

Essays on the Economics of Work and Family

by

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B.A., Economics
University of Rochester, 1995

Submitted to the Department of Economics
in Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

at the
Massachusetts Institute of Technology

May 1999

June 1999

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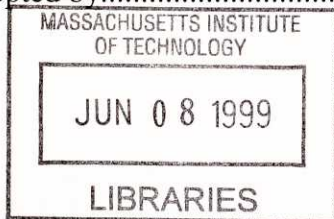
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Abstract

This thesis is about the interaction between work and families. Each chapter highlights a different source of variation in hours worked, and focuses on the potential impact of these working conditions on families. In Chapter 1, I use demand shocks within industries and regions to study the impact of long hours of work on divorce and grade repetitions. I also explore the characteristics of Americans that work long hours and present descriptive statistics on a variety of hours measures and work schedules. My key findings are that for the majority of Americans, 40 hour work weeks are still typical. OLS results suggest that adding ten hours to the average work week raises the probability of divorce by one-half of one percentage point. I also find that more work by parents is positively correlated with their children's grade repetition, but have little effect on other parent-child interactions. Instrumental variables estimates based on demand side variation in hours suggest the OLS estimates exaggerate the negative effects of longer hours. In Chapter 2, I use exogenous separations caused by Gulf War deployments to study the impact of one family member's absence on spouse's labor supply and children's disabilities. The estimates suggest that deployments of a male soldier reduced wives' employment rates, and had little effect on the probability of getting divorced. On the other hand, deployment of female soldiers left husband's employment rates unchanged, but sharply increased the probability of a couple getting divorced. In Chapter 3, I study a 1985 Supreme Court decision, *Garcia v. San Antonio Metropolitan Transit Authority*, that mandated overtime payments for state and local public sector workers. My results suggest that both the number of persons working any overtime and the actual number of overtime hours worked by public sector employees increased as a result of the law change.

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Acknowledgments

It is hard to imagine finishing this dissertation without the many who through both good and bad times have been here to lend support, advice, and encouragement.

First, I thank my advisors- Joshua Angrist, Daron Acemoglu, and Steve Pischke. Josh taught me how to think about research and has been infinitely patient with me, even when I've made that a challenge. His generosity with his time has been greatly appreciated. Daron gave me my first research job in graduate school, and has been most influential in shaping my views about economics. I've never met anyone more intellectually curious than him. Steve has been a wonderful source of practical advice and a calming influence through out. I also thank Susan Athey for being an excellent sounding board at many difficult times along the way.

My family has watched me proceed through MIT and have been supportive and encouraging through out. I thank my parents for teaching me to make education a priority in my life. They are two of my biggest fans, and their confidence in my abilities has carried me through many tough times. My brother Kevin has been a constant reminder of who I am- I always see a lot of myself in him. My in-laws Jim and Jackie have always reminded me that what I am doing is a big deal. And, a special thank you to my friend Chris Johnson, who spent many late nights on the phone and e-mail talking me through crisis after crisis, always boosting my confidence when I needed it most.

I have had the pleasure to work with and become friends with many amazing people at MIT. I thank my first year study buddies- Jeffrey Brown, Courtney Coile, and Susan Dynarski. The three of you carried me through the first two years, and made it not only tolerable, but fun. Daniel Dulitzky, Andrea Repetto, and Matthew Eichner all shared their voices of experience on numerous occasions. Kirstyn Walton provided exceptional research assistance on many of the chapters in this thesis. Alberto Abadie, Mark Aguiar, Eric Bettinger, Aimee Chin, Esther Duflo and Sam Liu have all been great colleagues.

A few people deserve honorable mentions for friendship above and beyond the call of duty. Campe Goodman has been a great friend and a constant source of support and sound advice. Adam Ashcraft has listened to me on countless occasions, never making me feel crazy or judged by him. Sean May is not only one of the best people I know, but his sense of humor has provided hours of entertainment (both laughing

with, and often, at him). Jon Guryan and I have dissected more labor problems in our office than I care to imagine. Not only has he taught me more economics than anyone, but his friendship and advice are invaluable. Finally, the countless hours in the computer room and job market stress always seemed more tolerable because Sandy Wolfson was going through it with me. I can't express how much I appreciate his insights, the many diversions we shared together outside economics, and most important, his friendship.

Finally, I dedicate this thesis to my wife, Christie. We moved to Boston to start the graduate program after being married for all of ten days. I'm not sure either of us knew exactly what MIT would hold for us, but most important, we knew we were facing it together. No matter what I have gone through, no matter how I have reacted, and no matter how miserable I have been, she has gotten me through. Her smile, her support, and her unconditional love have been the most important factors in my success. She has always reminded me that there was more to life than economics, and at the same time, that I should never give up on myself because I would be good at this! There is no words to express my gratitude, or my love, for her.

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Introduction

This thesis is about the interaction between work and families. Each chapter highlights a different source of variation in hours worked—demand shocks within industries and regions, exogenous separations caused by Gulf War deployments, and supply responses induced by changes in overtime legislation. I then focus on the potential impacts of these various hours shocks on families, studying divorce, spouse's labor force participation, and children's disabilities, grade repetitions, and suspensions.

In Chapter 1, I look at the effects of long work hours on divorce and children's outcomes. Recent accounts highlight the possibly detrimental effects of demanding work schedules on families, but the empirical evidence to date is limited. Using both cross-section and panel data from the 1992 Survey of Income and Program Participation, this chapter asks two questions. First, what are the characteristics of people who work long hours? Second, what is the impact of work hours on marital stability and child welfare? For the majority of Americans, 40 hour work weeks are still typical. People who work long hours tend to have higher earnings and to be more educated. Ordinary Least Squares (OLS) results suggest that adding ten hours to the average work week raises the probability of divorce by one half of one percentage point. However, shift-work, weekend work, and the variance of hours have little effect after conditioning on average hours worked. I also find that more work by parents is positively correlated with their children's grade repetition, but work hours have little effect on other parent-child interactions. Finally, instrumental variables (IV) estimates based on demand side variation in hours are smaller than the corresponding OLS estimates, suggesting the OLS estimates exaggerate the negative effects of longer hours. The effect of income on divorce and most children's outcomes is negative whether estimated by OLS or IV. I conclude that although there is some evidence of negative hours effects on families, the ability to infer causality is weak at best.

Chapter 2, co-authored with Joshua Angrist, focuses on a case study of Gulf War veterans. Many

soldiers who were mobilized for Gulf War service were away from home for an extended period of time, so Gulf War mobilization makes an interesting case study of work-related absences by both husbands and wives.

Using the 1992 Survey of Officers and Enlisted Personnel, the effect of Gulf War deployments on employment rates for soldiers' spouses, divorce rates, and disability rates among soldiers' children is estimated. Personnel deployed to the Gulf War spent 3-6 more months away from home than non-deployed personnel. The estimates suggest that deployments of a male soldier reduced wives' employment rates, probably because of added child care responsibilities. Deployment of a female soldier left husbands' employment rates unchanged, but female deployment is associated with significantly higher post-deployment divorce rates. Finally, estimates for the pooled sample of men and women show no significant increase in the incidence of temporary disabilities among children of deployed personnel. This may be because for military families, deployment was not associated with a change in living standards.

In Chapter 3, I study one of the largest changes in the overtime provisions of the Fair Labor Standards Act in the last two decades—the extension of coverage eligibility for state and local government workers. I study the natural experiment caused by the Supreme Court decision in *Garcia v. San Antonio Metropolitan Transit Authority* and the subsequent passage of the 1985 FLSA Amendments which made 80 percent of state and local government workers eligible to receive compensation for overtime hours worked. Using a difference-in-differences approach, I compare hourly state and local government workers to several control groups, including hourly federal government employees and salaried local government employees. I find a large positive effect of the law change on overtime hours, the percentage of people working any overtime hours last week, and earnings. The supply elasticity for overtime hours is about .5. I discuss three possible explanations for the results—shifting demand for state and local government workers, a supply response by workers to overtime hours worked, and shifting amongst government workers from uncovered to covered sectors.

Chapter 1

Is Overwork Hurting American Families?

Rigid, demanding career schedules are often the story for the middle classes. . .the long hours men devote to work and to recovering from work are often taken from the untold stories, unthrown balls, and uncuddled children left behind at home.

-Arlie Hochschild. *The Second Shift*. (1989)

1.1 Introduction

There has been little economic research on the impact of work hours on family stability and children's outcomes. This is surprising in light of labor economists' long-standing interest in the interaction between work and families and the extensive popular discussion of this topic. Recent accounts claim that long or inflexible hours have a negative impact on families. Marital discord, child neglect, sleep deprivation, and poor health have all been blamed on excessive work hours (Schor, 1992). Some researchers have suggested that family-friendly employment policies have not been effective in relieving stress on households, and that employers encourage employees to choose work over family (Hochschild 1989, 1997). Unions have also criticized long work hours. For example, in a recent strike against US West, the Communications Workers of America argued that the long hours mandated by the company were "driving workers to exhaustion and stealing time from their families" (Press Release, August 1998). Similar positions have been taken by other unions in response to sustained periods of mandatory overtime to meet production deadlines.

This paper describes the characteristics of people who work long hours, and estimates the effect of work hours on families. Recent studies have focused on trends in hours worked over time. Work hours have not changed dramatically for prime-age men since the mid-1970s, although more people are working longer work weeks (Rones, et. al, 1997). Female and educated workers experienced the largest increases in hours worked between 1940 and 1988 (Coleman and Pencavel, 1993). Another study suggests that since the turn

of the century, Americans have experienced increases in the amount of leisure time they have (Costa, 1997). Evidence on work schedules is more limited; one study suggests that one-fifth of all persons employed in 1991 did not work a fixed schedule (Presser, 1995). Another compares workers in the United States and Germany. The findings suggest that there is more variation in the U.S. in daily hours than in days worked per week, and that demographic factors affect daily hours differently than they affect workdays (Hamermesh, 1996).

Even if some Americans are working more, it is not clear whether extra work hours displace time with spouse and children or time spent on other leisure activities, such as watching television (Robinson and Godbey, 1997). Further, popular discussions of hours worked often ignore the benefits to families of higher earnings and economic stability. These caveats aside, it is not hard to imagine that extremely long or irregular work hours reduce workers' time contributions to their marriages and children. Additionally, some studies have shown that work requiring prolonged absences does affect families.¹

This paper begins by describing the cross-sectional variation in hours and work schedules of Americans in the 1992 Survey of Income and Program Participation (SIPP). I show that the majority of Americans work 40 hours per week, and that the percentage of persons working very long hours (greater than 80) is less than 1 percent. The highest hours men are also the most educated and have the highest incomes. For example, men with college degrees work on average seven hours more per week than high school dropouts. In contrast, women who work the longest hours are those who are divorced, non-white, and without a high school degree.

Next, I analyze the impact of work hours on families, looking first at marriage and then at children. Using the Survey of Income and Program Participation (SIPP) to look at married men who work and couples in which both spouses work, I measure the work hours in the first two years of a three-year panel and the

¹Recent examples include Angrist and Johnson, 1998 on female Gulf War veterans; Hiew, 1992 on Japanese executives; and Vormbrock, 1993 on Offshore oil riggers.

divorce rate in the third year. The panel allows me to follow the same families over time and condition on pre-existing characteristics such as marital status. The measures of hours I study are: average hours worked, maximum and minimum hours worked in any quarter, variance of hours worked, and the range (maximum hours worked in a quarter minus minimum hours worked in a quarter). I also look at the impact of work schedules such as working at night, on weekends, and at unusual times. Ordinary Least Squares (OLS) results suggest that adding ten hours to the average work week raises the probability of divorce by about one percentage point. However, work schedules and the variance of hours have little effect once average hours of work have been taken into account. An additional 1000 dollars of income decreases the probability of divorce by about one half of one percentage point.

