three continuous occupational measures identifying the percent of telecommuters, the percent of part-time employees (20–30 hours per week), and percent of women within each occupation. These variables help us control for the strength of “ideal worker” norms in each occupation that could independently affect wage trajectories. The “percent female in occupation” comes from the 1990 census; we use only 1990 census data since changes in occupational gender segregation between 1990 and 2000 have been modest. The “percent part-time” and “percent telecommute” measures come from our final analytic NLSY sample (these are weighted and are not year specific due to insufficient sample sizes).

We also include whether the respondent works in the *private sector*, whether the respondent is covered by a *union*, and whether the respondent works in a *large firm* (500 employees or more). All these firm characteristics are associated with employee earnings growth. We include a variable indicating the availability of *flexible hours or a flexible work schedule* (irrespective of whether the respondent actually takes advantage of these options) to help purge the respondent's general level of schedule autonomy from the telecommuting effect on earnings. Finally, we include an indicator of whether the respondent works a *fixed schedule* (i.e., a day or night shift as opposed to a split, rotating, or irregular schedule) in all models.

Analytic Plan

We exploit the longitudinal nature of the data to estimate fixed-effects models of changes in weekly earnings in response to changes in telecommuting hours. Because fixed-effects estimators depend only on deviations from their group means, they are sometimes referred to as within-groups estimators (Davidson and MacKinnon 1993). [endnote ⁸] Relevant demographic and personal characteristics (i.e., education, work experience at the current job, etc.) are included as controls in all of our models. Fixed characteristics (i.e., race) are not

⁸Since fixed-effects models rely on variation within job spells to derive coefficient estimates, if little within-job variation exists, fixed-effects methods will not produce reliable estimates. We calculated the percentage of workers who changed their on-site hours and telecommuting hours within standard and overtime hour ranges. For those workers who changed their telecommuting and on-site hours from one year to the next within a job, we calculated the mean fluctuation from one year to the next. These results are reported in Appendix 2.

included in the models as control variables because our modeling technique implicitly controls for any individual-level variables that do not change over time. The fixed-effects model takes the form:

$$Y_{ijt} = B_1 X_{ijt} + B_2 Z_{ijt} + u_{ij} + e_{ijt},$$

where i indexes individuals, j indexes job, t indexes time (survey year), Y represents weekly earnings, X represents the measures of telecommuting hours and on-site hours, Z represents a vector of personal, family, and workplace controls, u is a person-job-specific fixed-effect, and e is a random error term.

We initially estimate this model on the full sample of salaried workers. Again, the four key variables of interest are standard hours telecommuting, overtime hours telecommuting, standard hours on-site, and overtime hours on-site. In one set of models, we include an interaction of “paid by the hour” with overtime hours to see if those paid by the hour in some years reap a larger benefit for every additional hour of overtime work compared to those who are salaried workers. [endnote ⁹] In another set, we disaggregate the full sample into subsamples of women and men to test for gender differences in the processes leading to earnings growth. In our final set of models, we interact the four work hours measures with parental status (separately for men and women) to see whether the impact of telecommuting hours on earnings differs for respondents parenting dependent children.

Three additional sensitivity analyses are conducted to determine whether the estimated main effects of telecommuting hours on earnings are robust in a variety of alternative model specifications. First, we rerun the models using the natural log of weekly earnings to ascertain whether departures from normality in the dependent earnings variable substantially affect the results. Second, we rerun the models, using both weekly earnings and the natural log of weekly earnings, on the *total*/NLSY sample of employees including hourly paid workers. Finally, a model in which telecommuting was lagged by one survey wave was estimated, since the earnings impacts of telecommuting may be lagged rather than contemporaneous. Employers usually undertake only annual or biannual alterations in employees’ pay, so it may take time to see the effects of telecommuting practices on pay.

RESULTS

Descriptive Statistics

Table 1 displays descriptive statistics on telecommuting by gender and parental status combining all years of observation. Panel A shows the percent of person-job spells in which a respondent ever reports telecommuting. Telecommuting is not rare, indeed, 43 percent of the job spells in our analytic sample include at least one hour per week worked at home at some point. However, only 26 percent of our job spells include telecommuting at the level of five hours or more per week. Telecommuting is most common among fathers, and more common among men than women.

⁹Although our sample excludes those workers who are consistently paid by the hour, it does not exclude workers who report being paid by the hour but later paid by salary while with the same employer.

In Panel B of Table 1 we calculate the percentage of person-years during which a worker was currently telecommuting. These numbers tell us the intensity of telecommuting at any given point in time. The statistics in Panel B are smaller in magnitude compared to those in Panel A, but the pattern of results is similar. About 23 percent of our sample telecommutes at least one hour during any given year. Gender differences in rates of telecommuting are minor (3–5 percentage point gap).

Panel C of Table 1 shows the mean/median values for hours worked by location and schedule. These are the measures that are used in the regression analysis to determine whether telecommuting affects earnings growth differently than on-site work. On average, the respondents in our sample work approximately 44 hours per week. Not surprisingly, the vast majority of work hours are performed on-site versus at home. In fact, the average number of home-based hours worked per week in our sample is just over 1 hour (1.34 hours); the majority of home-based work occurs as overtime (0.96 hours) not as part of the standard work day (0.38 hours). Thus, over two thirds of the telecommuting hours in this sample are worked as overtime hours ($0.96/1.34 = 72$ percent). Our descriptive statistics also show men work more on-site overtime hours than women. Men average approximately 5 hours of overtime per week, whereas women work 2 hours of overtime work (see last row of Panel C, Table 1). Mothers work fewer overtime hours than childless women, and fathers work slightly more overtime than childless men. [endnote ¹⁰]

Table 2 shows the descriptive statistics for the dependent variable, weekly earnings, as well as the controls that are used in our regression models. We present the descriptive statistics for the entire sample, and by telecommuting status. Those who telecommute at least one hour per week earn more on a weekly basis than those who do not telecommute at all (on average, \$1,063 versus \$783).