Respondents with children answered a series of questions at the end of the third year of the panel (the children's well-being supplement). These questions include: whether the parents read to the children, how often parents take their children on trips, whether the children participate in sports and clubs, and whether the children have repeated grades or been suspended from school. Using methods similar to those used when looking at the effects of work hours on marriage, I find that longer work weeks are positively correlated with more grade repetitions. There is little evidence, however, that increased hours worked affect other parent-child interactions.

Finally, I use an instrumental variables approach because it is not clear that work schedules impact divorce rather than the reverse (i.e., problems leading to a divorce cause more work hours). In fact, persons working long hours or irregular schedules may differ from other families along many dimensions, so simple cross-family comparisons may not be a good indicator of the causal impact of work on families. People that work long hours may be a self-selected group; therefore, OLS estimates may be biased by the unobservable personal characteristics that are omitted from the specification. To try to capture exogenous variation in hours that is uncorrelated with other characteristics, I use hours variation across one-digit industries, hours variation by industry and region, and hours variation stratified by class of worker as instruments for work

hours. By using industry-region variation, and controlling for industry and region main effects, I can control for selection effects if selection into industries is the same across regions. Although there are strong first stage relationships, the instrumental variables estimates are imprecise. It is worth noting, however, that the IV estimates tend to have the opposite sign (i.e., more work reduces divorce) and suggest the OLS estimates are biased upwards by omitted variables. I also find that income has a significant and negative effect in both OLS and IV regressions.

1.2 Data

1.2.1 The Survey of Income and Program Participation

The Survey of Income and Program Participation (SIPP) is a panel survey of 20,000 families conducted by the US Census Bureau. Families are tracked for approximately 40 months in the 1992 panel.

The data set collects information on government programs and their potential effects on families. In addition, the data set also has many topical modules that vary from interview wave to interview wave. This paper uses the 1992 panel because it includes the only currently available children's well-being supplement, as well as modules on marital history and work schedules.

The SIPP interviews families at four month intervals about their work and family experiences over the previous four months. The basic survey elicits information on labor force participation, hours worked, industry and occupation. Demographic information includes age, sex, marital status, race, and schooling. The survey respondent is asked about all persons in the household in the initial wave; only adults are asked about in subsequent waves. For this project, I use the wave 1 cross-sectional data for basic descriptive information on hours worked and the characteristics of people who work long hours. The effects of hours of work on marriage and children are estimated using four topical modules merged to the longitudinal file.²

Table 1 shows descriptive statistics for the cross-sectional (wave 1) data set for both men and

²A detailed discussion of the longitudinal file and the topical modules can be found later in the paper.

women ages 25 to 55 in the labor force. The statistics in Table 1 and throughout the paper are weighted by SIPP longitudinal weights. The average age in this group is 38.2 years, with the majority of men (71 percent) being married, and a small fraction ever having been divorced (8.6 percent). Fewer women in the labor force are married (64 percent), but almost twice as many working women report ever being divorced (15 percent). This observation may explain the popular perception that the choice between work and career has more severe consequences for women than for men. It is also interesting to note that more working women are high school graduates than men (65 percent compared to 59 percent). About 3 percent more men than women are college graduates, but there are also about 4 percent more high school dropouts among the men than the women.

1.2.2 Hours

Figure 1 graphs the distribution of weekly hours worked last week by men aged 25-55 in the first wave of the 1992 survey. Many men work 40 hours per week, though there is clearly a lot of variation in the number of hours worked per week. The average hours worked per week is 40.5 hours, and the standard deviation of hours worked is 14.6. Very few men work 65 hours per week or more.³ Figure 2 shows the distribution of weekly hours worked by women aged 25-55. The distribution of women's work hours is similar, although fewer women than men work outside the home and more women work part-time. The average hours worked by women in the labor force is 35.0 hours per week, and the standard deviation of hours is 13.6.

Table 1 highlights some key differences in the job characteristics of men and women. Although the majority of working men and women are in the private sector, a high proportion of women are also in the non-profit sector (10 percent) and government jobs (22 percent). Very few men or women in this sample are

³This finding is in sharp contrast to claims made by other authors; for example, Schor argues that “the number of people who work eighty hours a week and bring home— if they ever get there— a six figure income is very small. But while incomes of those rarefied individuals were out of reach, their schedules turned out to be downright common.”

in the military. Manufacturing is the largest industry among men (22 percent), but construction, transportation, retail trade, and services each account for at least five percent of the sample. For women, services is by far the largest industry, with almost 41 percent of the sample; the next largest industries for women are manufacturing, retail trade, and finance. Many women are in administrative support jobs (28 percent) while the largest occupation group for men is laborers (22 percent). It is not surprising that few women are mechanics and construction workers. It is striking, however, that almost the same percentage of men and women are executives, and a higher percentage of working women are professionals.

The 1992 SIPP suggests that most people work five days per week, and that the average work day is 8.5 hours per day. Table 2 contains information on work schedules for labor force participants. The average hours per day is about 8.6 for married men. Not surprisingly, the mean days of work per week is close to 5. Weekend work is not too common; only about 9 percent of married men report work on Sundays, and 20 percent report working on Saturdays. Most people start their work days between seven and nine in the morning, and end their work days between three and six in the evening. A small percentage of the sample (15 percent) report working irregular schedules, and an even smaller fraction (4 percent) report night work. A majority of persons sampled (85 percent) report that the schedule they work is involuntary, even though most respondents work regular schedules.

Along what dimensions do hours worked differ? In Table 3, I show the average hours worked by men and women in the labor force by various characteristics. First, all measures show that women work about five and a half fewer hours per week than men. This is likely explained by the fact that women hold more part-time jobs than men. Single men work fewer hours than married men, but single women work more hours than married women. Persons with college degrees work about 3 hours more than persons with high school degrees. And, high school drop outs work about 4 hours less than high school graduates. A similar pattern exists for women. This is consistent with previous findings that the hours of the more educated Americans have been rising in recent years (Pencavel and Coleman, 1993).

Private sector workers work more hours than government or non-profit workers. The military has high hours of work, but again, the sample contains very few military persons. Across industries, the highest average hours are worked in mining (47.5), with the fewest hours worked in services (42.4). Across occupations, we see executives (46.8) and sales persons (46.4) work the highest hours. Workers in the South have the highest average hours of work in this sample, with workers in the Northeast having the fewest. The difference in hours across regions is about 3 hours.

Since much of the attention in the debate has focused on people who work long hours, it is useful to look at who it is that works more than 40 hours per week. In Table 4, I provide descriptive statistics on people who work between 40 and 50, between 50 and 60, and 60 or more hours per week. Men who work the longest hours are, on average, younger and are more likely to report they have ever been divorced. The extremely high hours men are also the persons with the highest income levels, with average monthly earnings of 3462 dollars. And, compared to the full sample, a higher percentage of the high hours persons are college graduates (between 35 and 38 percent). People working between 50 and 60 hours per week are mainly concentrated in the private sector; a noticeable exception is the high proportion of military in the high hours sample. The women who work longer hours exhibit different characteristics than the men who work long hours. For example, compared to all women in the labor force, high hours women are less likely to be married and more likely to be divorced. Although their average earnings are much higher than the average earnings of women in the labor force, the highest hours group actually has lower earnings than the 51-60 hours group. When we look more closely at the descriptive characteristics, we find many college graduates amongst the middle high hours group, but a high percentage of high school drop-outs (12 percent) and non-white women (27 percent) in the highest hours group. Here, women with moderately high hours have characteristics similar to those of the men: highly educated, high income, private sector workers. But, the 60 or more hours per week women are more in line with the popular image of the low-wage, less-educated overworked American. As a fraction of the sample, however, this group is quite small.

1.3 Background

Having described hours worked and who the people are that tend to work long hours, I turn my attention to the effects of hours worked on marriage and children. Descriptive information about divorce trends and a theoretical model provides a context for the research in this chapter. A review of the economics literature on children's attainment issues is found later. The simple model of divorce can be extended to children's outcomes.

1.3.1 Divorce

Divorce rates in the United States in the 1990's are between four and five per 1000 married persons (see Figure 3). The trend in divorce is slightly downward but flat through the 1980's and the early 1990's. A major spike in divorce occurred in 1945 at the end of World War II. Divorce also increased steadily throughout the 1970's. People who marry younger, are newly married, are less educated,⁴ and who give birth to a child before marriage are thought to be at higher risk of getting divorced (DaVanzo and Rahman, 1992). In a simple economic model, individuals decide to get married when the expected utility as a couple is greater than the expected utility of remaining single. Conversely, divorce occurs when a person can achieve higher utility outside the marriage. The expected utility of the marriage can be affected by uncertainty resulting from factors such as income shocks. (Becker, Landes and Michael, 1977).

Economists often argue that the rise in female labor force participation in the 1970's caused the increase in divorce rates. Others have noted that increases in public assistance and rising female wages are correlated with increasing divorce rates (Michael, 1988). Some evidence suggests women work more in the years prior to divorce, possibly to accumulate wealth in case a divorce occurs. (Johnson and Skinner, 1986; Greene and Questor, 1982). Another study suggests that shift workers have divorce rates that are three percent higher than other workers with more traditional schedules (White and Keith, 1990). Finally,

⁴Women with graduate degrees are more likely to get divorced than the general population.

variation in AFDC benefits has been used to investigate how poor families' divorce rates are affected by increased income (Schultz, 1994; Hoffman and Duncan, 1993).

1.3.2 Theoretical Framework

Consider an individual's utility function:

$$(1) \quad U_i = U(y, h_m, h_f, M, q)$$

where y is family income, h_m is hours worked by the husband, h_f is hours worked by the wife, M is a binary variable indicating marriage, and q is a variable indicating marital quality. The subscript i is either equal to m if the individual is the husband or f if the individual is the wife. The budget constraint for this family is:

$$(2) \quad y = w_m h_m + w_f h_f + y_o$$

We also know that hours worked are bounded and chosen by the utility maximizer:

$$(3) \quad h_m \in [\underline{h}_m, \bar{h}_m]$$

$$(4) \quad h_f \in [\underline{h}_f, \bar{h}_f]$$

Finally, the decision to stay married is a function of hours, income, and marital quality. The probability of staying married, $m = \text{Prob}(M=1)$ is:

$$(5) \quad m = g(h_m, h_f, y, q)$$

In the short run, the individual only has choice over hours of work, h . The solution to this problem is $h^*(w, y, q, M)$. Empirically, we are interested in, first, the change in marital status with respect to changes in hours and changes in income. This is the derivative $\partial g / \partial y$, which is probably positive. This paper is

primarily concerned with the derivative with respect to hours $\partial g/\partial h_i$, which can be positive or negative.

If this derivative is negative, more hours worked puts stress on marriages, taking time away from families, and causing them to break up. It is theoretically possible, however, that more hours could be good for marriages; work provides people with utility from, for example, job satisfaction. The model can be used to show why OLS estimates may be hard to interpret. Consider the correlation between hours worked and divorce:

$$(6) \quad \frac{\partial m}{\partial h_m} = \frac{\partial g}{\partial h_m} + \frac{\partial g}{\partial y} w_m$$

Clearly, the OLS relationship between divorce and hours is affected by income. Working more hours usually increases income, either due to direct hours effects (working more hours at a fixed rate increases income), or through the hourly wage rate, as a result of overtime laws. In light of this fact, we need to recognize that hours changes may be confounded with income changes, and at a minimum, control for income changes in the analysis. Even if we could isolate the changes from a pure hours effect, however, there are other reasons to think that the OLS relationship may not be causal. For example, if $\partial h^*/\partial q \neq 0$, then hours would change in response to changes in marital quality. People whose marriages are falling apart might work more to avoid being home. The instrumental variables strategy should help reduce bias from this sort of effect.

The instrumental variables used here exploit variation primarily at the industry level. A potential problem with this is that people may choose industries partly based on their hours. If a worker who has a preference for more time away from home selects his job on the basis of the hours worked, then the positive correlation between hours worked and negative family outcomes may simply reflect a low value for leisure. Some studies suggest, in fact, that employers exhibit more control over hours than individuals (Altonji and Paxson, 1992). To control for selection, I use instrumental variable strategies that rely on industry-region

interactions, and control for industry and region main effects. If selection effects are the same across industries, than the industry-region effects will capture exogenous hours variation.

1.4 Empirical Strategies

1.4.1 Data Configuration

To study divorce and children, I exploit the longitudinal aspect of the 1992 SIPP. By using the full panel, I can follow work histories for two years, and condition on pre-existing characteristics. The marital history supplement (wave 2) provides information on the current marriage, which allows me to calculate length of marriage and age at first marriage. The work-schedules supplements (waves 6 and 9) ask a variety of questions about hours of work, including hours per day, days per week, which days of the week are worked, start time, end time, and whether the work schedule is voluntary or involuntary. The children's well-being supplement (wave 9) asks questions about all children in all households at the end of the panel. It is important to note that children are not followed in other waves of the SIPP.⁵ For children under five, information on height, weight, age at start of kindergarten, number of times parents read to their children and number of "outings" with parents is provided. For children over the age of five, questions focus on grade repetitions, suspensions from school and participation in school activities.

The longitudinal panel for the 1992 survey is first merged to the marital history and work schedule modules. From this data set, I selected married men and married women who are then merged together to make a couples file. I also merged observations on each child in the supplement to his parent in the main data set. The majority of the survey respondents for the children's file are mothers. So, I begin by merging children to their mother, and then the mother to the father. In some cases, however, the responding parent

⁵Information on children is collected in wave 1, but the data does not contain the same type of detailed information as provided by parents in the children's supplement in wave 9.

is a male. So, for those children, I perform the merge in the opposite direction.⁶ Finally, I stack all children/parents files to have one observation per child matched to parent work histories. The data merge is illustrated in Figure 5.

The simplest data configuration conditions on men being married in the first sampling period, wave 1. From this sample, I calculate average hours worked (and other hours schedules measures) for the following two years (waves 1-6). To study divorce, I look at marital status in the third year. This is also convenient because the work schedules information is available in wave 6. The outcome of interest is marital-status-reported-as-divorced in waves 7, 8, or 9. For children's outcomes, I also consider work histories for the first two years of the panel, waves 1-6, or work schedules information provided in wave 6. All children outcomes are taken from wave 9. Figures 6-8 illustrate the data configurations using time lines.

Table 5 shows descriptive statistics for married men with a job in wave 1 and married men with a job every quarter. The average age of married men is about 38 years. Education levels are similar for the two samples; a majority have at least a high school degree (86 percent). The average right-censored marital duration for the married men is about 149 months, or about 12 years. After the demographic variables, Table 5 provides work information broken down by wave. A very small fraction of the sample report having a second job (less than 4 percent). Consistent with the previous discussion, most workers are in private sector jobs (79 percent) with most of the remaining people working for government (15 percent). Average earnings is 2666 dollars per month for married men, about 500 dollars higher than the level for all men in the labor force (2078 dollars). The average hours worked by married men during the first two years of the panel is 42.9 hours per week, and for those with a job each quarter, it is about 1 hour per week higher.

1.4.2 Effects on Divorce

Estimates of the relationship between hours of work and divorce are presented in Table 5. The

⁶In a few cases, there are two records for the same child—one reported by the father and one reported by the mother. In these cases, the final merge only includes the record from the first report.

results from models with covariates were computed by ordinary least squares (OLS) estimation of:

$$(10) \quad D_i = X_i' \beta_0 + \beta_1 H_i + \varepsilon_i$$

where D_i is divorce status in year 3, H_i is the average hours worked in the first two years of the panel by person i , and X_i is a vector of covariates. The covariates are average family income, age, length of marriage, two education dummies, nine occupation dummies, and in some regressions, a dummy indicating if the woman works any hours in period 1. I run regressions for the sub-sample with a job in the first period and for the sub-sample of men who are employed in every period.⁷ The coefficient β_1 is the effect of average hours worked on divorce. All regression estimates are weighted by longitudinal panel weights, and all standard errors are heteroscedasticity consistent.

I begin with OLS estimates from models that exclude income and baseline characteristics of the women. The dependent mean of divorce is .022. The simplest models imply that hours worked have a positive effect on divorce rates. The magnitude implies that an extra ten hours of work per week could increase divorce about a half a percentage point. The effect is slightly larger for the sub-sample who have a job every quarter. In regressions which control for income, the effects are again of about the same magnitude, and slightly more significant. Income has a negative effect on divorce; an additional 1000 dollars income per month reduces the probability of divorce by a little less than a half a percentage point.⁸ Length of marriage also has a small negative effect; each additional year of marriage reduces the probability of divorce by two tenths of a percentage point. In columns (3) and (6), I run the same regression but also include a dummy for whether the husband's spouse is working in the first wave. The inclusion of this additional control has little effect on the results.

It is interesting to compare the potential effects of the extra income gained by the extra hours of

⁷Estimates using a prediction equation to select men with predicted hours > 30 are similar to the estimates with no restriction on hours worked.

⁸In all regressions, the income covariate is scaled by 1000. So, the coefficient on family income represents the effect of an additional 1000 dollars in income per month.

work. An increase in hours of work by ten per week is predicted to increase the probability of divorce by about one half a percentage point. But a ten hour per week increase in hours would also imply an extra 50 hours of work per month. At an average wage rate of 10 dollars per hour, this is an extra 500 dollars per month. So, the net effect of the hours increase is closer to four tenths of one percentage point. These estimates imply that to completely eliminate the negative effect of hours, the ten hour a week (50 hour a month) increase would have to be accompanied by about 1600 dollars per month income increase, or 32 dollars per hour.

Table 6 presents further OLS results for additional covariates: maximum hours and minimum hours worked during any of the six 4-month periods in the first two years, as well as the variance of hours and the range (maximum hours minus minimum hours). The maximum hours worked comes in positive and significant, and is a bit smaller than the corresponding OLS estimates for the average hours worked. The minimum hours worked is negative and insignificant. As the highest hours increase, divorce increases. For people with low or no hours, the increase in hours also reduces divorce. Variance of hours has no significant effect, but the range, however, does have a positive and significant effect. An additional ten hours difference between the maximum hours and the minimum hours increases the probability of divorce by three tenths of one percentage point. This implies that people who experience wide fluctuations in their hours may be more susceptible to divorce; these may be people who change jobs frequently, or go from part-time work to temporary full time work.

OLS models for various work schedules regressors, shown in Table 7, are almost all imprecisely measured.⁹ After conditioning on average hours worked, working a night schedule has a negative and insignificant effect on divorce. A similar negative and insignificant coefficient can be found for people who work seven days a week. One interesting fact that may explain the sign of these estimates is that a high

⁹Timing is an issue here. Work schedules are reported in wave 6. For comparability, I continue to condition on marriage in wave 1 and look at divorce in year three (waves 7-9).

proportion of people in the sample who work every day report that it is voluntary. On the other hand, weekend work and working an odd schedule are both positively correlated with divorce, but again, the coefficient is insignificant. In general, after conditioning on average hours, work schedules do not have effects on divorce. This is an interesting finding, considering the timing of work is often thought to be important.

So far the analysis has focused on men because a higher percentage of men than women participate in the labor force.¹⁰ But, I also look at the effect of women's hours. For the couple's analysis, I limit myself to the 2931 couples in the SIPP where both the husband and the wife are employed in the first period. Table 8 presents descriptive statistics for men and women from this sample. Husbands and wives are about the same age and, mechanically, married for the same average length of time (179 months). Men and women have about the same mean levels of education, although there are fewer female drop outs and female college graduates. Women work in government (21 percent) and the non-profit sector (9 percent) far more than their male spouses (18 percent and 4 percent, respectively.) Finally, the men in this sample work on average 42.6 hours per week, and the women in this sample work on average 33.9 hours per week.

The OLS estimates of the effect of husband's and wife's hours worked on divorce, reported in Table 8, reflect a pattern similar to that in the male-only analysis. An extra ten hours a week of work by the husband is predicted to increase divorce by about one percentage point. Wife's hours, however, have a negative and insignificant effect. I also find that women with less education are less likely to get divorced, possibly as a result of their more limited economic opportunities. As in the male only regressions, I find that the longer people are married and the greater their family income, the less likely they are to get divorced. In column (3), I show the estimates from a regression that includes an interaction between husband's and wife's hours. I find a positive but insignificant effect on the interaction; as both husband's and wife's hours

¹⁰Since the instrumental variables strategy relies on job characteristics in the first period (wave 1 industry, industry*region, class of worker), this restriction simplifies the analysis.

increase, the likelihood of divorce increases. All the hours effects become insignificant in the interacted regression.

1.4.3 Effects on Children

Economists typically model the relationship between parents' time and children's outcomes with household production models. The husband and the wife both allocate time among work, leisure, and time spent in household activities (Gronau, 1981). Children's outcomes are determined in part by the time spent by the parents in home production. Parents make many choices that influence their children: household size and structure, consumption levels and saving, work and leisure, and the allocation of income and time (Haveman and Wolfe, 1995). An extensive literature in economics has focused on the effects of family background (Jencks, 1972), teenage child-bearing (Angrist and Lavy, 1992), receipt of welfare (Duncan and Hoffman, 1990), and single parenting (McLanahan and Sandefur, 1991) on children's schooling and development. A much smaller focus has been given to the effect of hours worked on children's attainment. Parcel and Menaghan (1994) provide the most direct study of work on family—they suggest that various work conditions affect families, but that the effects depend upon a wide variety of background characteristics. The interaction effects between husband's hours and wife's hours may be quite important for children; an increase in the hours worked by the father may be compensated by a decrease in hours worked by the mother.

The SIPP topical module on children's well-being provides a variety of child outcomes for children of the sample families. In principle, I would like to observe parent's work history in the first two years, and look at the effects on children in the third year. Some basic data problems make this difficult. First, the matching of children to parents proves to be quite difficult. As discussed above, a representative parent answers the questions on a given child. The child can be then matched to a parent in wave 9. The difficulty comes in trying to link children from wave 9 to their record in wave 1. The SIPP only interviews children once, in wave 1. After that, children are not followed again until the parents are asked about them in wave

9. In principle, we should be able to find matches for all children in Wave 1. However, response on the children's supplement does not appear to be very good. Even if the match was perfect, the information about children's outcomes are only available in the last period. So, there are no pre-period children's outcomes to control for. Thus, it is possible that the observed children's outcomes may occur before the work hours observed. Further, it appears parents are selectively answering questions. For example, far fewer parents are willing to provide information on whether their children have ever been suspended (1451) than are willing to report on grade repetitions (3306). These caveats must be kept in mind when viewing the children's results. In future work, I hope to control more carefully for the selective non-response in the children's survey.

In Table 9, I provide descriptive statistics on children from married families with children in wave 9.¹¹ Parents answer different questions about children based on their age. For young children, parents report that they take their children on outings (e.g., grocery store, park) on average 17.8 times during the past month. Parents also report that they read to their young children about 7 times during the previous month. Almost all of the older children (98 percent) are reported as attending school. About one tenth of the sample report that a child has repeated any grade, and 7 percent report that their child has ever been suspended from school. Also, a little less than half the children participate in clubs and sports, and about one fifth report their children take music lessons.

Table 10 presents the OLS results on grade repetitions and school suspensions. Since the unit of observation is the child, and there are many houses with more than one child, I correct the standard errors for within household serial correlation.¹² In columns (1)-(3), I present results first, for those children whose fathers report positive hours worked, and second for children where both parents are employed in all waves.

¹¹The quality of the children's data may be an issue. I discuss this later in the paper in the Children's Outcomes section.

¹²The within household correlation correction uses a Huber-White estimator of variance.