There are some noteworthy differences in educational attainment by telecommuting status. Approximately 62 percent of telecommuters in the data have college degrees, whereas only 34 percent of the non-telecommuters are college-educated. Telecommuters are more likely to work in managerial and professional occupations (i.e. upper white-collar) and report longer work hours on average. Approximately 60 percent of telecommuters are in upper-white collar occupations, compared to only twenty-four percent of non-telecommuters. Telecommuters work almost 6 hours more per week, but on-site hours are roughly the same between those who telecommute and those who did not (43 hours).

¹⁰Appendix 2 shows the extent to which workers alter their telecommuting hours and on-site hours while remaining at the same job. In 12 percent of job spells, workers altered their standard telecommuting hours and in nearly a quarter of job spells, workers altered their standard on-site hours. There was significantly more movement at the higher end of the hours distribution: in 35% of job spells, workers altered their overtime telecommuting hours, and in about half of job spells, workers changed their overtime on-site hours (see Panel A). Within job spells in which hours did fluctuate, the average deviation from the within-job mean was 2 to 4 hours (see Panel B). Among those who changed their hours, the average change from the *previous* year was between 4 and 7 hours. Our results were generally the same by sex and parental status. Women were significantly more likely than men to change their hours worked in the standard hours range, and men were more likely than women to shift their hours worked in the overtime portion of the distribution. These results contradict the notion that yearly variations are trivial.

Regression Results

In Table 3, we present the fixed-effects regression results predicting weekly earnings as a function of hours worked by schedule and location. Results from model 1 show that the impact of telecommuting hours on earnings is similar to the impact of hours worked on-site during the first 40 hours of the work week (about an \$8–\$9 increase for every additional hour worked). But overtime telecommuting has very little impact on earnings growth. For every additional hour worked at home after the first 40 hours of work performed that week, weekly earnings increase about \$3. Overtime work performed on-site leads to significantly greater earnings growth (about \$6.50 per hour) than overtime work performed at home. Model 2 shows that salaried workers who in some years are paid by the hour benefit more from overtime work in those years, irrespective of whether those hours are worked at home or on-site, suggesting the impact of the FLSA on employers' wage treatment of overtime.

Separate gender analyses show that reducing work hours below the 40-hour threshold has a slightly larger impact on women's earnings growth than men's, whether worked at home or on-site. Overall, men's weekly earnings seem impervious to changes in hours worked below 40 per week, especially hours worked on-site where the coefficients are barely significant. We believe this occurs for two reasons – first, this effect is conditioned on the small number of men shifting work hours below 40 per week, and, second, fixed-effects reflect not between-person variation in work hours but within-person variation in hours over time. Men's changes in labor supply below 40 hours per week are both rare and empirically less likely to affect their weekly salary, especially compared to women making similar changes in labor supply. Women suffer more than men when they reduce their work hours below 40 per week, hence the larger positive effect of standard hours on earnings among women. As scholars have noted, labor supply differences between women and men reflect, in part, the willingness of women to sacrifice earnings in order to work fewer hours (Felfe 2012; Goldin 2014).

Table 4 explores whether the location of hours worked impacts earnings differentially by parental status within sex. In general, for men, the impact of telecommuting on earnings does not differ based on parental status in the standard part of the hours distribution; fathers reap a larger benefit from overtime telecommuting, however. For women, we find that an increase in hours worked on-site has a larger impact on earnings growth in the years women are mothers as opposed to the years in which they are childfree. Neither gender shows any negative consequences of telecommuting in the years respondents are parents relative to their childfree years. Rather, the results suggest that mothers' weekly earnings are particularly sensitive to their work hours on-site, with mothers paying a substantially higher price for reducing their hours of work on-site below 40 per week (\$4 per hour), and even paying a penalty for reducing overtime hours on-site (approximately \$2 per hour).

Appendices 4–8 present our sensitivity analyses using alternate model specifications. Appendix 3 replicates the analysis in Table 3, but substitutes the natural log of weekly earnings for weekly earnings. The results are substantively similar; changes in hours worked in the overtime part of the schedule are less consequential for earnings than changes in the standard part of the work schedule. Furthermore, in the first 40 hours worked, working on-

site and working at-home result in similar earnings. But, earnings grow faster if the worker increases overtime hours on-site rather than overtime worked at home.

Appendix 4 tests whether there are any lagged negative effects of telecommuting on subsequent earnings, and whether overtime hours at any location have lagged positive impacts on earnings that could help explain their persistence. The results in Appendix 4 suggest first that hours worked in the current year are much more strongly associated with current earnings than hours worked in the previous wave. The pattern of results for the previous wave's telecommuting hours closely mirror the pattern found for the current year though effects are smaller in magnitude: past standard telecommuting hours yield stronger current earnings than past overtime telecommuting hours. Yet both coefficients are positive and significant, showing small net gains in current earnings for each past telecommuting hour. To look for any comparative disadvantage of telecommuting in the prior wave rather than working on-site, we compared the effects of prior hours worked on-site versus at home, but found no disadvantage from prior hours worked at home. In fact, among hours worked on-site, only past over-time hours are related to current earnings and the coefficient is equal in size to the overtime telecommuting coefficient. These results confirm the existence of small but significant lagged effects of overtime work hours on earnings that can help explain why salaried workers perform less remunerative overtime whether at home or on-site. And they suggest not insubstantial improvements in the future earnings (and presumably productivity) of workers who substitute work at home for work in the office during the first 40 hours worked per week.