An extra ten hours of work by the father will increase the probability of a child repeating a grade by 2 percentage points. When I interact husband's and wife's hours, all the hours effects become insignificant. The coefficient on the interaction term is positive, implying that higher hours of work by both parents will increase the likelihood of a grade repetition. In contrast, the results in columns (4)-(6) show no significant effect of hours worked on probability of being suspended from school. The results are again quite imprecise.

1.5 Endogeneity Issues

1.5.1 Industry and Industry-Region Instruments

As noted earlier, the OLS estimates need not have a causal interpretation. I therefore explore instrumental variables strategies. What types of variables provide potentially exogenous hours variation? I begin with one-digit industry dummies. Industry variation in hours levels is clearly correlated with actual hours worked. Moreover, it is likely uncorrelated with marital problems that could drive hours up. I also present instrumental variables strategies using industry interacted with region, class of worker (private, non-profit, government, and military), and class of worker by industry. The use of the interactions allows me to control for selection problems. If selection effects are similar across industries, than exploiting industry-region variation while controlling for industry main effects will control for selection bias. I also use hours predictions based on the experience of single men within the same industry as instruments. If we are concerned about married men changing their hours in an endogenous way due to positive or negative family circumstances, then using single men's experiences may provide a source of exogenous variation.

The first stage equation for the two stage least squares (2SLS) estimates is:

$$(11) \quad H_i = X_i' \gamma_0 + \gamma_1 Z_i + \eta_i$$

and the second stage equation is (4) above. Then, β_1 is the effect on divorce of exogenous changes in hours levels, and the instrument is Z_i . In the special case without covariates, using industry dummies is equivalent to predicting the hours worked of individual i with the mean hours worked by all persons in his industry in the sample. With covariates, this can be thought of as using industry means controlling for other

characteristics.

I also use dummy interactions as instruments (for example, using industry interacted with region). In this case, the instrument vector Z_i is just the interaction of the main effects. For example, in the case with industry-region interactions, the excluded instruments are nine base period industry dummies interacted with three region dummies. Again, in a model with no covariates, this would be the equivalent of instrumenting the hours of individual i with the mean hours worked by all individuals in the same industry and region in the sample.

Finally, I use two estimators other than 2SLS. I present limited information maximum likelihood estimates (LIML) which are asymptotically equivalent to 2SLS with less finite sample bias (Angrist, et al., 1999). Also reported are a modification of Unbiased Split Sample Instrumental Variables (USSIV) (Angrist and Krueger, 1995). USSIV is ordinarily applied to avoid small sample bias. In this case, the first stage was calculated using a different sample—single men. I then use the fitted values from the single men's hours as the instrument in the second stage equation for married men's hours.

1.5.2 Instrumental Variables Results

Estimates for OLS, 2SLS, LIML, and USSIV techniques are all presented in Table 11.¹³ Only men who are married and employed in all quarters are included in this analysis. The OLS estimates for married men are small and significant, implying that an extra ten hours a week (500 hours a year) would raise the probability of divorce by about one percentage point. The 2SLS estimates for industry, however, are negative and insignificant. The 95 percent confidence interval for the 2SLS estimate includes the small OLS effect and zero. We again get a small and imprecise effect with industry*region effects, both with 2SLS and LIML. Once again, the confidence interval includes the OLS estimate and zero. This estimate is of approximately the same magnitude and significance with and without region main effects. The class of

¹³Table 11 also provides first stage R^2 statistic, the F-test for the excluded instruments, and the overidentification test statistic and p-values. Reduced form estimates can be found in Appendix A.

worker and class of worker interacted with region estimates are also negative; the class of worker estimate of $-.005$ is significant. This implies that a ten-hour increase in hours worked would decrease divorce rates by 5 percentage points, a little large to be plausible. It is important to note that the class of worker instrument does somewhat poorly with the overidentification test.

Finally, the USSIV estimates, which use the experiences of single men within industry and within class of worker also give imprecise, negative coefficients. Both estimates include zero within the confidence interval. The USSIV for single men by class of worker is imprecise and implausibly large. Overall, the evidence from the instrumental variables strategies is mixed, but it is clear that no pattern of strong, positive hours effects emerge. In most cases, no statistically significant effect is detectable.

In Table 12, I treat both hours worked and income as endogenous regressors using the same set of instruments and the same estimation techniques. The hours effects on divorce do not change dramatically, but many of the income effects remain significant, even when we instrument. In the OLS specifications, an increase in income of 1000 dollars (per month) reduces the probability of divorce by almost a half percentage point. The 2SLS with industry is of the same magnitude but insignificant. Both the industry by region and the class of worker by region give significant negative results as well. Finally, the USSIV with single men's fitted values for industry and hours is negative and significant, of the magnitude of one and a half percentage point.

Finally, I instrument for the endogeneity of husband's and wife's work hours with each person's own industry in Table 13. The effects for husbands again are insignificant; as with the estimates from the men-only regressions, they are again close to zero. For women, the IV estimates indicate a positive but insignificant effect; again, the OLS estimate is within the bound of the IV estimate. LIML estimates are essentially the same as the 2SLS.

2SLS estimates for the effect of hours on grade repetitions (found in Table 14) are presented only for the sample with fathers that have positive hours of work. All of the estimates indicate a positive relationship

between hours and grade repetition, but none of the estimates are precise. The 2SLS estimates indicate that an extra ten hours of work per week by the father would increase the likelihood of grade repetition between five and seven percentage points. Overall, Table 14 presents weak evidence that the effect of hours on grade repetitions is likely positive.

1.6 Conclusion

Every person who works and has a family has confronted the conflict between time spent with family members and time spent on the job. To the best of my knowledge, this paper provides the first detailed statistical analysis of the question of whether more work hours are detrimental to families. The popular literature often focused on the fact that employers are demanding more time from workers and that families are suffering as a consequence. Yet, I find no evidence that the distribution of work hours is particularly skewed towards high hours of work; it continues to be the case that for the majority of Americans, weekly work hours are clustered at 40. People who work longer hours are a fairly select group—generally highly educated, high-income persons.

I show that a significant positive correlation does exist between hours worked and negative family outcomes, including divorce and grade repetitions. Many other dimensions, such as work schedules and variance of hours worked are far less important to families. Income is also important for family well-being. IV estimates suggest that the selection problems associated with this correlation may well drive these results; all IV estimates are imprecise and contain the OLS estimates within confidence intervals.

Many policies have been advocated to alleviate the possible negative effects of work hours on families. The suggestions range from day care centers in every community to companies allowing more flexibility in scheduling. My findings suggest that it is far too early to commit to policies that exclusively rely on alleviating hours of work; there is no clear evidence that these policies would be effective in helping families. On the other hand, it might be the case that more traditional policies focused on supplementing income could be as important. That does not imply, however, that families may not be helped by

interventions, just that the most effective way to help families may not simply be by reducing hours of work.

All that said, my findings also do not rule out the possibility that extreme work conditions effect families. Isolated episodes of long hours that are unexpected, sustained, or mandatory may well have detrimental effects on individual families. A natural avenue for future research is to study episodes of mandatory overtime in production and look at their families. The evidence here suggests that the frequency of these types of episodes is small, and that the cross-sectional demand side variation is not that large. Clearly, for the average American, overwork is not the case.

Table 1
Survey of Income and Program Participation-Descriptive Statistics

	Men in Labor Force (1)	Women in Labor Force (2)		Men in Labor Force (3)	Women in Labor Force (4)
<i>Demographic Characteristics</i>			<i>Industry (continued)</i>		
Married	.711 (.453)	.643 (.479)	Manufacturing	.220 (.414)	.134 (.341)
Divorced	.086 (.281)	.146 (.353)	Transportation	.084 (.277)	.046 (.209)
Age	38.24 (8.28)	38.23 (8.22)	Wholesale	.050 (.217)	.020 (.140)
Less than High School	.130 (.337)	.093 (.290)	Retail Trade	.088 (.283)	.122 (.327)
High School Graduate	.587 (.492)	.652 (.476)	Finance	.034 (.182)	.082 (.274)
College Graduate	.283 (.450)	.255 (.436)	Services	.179 (.383)	.414 (.496)
Non-White	.138 (.345)	.167 (.373)	Public Administration	.068 (.251)	.042 (.201)
<i>Job Characteristics</i>			<i>Occupation</i>		
Hours Worked	40.5 (14.6)	35.0 (13.5)	Executive	.138 (.345)	.134 (.340)
Earnings	2078 (1946)	1453 (1301)	Professional	.132 (.338)	.184 (.387)
Private Sector	.781 (.413)	.686 (.464)	Technician	.048 (.214)	.052 (.222)
Non-Profit Sector	.035 (.185)	.094 (.291)	Sales	.095 (.294)	.088 (.284)
Government Sector	.165 (.371)	.216 (.411)	Administrative Support	.064 (.245)	.283 (.450)
Military Sector	.019 (.135)	.004 (.065)	Service	.084 (.277)	.140 (.347)
			Farming	.019 (.139)	.005 (.072)
Agriculture	.014 (.116)	.007 (.082)	Mechanic	.076 (.265)	.003 (.054)
Mining	.011 (.106)	.001 (.038)	Construction	.123 (.329)	.016 (.127)
Construction	.069 (.253)	.009 (.096)	Laborers	.217 (.412)	.091 (.288)
Sample Size	7528	6942		7528	6942

Table 1 Notes: Standard deviations are in parentheses. Estimates are weighted by longitudinal (panel) weights.

Table 2
Descriptive Statistics
Work Schedules

Variable	Men in Labor Force (1)	Women in Labor Force (2)
<i>Work Schedules in Wave 6</i>		
Hours per Day	8.59 (2.21)	7.78 (2.16)
Days per Week	5.14 (.709)	4.84 (.862)
Average Start Time	505.21 [8:25 am] (204.99)	524.41 [8:44 am] (197.18)
Average End Time	976.14 [4:16 pm] (223.62)	959.84 [4:00 pm] (215.71)
Works Sundays	.108 (.310)	.091 (.289)
Works Saturdays	.241 (.438)	.178 (.383)
Works All Days	.047 (.213)	.023 (.151)
Works Night Schedule	.035 (.173)	.023 (.151)
Works Irregular Schedule	.171 (.376)	.141 (.348)
Schedule is Involuntary	.856 (.351)	.795 (.404)
Sample Size	7528	6942

Table 2 Notes: Standard deviations are in parentheses. Estimates are weighted by longitudinal (panel) weights.

Table 3
Average Hours Worked by Various Characteristics

	Men in Labor Force (1)	Women in Labor Force (2)		Men in Labor Force (3)	Women in Labor Force (4)
Hours Worked	40.4 (14.7)	35.0 (13.5)			
			<i>Industry</i>		
	<i>Marital Status</i>		Agriculture	45.6 (12.6)	35.8 (16.2)
Single	37.1 (16.6)	36.3 (13.6)	Mining	47.5 (12.6)	44.5 (14.3)
Married	41.9 (13.5)	34.2 (13.4)	Construction	41.2 (9.2)	35.4 (11.9)
	<i>Education</i>		Manufacturing	43.4 (7.88)	39.5 (7.25)
Less than High School	35.8 (17.5)	31.4 (15.7)	Transportation	43.2 (10.7)	37.8 (9.64)
High School Graduate	40.2 (13.9)	34.5 (13.0)	Wholesale	45.6 (9.01)	39.3 (9.79)
College Graduate	43.2 (14.2)	37.9 (13.5)	Retail Trade	43.8 (11.2)	34.3 (11.6)
	<i>Region</i>		Finance	45.1 (8.8)	39.1 (8.45)
Northeast	38.4 (15.6)	33.4 (13.9)	Services	42.4 (12.1)	36.1 (12.3)
Midwest	41.3 (13.7)	34.7 (13.1)	Public Administration	44.0 (9.4)	38.9 (8.46)
South	41.5 (14.8)	36.1 (13.0)			
			<i>Selected Occupations</i>		
West	39.6 (14.5)	34.8 (14.5)	Executive	46.8 (10.1)	41.4 (10.0)
	<i>Class of Worker</i>		Professional	43.8 (12.3)	37.8 (12.2)
Private	43.6 (10.0)	36.9 (10.9)	Farming	43.7 (13.6)	34.1 (13.2)
Non-Profit	42.8 (12.9)	35.1 (11.3)	Sales	46.4 (10.2)	35.2 (11.8)
Government	41.7 (10.0)	37.9 (10.8)	Administrative Support	40.6 (7.56)	36.5 (9.23)
Military	48.7 (11.9)	39.8 (11.6)	Service	40.5 (10.9)	32.5 (13.3)
Sample Size	7528	6942	Sample Size	7528	6942

Table 3 Notes: Standard deviations are in parentheses. Estimates are weighted by longitudinal (panel) weights.

Table 4: Survey of Income and Program Participation-Descriptive Statistics by Hours Worked

	Men in Labor Force			Women in Labor Force		
	Worked 41-50 hours (1)	Worked 51-60 hours (2)	Worked Hours>60 (3)	Worked 41-50 hours (4)	Worked 51-60 hours (5)	Worked Hours >60 (6)
Married	.762 (.425)	.765 (.423)	.771 (.259)	.566 (.199)	.593 (.491)	.525 (.499)
Divorced	.070 (.255)	.076 (.265)	.082 (.275)	.199 (.399)	.187 (.390)	.168 (.373)
Age	38.04 (8.03)	38.06 (8.00)	36.9 (8.49)	37.7 (8.02)	39.04 (8.19)	40.4 (8.03)
Earnings	3036 (1778)	3286 (1931)	3462 (4838)	2445 (1796)	2873 (1742)	2640 (1839)
Less than High School	.083 (.276)	.109 (.312)	.098 (.297)	.044 (.205)	.048 (.213)	.115 (.318)
High School Graduate	.566 (.496)	.509 (.499)	.525 (.499)	.558 (.49)	.366 (.482)	.417 (.493)
College Graduate	.351 (.477)	.381 (.485)	.375 (.484)	.397 (.489)	.585 (.49)	.468 (.498)
Non-White	.092 (.289)	.091 (.288)	.101 (.301)	.087 (.282)	.123 (.32)	.266 (.442)
Private	.833 (.372)	.811 (.391)	.772 (.418)	.707 (.457)	.662 (.47)	.655 (.475)
Non-Profit	.028 (.165)	.036 (.186)	.058 (.235)	.084 (.277)	.089 (.28)	0
Government	.114 (.318)	.118 (.323)	.115 (.318)	.207 (.405)	.236 (.42)	.344 (.475)
Military	.024 (.154)	.035 (.184)	.053 (.225)	.007 (.08)	.011 (.11)	0
Sample Size	1492	665	219	745	198	61

Table 4 Notes: Standard deviations are in parentheses. Estimates are weighted by longitudinal (panel) weights.

Table 5
 Ordinary Least Squares: Married Men
 Dependent Variable: Divorced, Year 3

	Job in Wave 1 Dependent Mean: .022				Job Every Quarter Dependent Mean: .021			
	Mean (1)	OLS (2)	OLS (3)	OLS (4)	Mean (5)	OLS (6)	OLS (7)	OLS (8)
Average Hours Worked, Years 1-2	42.9	.0005 (.0003)	.0006 (.0003)	.0006 (.0003)	43.9	.0007 (.0003)	.0008 (.0003)	.0008 (.0003)
Income	2666	-	-.0036 (.0012)	-.0035 (.0012)	2757	-	-.0035 (.0012)	-.0035 (.0012)
Age	38.2	.0002 (.0004)	.0004 (.0005)	.0004 (.0004)	38.2	.000001 (.0004)	.0002 (.0004)	.0002 (.0004)
Length of Marriage	148.7	-.0001 (.00003)	-.0001 (.00003)	-.0001 (.00003)	148.9	-.0001 (.00003)	-.0001 (.00003)	-.0001 (.00003)
Non-White	.121	-.009 (.007)	-.009 (.007)	-.009 (.007)	.118	-.006 (.007)	-.006 (.007)	-.006 (.007)
Less than High School	.129	.012 (.010)	.004 (.010)	.004 (.009)	.113	.017 (.009)	.009 (.009)	.009 (.009)
High School Graduate	.590	.0003 (.006)	-.004 (.006)	-.004 (.006)	.593	-.001 (.006)	-.006 (.006)	-.006 (.006)
Occupational Dummies	N/A	No	Yes	Yes	N/A	No	Yes	Yes
Dummy for wife working	N/A	No	No	Yes	N/A	No	No	Yes
Sample Size	4574	4574	4574	4574	4161	4161	4161	4161

Table 5 Notes: Standard errors are in parentheses. Estimates are weighted by panel weights. All persons in this sample are in the survey for all waves. Income covariate is scaled by 1000, so the coefficient on family income represents the effect of an additional 1000 dollars in income per month.

Table 6
 Ordinary Least Squares: Married Men Employed in All Waves
 Dependent Variable: Divorced, Year 3

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)
Average Hours Worked	.0005 (.0002)	.0006 (.0003)	-	-	.0006 (.0003)	.0006 (.0003)	.0005 (.0002)	.0006 (.0002)
Maximum Hours Worked	-	-	.0004 (.0002)	.0005 (.0002)	-	-	-	-
Minimum Hours Worked	-	-	-.0001 (.0002)	-.00005 (.0002)	-	-	-	-
Variance Hours Worked	-	-	-	-	.000003 (.000004)	.000002 (.000004)	-	-
Range (Max-Min)	-	-	-	-	-	-	.0003 (.0001)	.0003 (.0001)
Income	No	-.0035 (.0011)	No	-.0035 (.0011)	No	-.0035 (.0011)	No	-.0035 (.0012)
Sample Size	4540	4540	4540	4540	4540	4540	4540	4540

Table 6 Notes: Standard errors are in parentheses. Estimates are weighted by panel weights. All persons in this sample are in the survey for all waves. All specifications include education dummies, length of marriage, age, a race dummy, and 9 occupation dummies.

Table 7
Married Men
Ordinary Least Square- Work Schedules
Dependent Variable: Divorced, Year 3

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)
Ave Hours, Year 1-2	.0007 (.0003)	.0020 (.0007)	.0008 (.0003)	.0008 (.0003)	.0008 (.0003)	.0008 (.0003)
Max Hrs, Year 1-2	-	-.0005 (.0004)	-	-	-	-
Min Hrs, Year 1-2	-	-.0006 (.0003)	-	-	-	-
Works Nights	-	-	-.008 (.011)	-	-	-
Works Weekends	-	-	-	.0008 (.005)	-	-
Works Every Day	-	-	-	-	-.005 (.012)	-
Odd Schedule	-	-	-	-	-	.009 (.006)
Sample Size	4380	4380	4380	4380	4380	4380

Table 7 Notes: Standard errors are in parentheses. Estimates are weighted by longitudinal weights. All regressions include family income, length of marriage, age, a race dummy, 2 education dummies, and 9 occupation dummies.

Table 8
 Ordinary Least Squares Results, Couples with Employment Every Period
 Dependent Mean: .020

	Mean (1)	OLS (1)	OLS (2)
Average Hours Man Years 1-2	42.6	.0009 (.0003)	-.0002 (.0010)
Average Hours Wife Years 1-2	33.9	-.0002 (.0002)	-.0016 (.0010)
Hours Interaction	N/A	-	.00003 (.00003)
Family Income	2757	-.003 (.001)	-.003 (.001)
Length of Marriage	179.1	-.00006 (.00004)	-.00006 (.00004)
Education Husband Less than High School	.129	.012 (.010)	.013 (.010)
Education Husband High School Graduate	.580	.002 (.007)	.003 (.007)
Education Wife Less than High School	.088	-.024 (.011)	-.025 (.012)
Education Wife High School Graduate	.646	-.001 (.007)	-.002 (.007)
Sample Size	2867	2867	2867

Table 8 Notes: Estimates are weighted by longitudinal weights. All persons in this sample are in the survey for all waves. The regressions also include occupation dummies for both husbands and wives.

Table 9
 Descriptive Statistics
 Children in Wave 9 Over 2 Years Old

	Married Families with Children Wave 9 (1)
<i>Children under 5</i>	
Number of times took child out of house	17.86 (14.0)
Number of times read to in the last month	6.77 (8.32)
Sample Size	2037
<i>Children Age 6-17</i>	
Attend School	.986 (.12)
Repeat a Grade	.095 (.293)
Participate in Lessons	.222 (.415)
Participate in Clubs	.451 (.498)
Participate in Sports	.425 (.494)
Ever been Suspended	.076 (.265)
Sample Size	4246

Table 9 Notes: Standard deviations are in parentheses. The unit of observation is the child. Estimates are weighted by longitudinal (panel) weights.

Table 10
 Ordinary Least Squares Results, Children's Outcomes
 School Age Children, Age 7-17

	Father Employed	Both Parents Employed	Father Employed	Both Parents Employed		
	OLS Repeat a Grade	OLS Repeat a Grade	OLS Repeat a Grade	OLS Suspended from School	OLS Suspended from School	OLS Suspended from School
	(1)	(2)	(3)	(4)	(5)	(6)
Average Hours Man Years 1-2	.0015 (.0006)	.0021 (.0009)	.0005 (.0016)	-.0013 (.0009)	-.0017 (.0012)	-.0040 (.0027)
Average Hours Woman Years 1-2	-	.0009 (.0006)	-.0014 (.0021)	-	-.0008 (.0008)	-.0041 (.0034)
Husband*Wife Hours Interaction	-	-	.00005 (.00004)	-	-	.00008 (.00007)
Family Income	-.0152 (.0028)	-.0105 (.0038)	-.0104 (.0038)	-.0050 (.0035)	.0003 (.0041)	.0003 (.0041)
Education Dad Less than High School	.0676 (.0227)	.0820 (.0294)	.0807 (.0292)	.0061 (.0275)	.0131 (.0324)	.0112 (.0323)
Education Dad High School Graduate	.0109 (.0131)	.0279 (.0139)	.0268 (.0138)	-.0009 (.0174)	.0225 (.0193)	.0206 (.0194)
Child's Age	.0172 (.0017)	.0139 (.0022)	.0138 (.0022)	.0172 (.0039)	.0164 (.0048)	.0162 (.0048)
Sample Size	3435	1838	1838	1451	943	943

Table 10 Notes: Estimates are weighted by longitudinal (panel) weights. The unit of observation is the child. All regressions include a full set of occupation dummies. Standard errors are corrected for with in household serial correlation.

Table 11
 OLS and 2SLS for Married Men Employed in All Waves
 Dependent Variable: Divorced in Year 3
 (Standard Errors in parentheses)
 Hours Endogenous

	OLS	2SLS Industry	2SLS Industry *Region (no main effects)	LIML Industry *Region (no main effects)	2SLS Industry *Region (with main effects)	LIML Industry *Region (with main effects)	2SLS Class of Worker	2SLS COW* Region	LIML COW* Region	USSIV Single Men Industry	USSIV Single Men COW
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Average Hours Worked	.0008 (.0003)	-.002 (.003)	.001 (.002)	.001 (.001)	-.0002 (.002)	-.0007 (.003)	-.005 (.002)	-.001 (.002)	-.001 (.002)	-.006 (.006)	-.013 (.018)
Income Controls	No	Yes	Yes	Yes	Yes	yes	yes	yes	yes	yes	yes
Industry Main Effects	No	No	No	No	No	No	No	No	No	No	No
Region Main Effects	No	No	No	No	Yes	Yes	No	Yes	Yes	No	Yes
First Stage R ²	–	.110	.128	.128	.128	.128	.116	.126	.126	–	–
F-Test, Excluded Instrument	–	4.50	1.93	1.93	1.93	1.93	24.3	2.00	2.00	–	–
Overid. Test F-statistic	–	1.22	1.13	1.13	1.02	1.02	.57	1.51	1.51	–	–
Overid. Test (Prob>F)	–	.28	.29	.29	.43	.43	.56	.09	.09	–	–
Sample Size	4160	4160	4160	4160	4160	4160	4160	4160	4160	4160	4160

Table 11 Notes: Estimates are weighted by longitudinal (panel) weights. All persons in this sample are in the survey for all waves.