Results in Appendices 5–7 show descriptive statistics (Appendix 5) and regression results predicting weekly earnings (Appendix 6) and ln weekly earnings (Appendix 7) for the larger sample of person-jobs *including* those workers who are consistently paid by the hour. Again, the substantive story remains the same: increases in hours worked in the standard part of the work schedule lead to higher earnings than increases in hours in the overtime range, and among overtime hours, increasing hours worked on-site leads to higher earnings than hours worked at home.

DISCUSSION

We began by asking about the prevalence of telecommuting, its distribution across American workers, and its impact on employee earnings. As several scholars have recently noted, flexibility in the scheduling and location of work hours are highly desirable work amenities, and women in particular appear to be willing to sacrifice earnings in order to achieve them (Felfe 2012; Goldin 2014). With this in mind, we analyzed the impact of telecommuting in the first 40 hours worked per week and overtime telecommuting among salaried workers using fixed-effects models to control for endogeneity in the characteristics of workers who telecommute.

Among mid-life employees, telecommuting is not rare, indeed, over 40 percent of salaried workers in the NLSY79 report working from home at some point between 1989 and 2008. However, telecommuting hours are three times more likely to occur as overtime than hours worked on-site. Telecommuting in practice seems to facilitate longer work hours, rather than

decrease face time at the office (see also Duxbury, Higgins, and Mills 1992). When telecommuting hours increase from the previous wave, total work hours go up about 3 hours on average among NLSY respondents, meaning telecommuting hours are mostly an addition to, not a substitute for, on-site hours. Consistent with this, when telecommuting hours decrease from the previous wave, total work hours go down by about 3 hours.

These overall patterns may be driven by the types of workers who telecommute. Telecommuting workers in this sample are more likely to be managerial and professional workers with higher salaries and higher educational attainment. Descriptive statistics show that telecommuting is significantly more common among fathers than mothers. When mothers work from home, however, they are more likely than fathers to do so during standard work hours (Table 1, Panel C). But telecommuters are quite similar to other workers on a whole range of other socio-demographic characteristics including presence of children, marital status, region, firm size, health status, and work experience.

These numbers belie the notion that working from home is a strategy commonly used to balance work and family demands, and that such amenities draw women, particularly mothers, to jobs that facilitate this form of work flexibility. Few jobs facilitate telecommuting as a substitute for on-site hours in the first 40 hours worked per week, and female dominated jobs are not more likely to do so than male-dominated jobs. It does appear to be the case that mothers use telecommuting as a strategy to manage family demands more than fathers *when* working from home is possible and feasible.

As Morgan and Arthur (2005) have shown, disaggregating work hours into standard and overtime hours is essential to accurately model the impact of telecommuting hours on earnings. Although we expected telecommuting in the first 40 hours worked each week might have negative consequences for subsequent earnings, results from the experiences of salaried workers in the NLSY show this was not the case. In the standard range of work hours (up to 40 per week), neither men nor women show any penalty for hours spent working at home compared to on-site work hours. In fact, telecommuting hours produce slightly larger earnings effects in some models than hours worked on-site, bolstering the empirical work showing greater productivity and higher wages among remotely working employees (Kelliher and Anderson 2013; Pabilonia 2006; Schroeder and Warren 2005). Thus, the *location* of work in the first 40 hours per week seems mostly irrelevant – no difference could be detected that suggests hours worked on-site have a stronger earnings impact than hours worked from home, and no gender difference in the impact of telecommuting that disadvantaged women or mothers' earnings appeared.

When overtime is subdivided into hours worked on-site and at home, however, it becomes clear that overtime worked at home (the most common form of telecommuting) is extremely limited as an earnings enhancement for salaried workers. Overtime hours worked on-site have a significantly stronger impact on earnings, nearly twice as much in dollars per hour for both women and men, although no type of overtime produces earnings increases comparable to standard work hours up to 40 per week. Earnings seem relatively inelastic with respect to the number of unseen hours of overtime worked at home, begging the question of why workers provide overtime work from home to employers.

To find potential answers, we performed sensitivity analyses in which lagged telecommuting and on-site hours from the previous wave are included in the earnings equations, since the willingness to provide unpaid overtime may produce stronger earnings growth in subsequent years rather than the current year. Future promotions or merit increases from past work devotion may show up only over time. Results show current overtime work hours have stronger effects on current earnings than previous overtime work hours irrespective of location. But importantly, prior year overtime hours worked *at either location* have stronger effects on current earnings than prior year standard hours worked on-site, supporting the theory that workers' demonstrated willingness to put in extra hours yields marginally higher earnings over time. Because we use fixed-effects models, past years in which workers had larger or smaller amounts of overtime are being compared within an employer spell to control any exogenous factors that might increase both overtime work hours and earnings.