Table 12
 OLS and 2SLS for Married Men Employed in All Waves
 Dependent Variable: Divorced in Year 3
 (Standard Errors in parentheses)
 Hours and Income Endogenous

	OLS	2SLS Industry	2SLS Industry *Region (no main effects)	LIML Industry *Region (no main effects)	2SLS Industry *Region (with main effects)	LIML Industry *Region (with main effects)	2SLS Class of Worker	2SLS COW* Region	LIML COW* Region	USSIV Single Men Industry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Average Hours Worked	.0008 (.0003)	-.003 (.003)	.001 (.002)	-.002 (.003)	-.0003 (.002)	-.001 (.003)	-.005 (.002)	-.004 (.002)	-.005 (.003)	-.0005 (.003)
Average Family Income (1000)	-.004 (.001)	-.005 (.008)	-.012 (.007)	-.015 (.007)	-.005 (.008)	-.007 (.009)	-.030 (.030)	-.026 (.009)	-.032 (.012)	-.013 (.008)
Industry Main Effects	No	No	No	No	Yes	Yes	No	No	No	No
Region Main Effects	No	No	No	No	Yes	Yes	No	Yes	Yes	No
First Stage R ²	–	.110	.145	.145	.127	.127	.116	.126	.126	–
F-Test, Excluded Instrument	–	4.49	1.33	1.33	1.91	1.91	24.3	2.00	2.00	–
Overid. Test F-statistic	–	1.35	1.13	1.13	1.05	1.05	.01	.96	.96	–
Overid. Test (Prob>F)	–	.22	.29	.29	.387	.387	.924	.48	.48	–
Sample Size	4160	4160	4160	4160	4160	4160	4160	4160	4160	4160

Table 12 Notes: Estimates are weighted by longitudinal (panel) weights. All persons in this sample are in the survey for all waves.

Table 13
 2SLS Results, Couples with Employment Every Period
 Dependent Mean:.020

	OLS	2SLS Industry	LIML Industry
	(1)	(2)	(3)
Average Hours Man Years 1-2	.0009 (.0003)	.001 (.002)	.001 (.002)
Average Hours Wife Years 1-2	-.0002 (.0002)	.001 (.001)	.001 (.002)
Family Income	-.003 (.001)	-.003 (.003)	-.003 (.003)
Length of Marriage	-.00006 (.00004)	-.000006 (.00003)	-.000006 (.00003)
Education Husband Less than High School	.012 (.010)	.013 (.011)	.013 (.012)
Education Husband High School Graduate	.002 (.007)	.004 (.008)	.004 (.008)
Education Wife Less than High School	-.024 (.011)	-.023 (.012)	-.023 (.012)
Education Wife High School Graduate	-.001 (.007)	-.0001 (.008)	-.0001 (.008)
Sample Size	2867	2867	2867

Table 13 Notes: Estimates are weighted by longitudinal weights. All persons in this sample are in the survey for all waves. The regressions also include occupation dummies for both husbands and wives.

Table 14
Impact of Hours Worked on Grade Repetitions
School Age Children, Age 7-17

	Hours Endogenous			Hours & Income Endogenous	
	OLS	2SLS Industry	2SLS Industry *Region	2SLS Industry	2SLS Industry *Region
	(1)	(2)	(3)	(4)	(5)
Average Hours Man Years 1-2	.0019 (.0007)	.0074 (.0052)	.005 (.004)	.007 (.005)	.005 (.004)
Family Income	-.01 (.002)	-.02 (.01)	-.02 (.01)	-.02 (.01)	.005 (.03)
Education Dad Less than High School	.0619 (.0237)	.0785 (.0292)	.0752 (.0267)	.0773 (.0429)	.1251 (.0621)
Education Dad High School Graduate	.0110 (.0133)	.0119 (.0139)	.0167 (.0145)	.0112 (.0229)	.0457 (.0382)
Child's Age	.0162 (.0018)	.0165 (.001)	.0161 (.0018)	.0165 (.0019)	.0156 (.0019)
Occupation Dummies	Yes	Yes	Yes	Yes	Yes
Sample Size	3159	3159	3159	3159	3159

Table 14 Notes: Estimates are weighted by longitudinal weights. Standard errors are corrected for with in household serial correlation. The unit of observation is the child.

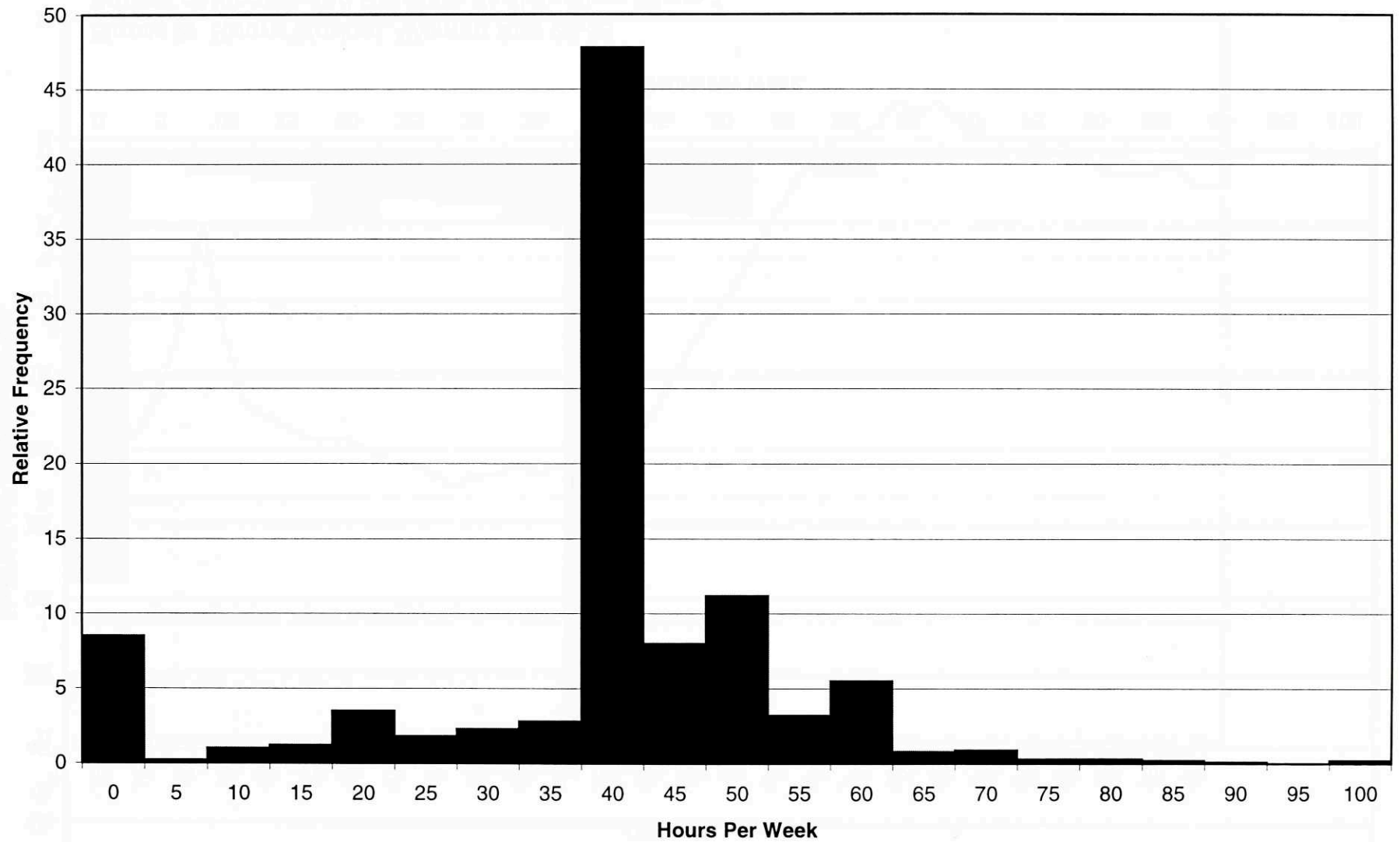


Figure 1. Hours Worked, Men Age 25-55
Survey of Income and Program Participation, Wave 1

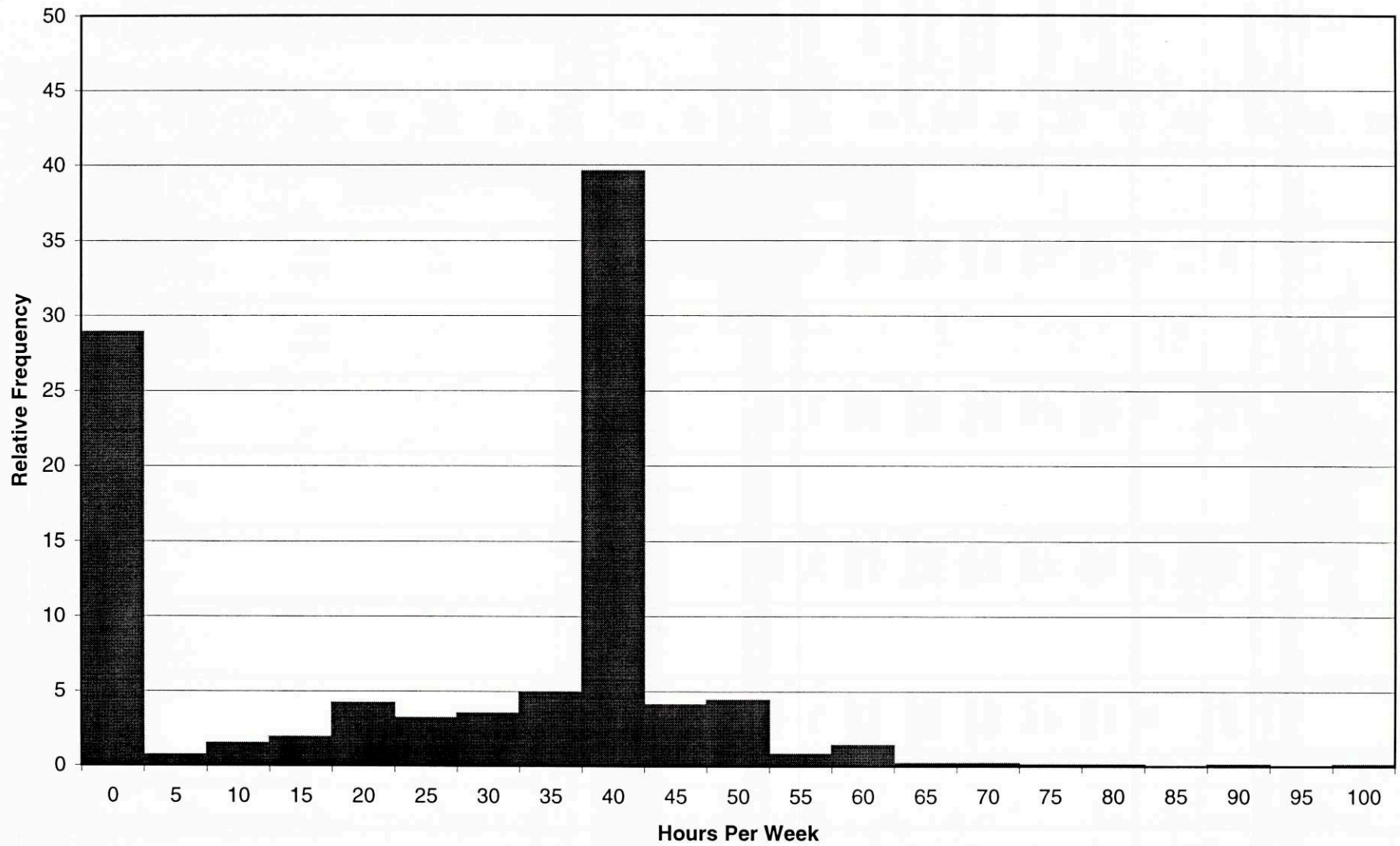


Figure 2: Hours Worked, Women Age 25-55
Survey of Income and Program Participation, Wave 1