CONCLUSIONS

Contradicting theories of signaling and stigma, and confounding predictions of compensating wage differentials, telecommuting instead of working on-site is not penalized in the first 40 hours worked per week, and produces an earnings penalty only in the overtime hours distribution where earnings returns are much smaller to begin with. This leaves analysts with a peculiar paradox – employees are clearly most likely to telecommute from home as overtime (“taking work home” at the end of the day) yet this type of telecommuting yields noticeably lower earnings growth compared to overtime worked on-site. Why should the location of *overtime* hours matter so much when the location of standard hours worked does not? We turn to signaling theory again, with its implication that visible overtime worked on-site serves as an indicator of work devotion even when divorced from actual total hours worked and/or measured productivity. These results support the suggestion that managerial biases reward employees for just “being there” beyond the standard 40-hour workweek, and that face time at the work site is necessary for overtime to count as commitment or loyalty. Yet we do not want to overemphasize the impact of overtime on earnings among salaried workers. While important at the margins for accelerating earnings increases, overtime hours at both locations show dramatically lower dollar returns compared to the first 40 hours worked per week. The message is clear – telecommuting that replaces standard hours usually worked on-site carries no penalties among the workers allowed this much locational flexibility, but the more common form of telecommuting that represents work done at home after hours has significantly less value than overtime worked on-site. This is bad news for parents and others who want to cut back on overtime hours on-site without damaging their productivity by getting some tasks done at home.

However, neither women in general, nor mothers in particular, pay a larger earnings penalty for telecommuting than men. Hours worked from home show similar earnings returns for women and men whether worked as standard hours or overtime. Instead, mothers face differential earnings outcomes when they decrease their hours worked *on-site*. Whether in the standard or overtime range of hours, mothers' earnings show significantly greater sensitivity to each hour worked on-site relative to men. These findings bolster the contention that managers hold mothers to higher standards of accountability and accessibility than other workers (Correll, Benard and Paik 2007), and punish them more harshly for work hour

reductions. Because employers are more likely to doubt mothers' commitment to the workplace, mothers pay a harsher penalty when their behavior deviates from the ideal worker norm of copious face time at the office. Thus, motherhood, more than telecommuting status, triggers compensation biases.

Overall, our results confirm the contention of scholars that information technology has played a profound role in escalating the productivity demands placed upon salaried workers, and subjected them to increasing expectations of 24/7 connectivity (Perlow 2012; Schieman, Milkie, and Glavin 2009). This does not bode well for either gender equality, given mothers' greater burden of caregiving at present, or work-life balance, given parents' needs to shelter time with family and community without hurting themselves financially. The twin findings here that most telecommuting hours are overtime hours after at least 40 hours have already been spent at the office, and that these hours are least likely to result in earnings growth over time, show in stark terms how new workplace technologies have been used to create new managerial pressures to extract additional productivity from workers without raising the wage bill. Rather than utilizing the promise of telecommuting to create more flexible work schedules and accommodate family care among workers, the actual practice of telecommuting within work organizations has mostly just increased total work hours among salaried workers and ratcheted up competition among workers for raises and job security. However, there is a nugget of good news as well- among those progressive employers who allow telecommuting to substitute for time at the office, hours worked at home contribute as much to pay growth as hours worked on-site for both sexes. This is *prima facie* evidence that perceived productivity does not diminish when workers are given autonomy over where they will work. The policy goal should therefore be spreading this practice while discouraging overtime worked from home.

The analyses reported here point to several avenues for further research. First, as Goldin (2014) points out in a recent analysis of client intensive professions, different occupational groups of workers may experience different earnings consequences for telecommuting because they are located in different institutional sectors. Future work should incorporate more detailed workplace characteristics (such as service or technical sector, level of professional autonomy, etc.) into analyses of the consequences of workplace flexibility. Furthermore, although we find no negative lagged effects of telecommuting on earnings here, analyses of the long term consequences of telecommuting on future promotion opportunities and vulnerability to layoffs or downsizing may yield stronger negative consequences.

While fixed-effects models represent an improvement over earlier analyses of the earnings effects of telecommuting, we acknowledge that the models presented here still have limitations. The NLSY is a cohort study of workers at midlife in 2008. The experiences of younger workers, especially following the Great Recession, may be different. Further, the effects of endogeneity on telecommuting in any given year may not be completely eradicated with fixed-effects analyses, which only control for stable unmeasured productivity characteristics. Unmeasured exigent factors could exist that affect the number of hours worked from home and cannot be excluded as confounding factors. Finally, within-person variation in telecommuting hours may only exist among those who believe

telecommuting will not hurt their career prospects. This could create an upward bias in the measured effects of telecommuting, since those who might suffer from telecommuting avoid the practice and cannot be observed.

Only continued monitoring of data will reveal whether telecommuting persists mostly as poorly compensated overtime performed at home, or percolates through the labor force as a penalty-free substitute for hours worked on-site. As communication technologies replace in-person meetings and as employees become increasingly comfortable with their use, we hope telecommuting during the standard workweek will expand among salaried workers. Resistance in the form of managerial discomfort may slow this process more than the existence of earnings penalties among workers.

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Appendix

Appendix 1

Sample Selection Details

Criteria	N (persons)	Percent Remaining	N (person-years)	Percent Remaining	N (person-job spells)
Total Sample					
Total person-records (12,686 respondents; each has 13 records '89-'94, '96, '98, '00, '02, '04, '06 and '08)	12,686	100%	164,918		
First sample restriction					
Exclude if not interviewed (during '89-'08 time period)	11,104	88%	112,838	68%	
Exclude if not employed	10,401	82%	83,587	51%	
Exclude if self-employed	10,145	80%	76,422	46%	
Exclude if work all hours at home	10,123	80%	75,688	46%	
Exclude if active military	10,034	79%	74,479	45%	
Exclude if farmer	9,992	79%	73,398	45%	
Exclude if currently student (unless also working full-time)	9,963	79%	72,423	44%	
Exclude if not working at least 20 hrs/week or working more than 126 hrs/week (i.e., 18 hrs/day, 7 days/wk)	9,802	77%	69,446	42%	
Second sample restriction					
Starting point	9,802	100%	69,446	100%	
Exclude if missing data on work hours (office or home) or illogical reports on hours (hours worked at home > total hours worked)	9,800	100%	69,339	100%	
Exclude if weekly earnings are missing	9,716	99%	67,675	97%	
Exclude if weekly earnings fall below the bottom 1% or above the top 1% (i.e., < \$70/wk or > \$2500/wk)	9,670	99%	66,288	95%	