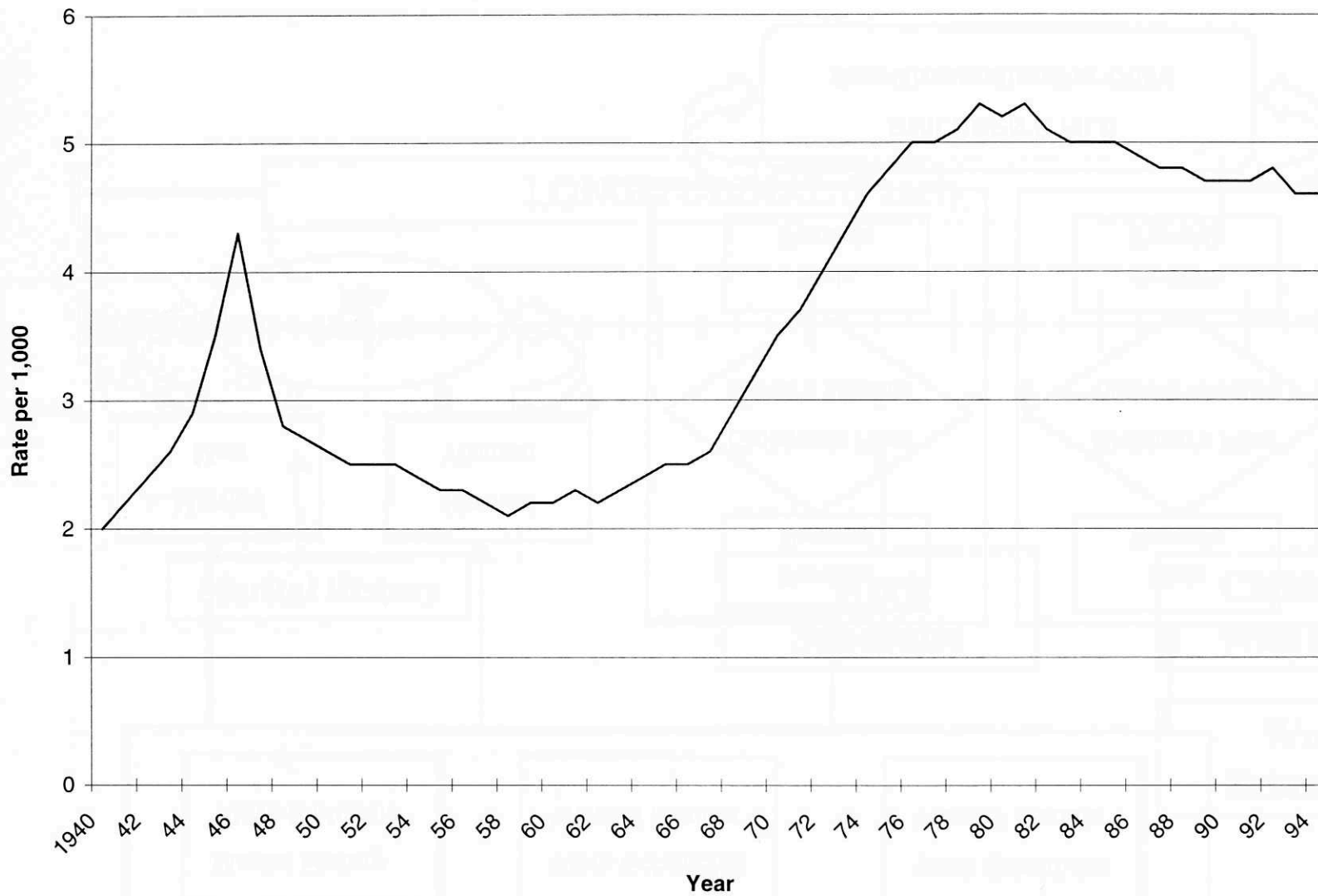


Figure 3: Divorce Rates in the United States, 1940-1994.

Source: National Center for Health Statistics and Statistical Abstract of the US.

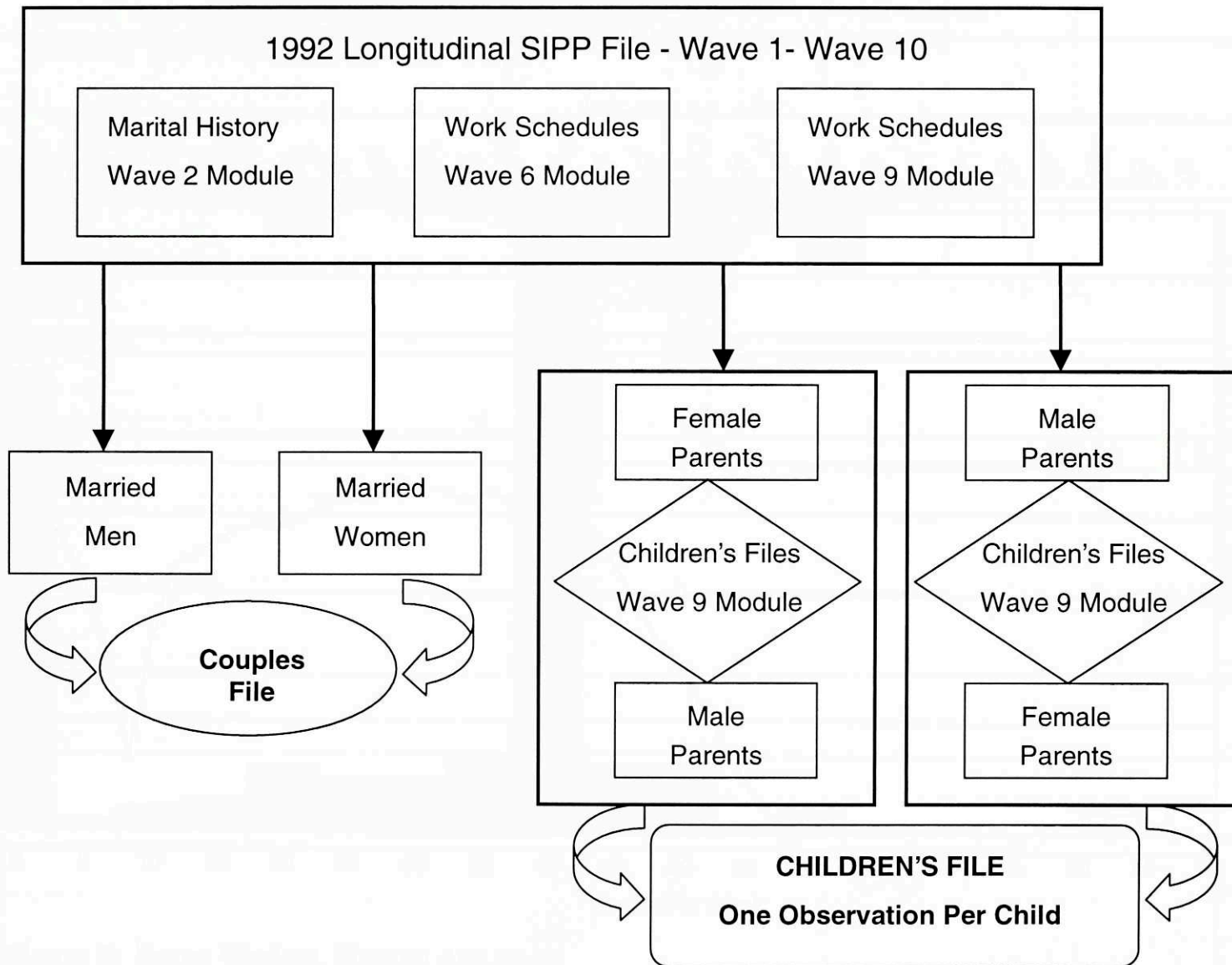


Figure 4. Survey of Income and Program Participation- Data Layout.

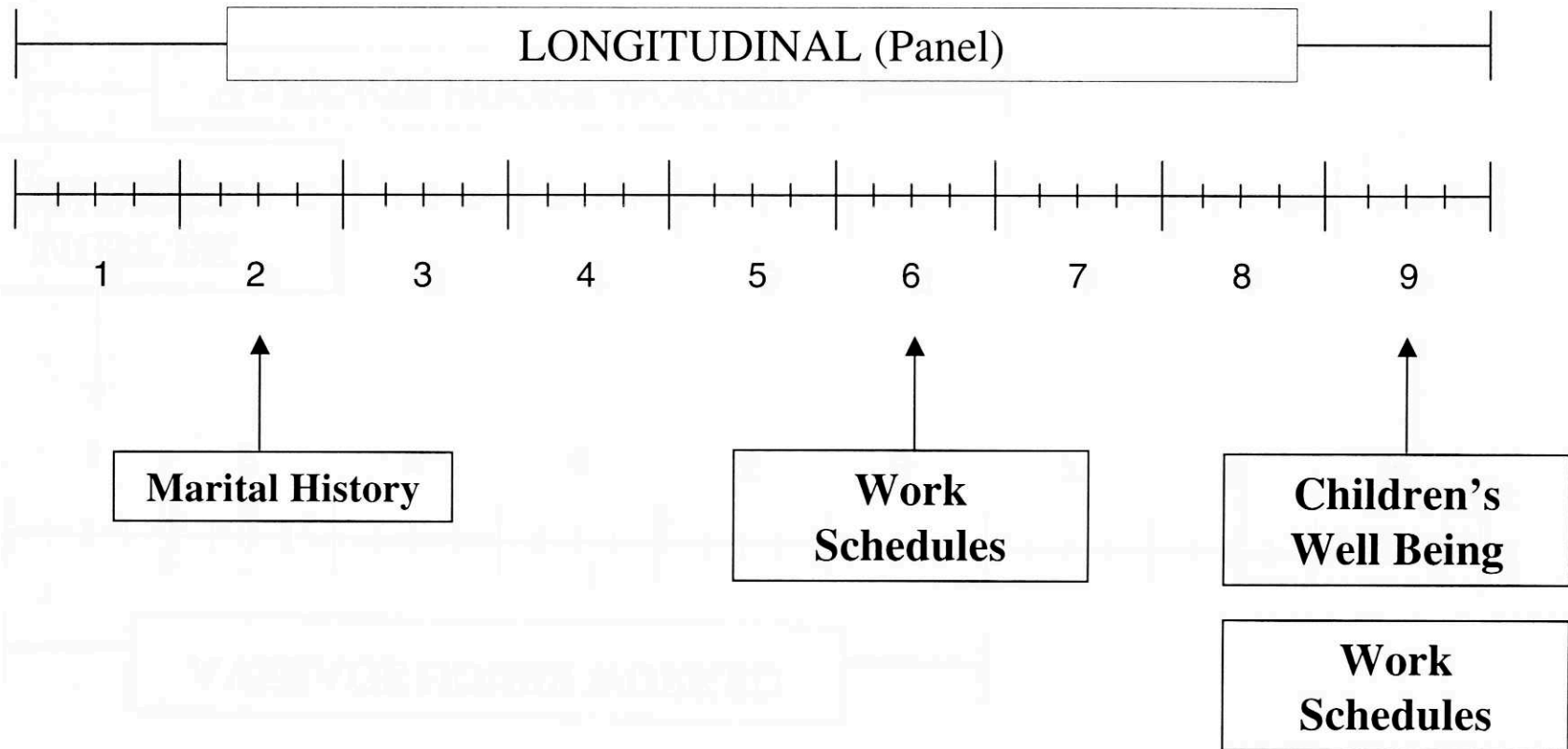


Figure 5. Time Line - Topical Module Placement.