Criteria	N (persons)	Percent Remaining	N (person-years)	Percent Remaining	N (person-job spells)
Exclude if missing data/outliers on control variables (education, type of work (private/public), union, type of schedule (fixed or not), firm size, availability of flex schedule, region, urban, health, pay type (hourly or salary))	9,396	96%	59,145	85%	
Exclude if missing data on occupation or percent female/telecommuter/part-time for occupation	9,375	96%	58,495	84%	
Third sample restriction					
Starting point	9,375	100%	58,495	100%	22,485
Identify "job spells" for each respondent					
Exclude those job spells with only one observation	7,379	79%	47,396	81%	11,386
Within each job spell identify "blocks" of contiguous observations. A block is defined as at least two observations without a gap. A gap within a job spell could occur for multiple reasons - the respondent was not interviewed in a given year, not employed, missing data on key variables, etc.					
If there is more than one block per job spell, keep only observations which are part of the longest continuous block within a job spell. If have multiple blocks of the same length, keep the earliest.	7,036	75%	40,395	69%	10,582
Keep only those person-job spells where respondent is paid by salary (i.e., drop those person-job spells if respondent is <u>consistently</u> paid by the hour (using the NLSY question "Are you paid by the hour at this job?").	3,621	39%	19,633	34%	4,778
Final sample size	3,621		19,633		4,778

Appendix 2

Change in Hours Worked, by Location and Schedule, Within Person-Job Spells, NLSY '89-'08

Panel A. Percent of person-job spells in which <i>any</i> change occurs in:		All	Women	Men	T-test
At home (telecommuting) hours					
Standard hours		12%	14%	11%	**
Overtime hours		35%	31%	37%	***
On-site hours					
Standard hours		23%	32%	17%	***
Overtime hours		52%	41%	61%	***
N (person-job spells)		4,778	2,153	2,625	
Panel B. Average absolute change within person-job spells in which change occurs		All	Women	Men	T-test
Among person-job spells in which <u>standard</u> telecommuting hours changes:					
Mean absolute difference from the average within the job spell:		2.57	2.38	2.75	
N (person-job spells)		537	271	266	

Panel A. Percent of person-job spells in which <i>any</i> change occurs in:	All	Women	Men	T-test
Among person-job spells in which overtime telecommuting hours changes:				
Mean absolute difference from the average within the job spell:	2.05	1.97	2.09	
N (person-job spells)	1,533	628	905	
Among person-job spells in which <u>standard</u> on-site hours changes:				
Mean absolute difference from the average within the job spell:	2.78	2.73	2.84	
N (person-job spells)	1,094	657	437	
Among person-job spells in which overtime on-site hours changes:				
Mean absolute difference from the average within the job spell:	3.60	3.23	3.78	***
N (person-job spells)	2,380	826	1,554	
Panel C. Average change from previous year in years which change occurs	All	Women	Men	T-test
Standard telecommuting hours				
Mean difference from the previous year when change is positive	6.00	5.48	6.45	
Mean difference from the previous year when change is negative	-5.47	-4.49	-6.29	***
Overtime telecommuting hours				
Mean difference from the previous year when change is positive	4.16	4.29	4.09	
Mean difference from the previous year when change is negative	-3.92	-3.87	-3.95	
Standard on-site hours				
Mean difference from the previous year when change is positive	5.46	5.14	5.92	*
Mean difference from the previous year when change is negative	-5.94	-5.61	-6.38	
Overtime on-site hours				
Mean difference from the previous year when change is positive	6.94	6.61	7.08	
Mean difference from the previous year when change is negative	-6.83	-6.27	-7.06	**

Notes: These data are weighted. T-test indicates significant differences between groups (p-values: ***<0.001, **<0.01, *<0.05).

Appendix 3

Fixed-effects Regression Results Predicting Ln Weekly Earnings as a Function of Location of Work and Schedule, NLSY '89-'08

	All		Women		Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Location of Work and Schedule						
At home (telecommuting)						
Standard hours	0.021*** (0.001)	0.020*** (0.001)	0.022***, <i>a</i> (0.002)	0.021*** (0.002)	0.015***, <i>a</i> (0.003)	0.014*** (0.003)
Overtime hours	0.004***, <i>b</i> (0.001)	0.002* (0.001)	0.004***, <i>b</i> (0.001)	0.001 (0.001)	0.003***, <i>b</i> (0.001)	0.002* (0.001)
Overtime hours*Paid by the hour in the current year (1=yes)		0.011*** (0.001)		0.014*** (0.003)		0.007* (0.003)
On-site						
Standard hours	0.020*** (0.001)	0.019*** (0.001)	0.021***, <i>a</i> (0.001)	0.021*** (0.001)	0.013***, <i>a</i> (0.002)	0.013*** (0.002)
Overtime hours	0.008***, <i>b</i> (0.001)	0.006*** (0.001)	0.009***, <i>b</i> (0.001)	0.007*** (0.001)	0.008***, <i>b</i> (0.001)	0.006*** (0.001)

	All		Women		Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Location of Work and Schedule						
Overtime hours*Paid by the hour in the current year (1=yes)		0.006*** (0.001)		0.007*** (0.001)		0.006*** (0.001)
Constant	5.051*** (0.098)	5.138*** (0.098)	4.705*** (0.159)	4.718*** (0.159)	5.499*** (0.154)	5.592*** (0.154)
N (groups: person-job spells)	4,778	4,778	2,153	2,153	2,625	2,625
N (observations: person-years)	19,633	19,633	8,716	8,716	10,917	10,917

Notes: Standard errors in parentheses. All models include controls for employee and occupational characteristics listed in Table 2. Year dummies also included. P-values: ***<0.001, **<0.01, *<0.05.

^aDenotes statistically significant different coefficient by sex in Model 1 (p<0.05).

^bDenotes statistically significant different coefficient by location in Model 1 (p<0.05).

Appendix 4

Fixed-effects Regression Results Predicting Weekly Earnings as a Function of Location of Work and Schedule, Incorporating Previous Wave Information, NLSY '89-'08

Location of Work and Schedule	Model 1
Previous year	
At home (telecommuting)	
Standard hours	4.45*** ^b (1.73)
Overtime hours	2.15* (0.88)
On-site	
Standard hours	1.60 ^b (1.10)
Overtime hours	2.15*** (0.39)
Current year	
At home (telecommuting)	
Standard hours	11.61*** ^b (1.65)
Overtime hours	3.62*** ^b (0.85)
On-site	
Standard hours	8.74*** ^b (1.11)
Overtime hours	6.08*** ^b (0.39)
Constant	-172.82 (116.55)
N (groups: person-job spells)	3,048
N (observations: person-years)	13,125

Notes: Standard errors in parentheses. P-values: ***<0.001, **<0.01, *<0.05. All models include controls for employee and occupational characteristics listed in Table 2. Year dummies also included.

^bDenotes statistically significant different coefficient by location within given time period (previous or current) (p<0.05).

Appendix 5

Descriptive Statistics by Telecommuting Status, No Restriction on Type of Pay,
NLSY '89-'08

Variable	Telecommuting Status			
	All	No	Yes	T-test
Income				
Weekly earnings (in 2000 dollars)	\$703	\$653	\$1,015	***
Employee Characteristics				
Hours Worked				
Total hours	42.70	41.78	48.44	***
Total hours worked at home (telecommuting)	0.79	0.00	5.73	***
Total hours worked on-site	41.91	41.78	42.71	***
Work History				
Years of full-time work experience	13.37	13.29	13.91	**
Years of part-time work experience	2.39	2.37	2.55	***
Educational Attainment				
Less than high school	0.07	0.08	0.02	***
High school	0.44	0.48	0.20	***
Some college	0.23	0.24	0.21	***
College graduate or more	0.26	0.21	0.57	***
Marital Status				
Never married	0.19	0.19	0.18	*
Married	0.64	0.63	0.70	***
Divorced/widowed	0.17	0.18	0.12	***
Parental Status				
Parent	0.60	0.60	0.61	
Number of children	1.15	1.14	1.18	
Demographic Characteristics				
Gender (1 = female)	0.44	0.44	0.39	***
Health limitations	0.04	0.04	0.03	
Region (1=South)	0.35	0.35	0.34	
Urban	0.74	0.73	0.78	***
N (person-years)	40,395	35,592	4,803	
Occupation/Job Characteristics				
Occupation				
Lower working-class	0.15	0.17	0.02	***
Upper working-class	0.23	0.26	0.08	***
Lower white-collar	0.32	0.32	0.30	**
Upper white-collar	0.29	0.24	0.60	***
Proportion telecommuters in occupation (at least 1 hr/wk)	0.14	0.12	0.31	***
Proportion part-timers in occupation (b/w 20–30 hrs/wk)	0.06	0.06	0.05	***
Proportion women in occupation	0.42	0.42	0.42	

Variable	Telecommuting Status			
	All	No	Yes	T-test
Private sector	0.85	0.85	0.84	
Union	0.15	0.17	0.06	***
Large firm (500 or more employees)	0.19	0.19	0.20	
Flexible work schedule available	0.55	0.53	0.70	***
Fixed work schedule	0.90	0.90	0.87	***
Paid by the hour in the current year	0.60	0.67	0.21	***
N (person-years)	40,395	35,592	4,803	

Notes: These data are weighted. Telecommuters are defined as those working at least 1 hour per week at home. T-test indicates significant differences between groups (p-values: ***<0.001, **<0.01, *<0.05).

Appendix 6

Fixed-effects Regression Results Predicting Weekly Earnings as a Function of Location of Work and Schedule, No Restriction on Type of Pay, NLSY '89–'08

	All		Women		Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Location of Work and Schedule						
At home (telecommuting)						
Standard hours	11.31***, <i>b</i> (0.82)	10.59*** (0.81)	11.05*** (0.95)	10.59*** (0.95)	10.09***, <i>b</i> (1.47)	9.07*** (1.46)
Overtime hours	4.87***, <i>b</i> (0.48)	2.61*** (0.57)	4.72***, <i>b</i> (0.62)	1.49 (0.80)	5.01***, <i>b</i> (0.71)	3.29*** (0.80)
Overtime hours*Paid by the hour in the current year (1=yes)		6.27*** (0.98)		7.11*** (1.18)		5.98*** (1.59)
On-site						
Standard hours	8.82***, <i>b</i> (0.41)	8.62*** (0.41)	9.52***, <i>a</i> (0.39)	9.36*** (0.39)	6.78***, <i>a b</i> (0.98)	6.56*** (1.84)
Overtime hours	8.49***, <i>b</i> (0.19)	5.51*** (0.27)	7.94***, <i>b</i> (0.30)	5.52*** (0.44)	8.71***, <i>b</i> (0.25)	5.40*** (0.35)
Overtime hours*Paid by the hour in the current year (1=yes)		5.10*** (0.34)		4.07*** (0.57)		5.67*** (0.44)
Constant	−45.17 (40.70)	−4.83 (40.65)	−87.97 (49.34)	−62.90 (49.34)	71.00 (72.71)	122.97 (72.04)
N (groups: person-job spells)	10,582	10,582	4,987	4,987	5,595	5,595
N (observations: person-years)	40,395	40,395	18,577	18,577	21,818	21,818

Notes: Standard errors in parentheses. All models include controls for employee and occupational characteristics listed in Table 2. Year dummies also included. P-values: ***<0.001, **<0.01, *<0.05.

^aDenotes statistically significant different coefficient by sex in Model 1 (p<0.05).

^bDenotes statistically significant different coefficient by location in Model 1 (p<0.05).

Appendix 7

Fixed-effects Regression Results Predicting Ln Weekly Earnings as a Function of Location of Work and Schedule, No Restriction on Type of Pay, NLSY '89–'08

	All		Women		Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Location of Work and Schedule						
At home (telecommuting)						
Standard hours	0.030***, <i>b</i> (0.001)	0.029*** (0.001)	0.030*** (0.001)	0.029*** (0.002)	0.027***, <i>b</i> (0.001)	0.026*** (0.002)
Overtime hours	0.005***, <i>b</i> (0.001)	0.002* (0.001)	0.006***, <i>b</i> (0.001)	0.001 (0.001)	0.005***, <i>b</i> (0.001)	0.002* (0.001)
Overtime hours*Paid by the hour in the current year (1=yes)		0.010*** (0.001)		0.011*** (0.002)		0.008* (0.002)
On-site						
Standard hours	0.027***, <i>b</i> (0.001)	0.027*** (0.001)	0.028***, <i>a</i> (0.001)	0.028*** (0.001)	0.024*** <i>a, b</i> (0.001)	0.024*** (0.002)
Overtime hours	0.011***, <i>b</i> (0.001)	0.007*** (0.001)	0.011***, <i>b</i> (0.001)	0.007*** (0.001)	0.011***, <i>b</i> (0.001)	0.006*** (0.001)
Overtime hours*Paid by the hour in the current year (1=yes)		0.008*** (0.001)		0.008*** (0.001)		0.008*** (0.001)
Constant	4.560*** (0.156)	4.625*** (0.156)	4.640*** (0.077)	4.684*** (0.077)	5.032*** (0.089)	5.105*** (0.089)
N (groups: person-job spells)	10,582	10,582	4,987	4,987	5,595	5,595
N (observations: person-years)	40,395	40,395	18,577	18,577	21,818	21,818

Notes: Standard errors in parentheses. All models include controls for employee and occupational characteristics listed in Table 2. Year dummies also included. P-values: ***<0.001, **<0.01, *<0.05.

^aDenotes statistically significant different coefficient by sex in Model 1 (p<0.05).

^bDenotes statistically significant different coefficient by location in Model 1 (p<0.05).

Biographies

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Table 1

Flexible Policy Use, by Sex and Parental Status, NLSY '89-'08

Panel A. Percent of person-job spells in which respondent:	All		All		Parents		Non-parents	
	Women	Men	Women	Men	T-test	Women	Men	T-test
Ever telecommuted between '89 and '08								
At least 1 hour/wk	40%	44%	**	40%	48%	**	40%	40%
At least 5 hours/wk	23%	28%	***	22%	29%	**	23%	26%
N (person-job spells)	2,153	2,625		1,278	1,427		875	1,198
Panel B. Percent of person-year observations during which respondent is:								
Currently telecommuting								
At least 1 hour/wk	20%	25%	***	19%	27%	***	22%	21%
At least 5 hours/wk	10%	13%	***	9%	13%	***	11%	12%
N (person-years)	8,716	10,917		5,333	6,223		3,383	4,694
Panel C. Mean hours worked by location and schedule:								
Total hours	41.68	46.42	***	40.73	46.76	***	43.04	45.95
Location of Work and Schedule								
At home (telecommuting)								
Total hours	1.34	1.47	***	1.06	1.53	***	1.27	1.39
Standard hours	0.38	0.37		0.41	0.36		0.33	0.40
Overtime hours	0.96	1.10	***	0.65	1.18	***	0.94	0.99
On-site								
Total hours	43.13	44.95	***	39.67	45.23	***	41.77	44.56
Standard hours	38.99	39.42	***	37.98	39.52	***	38.95	39.28
Overtime hours	4.14	5.53	***	1.68	5.71	***	2.82	5.27
N (person-years)	19,633	10,917		5,333	6,223		3,383	4,694

Notes: These data are weighted. T-test indicates significant differences between groups (p-values: ***<0.001, **<0.01, *<0.05).

Table 2

Descriptive Statistics by Telecommuting Status, NLSY '89–'08

Variable	Telecommuting Status			
	All	No	Yes	T-test
Income				
Weekly earnings (in 2000 dollars)	\$848	\$783	\$1,063	***
Employee Characteristics				
Hours Worked				
Total hours	44.47	43.12	48.99	***
Total hours worked at home (telecommuting)	1.34	0.00	5.85	***
Total hours worked on-site	43.13	43.12	43.13	
Work History				
Years of full-time work experience	13.91	13.83	14.17	**
Years of part-time work experience	2.31	2.26	2.47	***
Educational Attainment				
Less than high school	0.03	0.04	0.02	***
High school	0.32	0.37	0.18	***
Some college	0.24	0.25	0.19	***
College graduate or more	0.40	0.34	0.62	***
Marital Status				
Never married	0.18	0.18	0.17	*
Married	0.67	0.65	0.72	***
Divorced/widowed	0.15	0.16	0.11	***
Parental Status				
Parent	0.58	0.58	0.61	***
Number of children	1.09	1.08	1.17	***
Demographic Characteristics				
Gender (1 = female)	0.41	0.42	0.37	***
Health limitations	0.03	0.03	0.03	
Region (1=South)	0.36	0.37	0.35	
Urban	0.77	0.77	0.79	***
N (person-years)	19,633	15,545	4,088	
Occupational/Job Characteristics				
Occupation				
Lower working-class	0.07	0.08	0.01	***
Upper working-class	0.15	0.18	0.06	***
Lower white-collar	0.34	0.35	0.30	***
Upper white-collar	0.45	0.39	0.63	***
Proportion telecommuters in occupation (at least 1 hr/wk)	0.21	0.17	0.33	***
Proportion part-timers in occupation(b/w 20–30 hrs/wk)	0.05	0.06	0.04	***
Proportion women in occupation	0.42	0.43	0.41	***
Private sector	0.82	0.81	0.85	***

Variable	Telecommuting Status			
	All	No	Yes	T-test
Union	0.10	0.12	0.06	***
Large firm (500 or more employees)	0.21	0.20	0.21	
Flexible work schedule available	0.60	0.56	0.70	***
Fixed work schedule	0.89	0.90	0.87	***
Paid by the hour in the current year	0.25	0.30	0.09	***
N (person-years)	19,633	15,545	4,088	

Notes: These data are weighted. Telecommuters are defined as those working at least 1 hour per week at home. T-test indicates significant differences between groups (p-values: ***<0.001, **<0.01, *<0.05).

Fixed-effects Regression Results Predicting Weekly Earnings as a Function of Location of Work and Schedule, NLSY, 89-08

Table 3

Location of Work and Schedule	All		Women		Men	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
At home (telecommuting)						
Standard hours	9.58*** (1.27)	8.92*** (1.27)	10.01*** (1.49)	9.54*** (1.49)	5.93* (2.34)	5.13* (2.38)
Overtime hours	3.78***, <i>b</i> (0.66)	2.39*** (0.71)	3.51***, <i>b</i> (0.92)	1.24 (1.01)	3.93***, <i>b</i> (0.93)	3.10*** (0.97)
Overtime hours*Paid by the hour in the current year		8.14*** (1.62)		9.40*** (1.95)		6.60* (2.63)
On-site						
Standard hours	7.98*** (0.85)	7.52*** (0.85)	9.61***, <i>a</i> (0.86)	9.27*** (0.86)	3.27, <i>a</i> (1.84)	2.79 (1.84)
Overtime hours	6.46***, <i>b</i> (0.31)	5.22*** (0.34)	6.57***, <i>b</i> (0.50)	5.19*** (0.56)	6.51***, <i>b</i> (0.39)	5.20*** (0.43)
Overtime hours*Paid by the hour in the current year		4.55*** (0.56)		4.88*** (1.01)		4.86*** (0.72)
Constant	-53.78*** (80.55)	0.29 (80.55)	-204.95 (114.89)	-165.98 (114.71)	225.16 (135.90)	286.25 (135.71)
N (groups: person-job spells)	4,778	4,778	2,153	2,153	2,625	2,625
N (observations: person-years)	19,633	19,633	8,716	8,716	10,917	10,917

Notes: Standard errors in parentheses. All models include controls for employee and occupational characteristics listed in Table 2. Year dummies also included. P-values: *** <0.001, ** <0.01, * <0.05.

^aDenotes statistically significant different coefficient by sex in Model 1 ($p < 0.05$).

^bDenotes statistically significant different coefficient by location in Model 1 ($p < 0.05$).

Table 4

Fixed-effects Regression Results Predicting Weekly Earnings as a Function of Location of Work and Schedule, Incorporating Parenthood Interactions, NLSY '89-'08

Location of Work and Schedule	Women	Men
At home (telecommuting)		
Standard hours	8.44** (2.94)	8.34** (3.09)
Standard hours*Parent (1=yes, 0=no)	1.69 (3.27)	-5.59 (4.25)
Overtime hours	2.91* (1.44)	0.87 (1.42)
Overtime hours*Parent (1=yes, 0=no)	1.04 (1.82)	5.24** (1.79)
On-Site		
Standard hours	6.19*** (1.10)	4.45* (2.23)
Standard hours*Parent (1=yes, 0=no)	4.10* (1.98)	-3.22 (3.44)
Overtime hours	5.43*** (0.55)	6.16*** (0.54)
Overtime hours*Parent (1=yes, 0=no)	1.88* (0.94)	0.56 (0.65)
Constant	-63.55 (130.96)	177.08 (143.49)
N (groups: person-job spells)	2,153	2,625
N (observations: person-years)	8,716	10,917

Notes: Standard errors in parentheses. P-values: ***<0.001, **<0.01, *<0.05. All models include controls for employee and occupational characteristics listed in Table 3. Year dummies are also included.