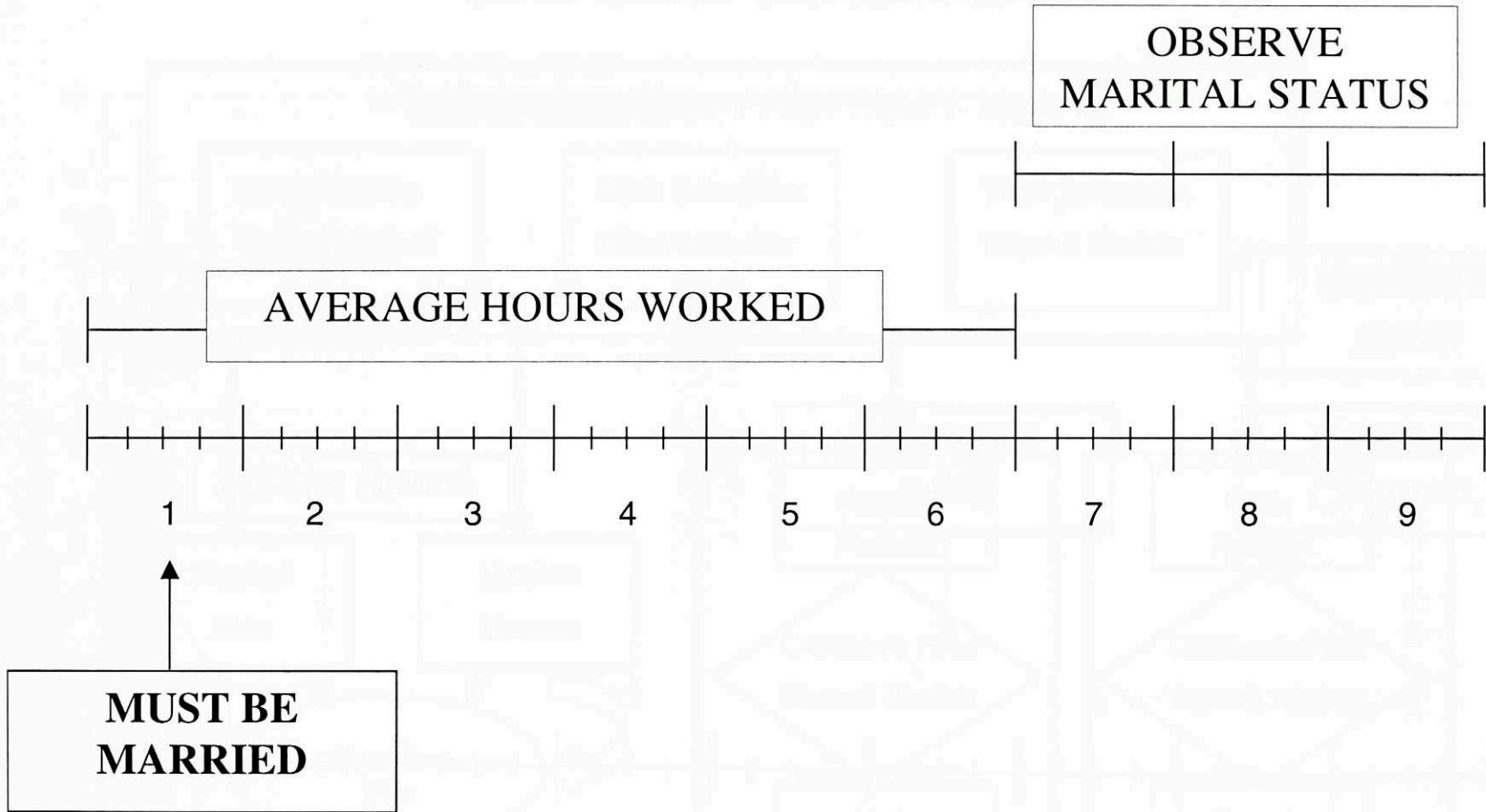


Figure 6. Time Line - Data Configuration for Divorce.

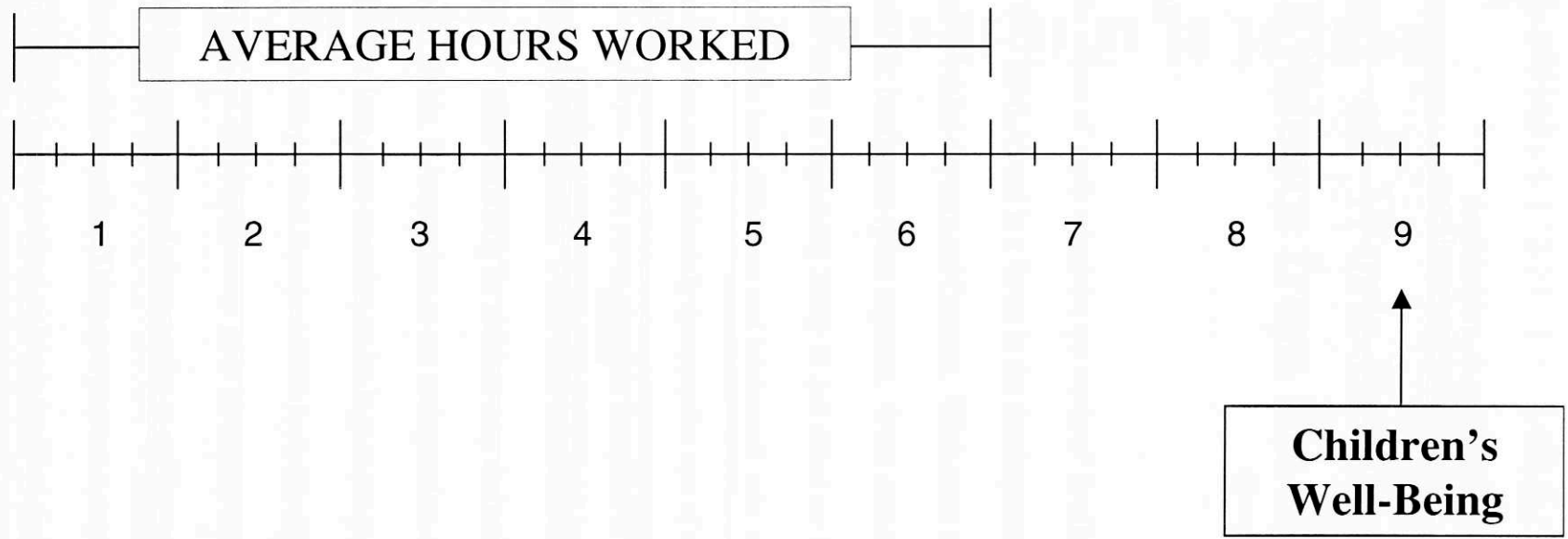


Figure 7. Time Line - Data Configuration for Children.

Appendix

Table A1: Reduced Form Estimates
Effect of Industry Dummies on Divorce

	OLS (1)
Agriculture	-.060 (.027)
Mining	-.011 (.020)
Construction	-.0003 (.012)
Manufacturing	-.002 (.009)
Transportation	-.002 (.010)
Wholesale	-.016 (.012)
Retail Trade	.003 (.011)
Finance	-.021 (.013)
Services	-.01 (.01)
R ²	.014
Sample Size	4160

Table A2
Reduced Form Estimates- Effect of Class of Worker on Divorce

	OLS (1)
Private	.018 (.014)
Government	.026 (.015)
Non Profit	.038 (.018)
Other Covariates	yes
R ²	.012
Sample Size	4160

Chapter 2

The Impact of Work-Related Absences on Families: Evidence from the Gulf War

(co-authored with Joshua Angrist)

2.1 Introduction

Concern about the effect of work schedules on workers' families helps motivate the Family and Medical Leave Act of 1993 (FMLA) and is a factor in the development of private sector human resource policies such as employer-provided day care and flextime. While more work typically means more income, it can also mean less time for families to spend together. Work schedules that involve unusual hours or extended business-related travel is especially likely to put stress on family relationships and to create disagreements between spouses over child care and housework (see, e.g., Hochschild, 1989; Parcel and Menaghan, 1994). These factors may ultimately increase the rate of marital dissolution and have other negative consequences for children. It also seems plausible that parental absences are bad for children even in the absence of an effect on marital stability. On the other hand, research on single parenting suggests that the negative consequences of single-parenting for children may derive in large part from a loss of income (McLanahan and Sandefur, 1994). If income loss is the main problem created by a parent's absence, then demanding work schedules, at least those associated with high earnings, may not hurt children after all.

The families that experience parental absences differ from other families along many dimensions, so simple cross-family comparisons are unlikely to be good indicators of the impact of a parent's time away from home. On the other hand, work-related absences due to sudden reassignments may be exogenous, at least conditional on industry and occupation. This paper presents a case study of one plausibly exogenous work-related absence that affected many soldiers and their families: deployment for military service in the

Persian Gulf in 1990 and 1991. This episode comes closer than other comparisons to providing evidence on the causal effects of a parent's absence on spouses and children.

The deployment episode is especially useful for studying the impact of parental absences on children because, as we show below using military pay records, the earnings of deployed personnel actually increased slightly as a consequence of deployment. So any effects of parental absence in this case probably do not reflect a change in living standards. Another unusual feature of Gulf War deployment is that the resulting absences involved mothers as well as fathers, so our study is related to research on the effect of mothers' employment on children (see, e.g., Blau and Grossberg, 1992). Of course, the military is an unusual employer in many other respects, so lessons from this study need not generalize. On the other hand, the military is not entirely unique since many other jobs involve extended parental absences. In fact, Hiew (1992) draws an analogy between time spent away from home by Canadian military personnel and Japanese civilian men. Apparently, many large employers in Japan expect employees to live apart from their families at regular intervals much like military personnel. Other occupations and industries which follow this pattern include the fishing industry and jobs in the offshore oil industry (Vormbrock, 1993). Repeated short-term separations are also common for night-shift workers and airline pilots, facts used by Landy, Rosenberg, and Sutton-Smith (1969) and Rigg and Cosgrove (1994) in studies of the effects of intermittent work-related absences on workers' families.

The empirical analysis begins with reduced form estimates of the effect of Persian Gulf deployment on time away from home, spouse's employment status, and divorce rates. We then use two-stage least squares (2SLS) to interpret the reduced form effects of deployment as the impact of time spent away from home. Following the analysis of effects on couples, we turn to an analysis of effects on disabilities among the children of deployed personnel. The estimation for all outcome variables uses data from the Department of Defense 1992 Survey of Officers and Enlisted Personnel (SOEP), linked with administrative data on the income of service personnel from 1990-92 and on marital status before deployment. The SOEP contains

information on soldiers and family members for a large sample of military personnel with at least four months of service in 1991. The link to administrative data allows us to document the effect of deployment on military pay and to control for key pre-deployment characteristics, making it more likely that the estimated deployment effects have a causal interpretation.

The results suggest that deployment of male soldiers led their wives to work less, probably because of added child care responsibilities while their husbands were away. Another interesting finding is that deployment of female soldiers led to an increase in divorce rates. This supports the notion that deployment strains married couples. On the other hand, deployment of male soldiers did not lead to an increase in divorce and deployment of female soldiers did not affect husbands' labor supply. Finally, the results show no significant increase in child disability rates, at least as measured by the reported incidence of temporary or permanent disabilities among the children of deployed personnel. On balance, therefore, the results suggest that the consequences of parental absences for couples differ for men and women, and that any negative consequences for children were minimal. This may be because of the extensive family support services provided by the military and because deployment typically did not lead to a reduction in living standards.

2.2 Background

The Military is the largest employer in the United States besides the federal government, with 1.58 million active duty service members and 984,000 reservists in 1995. In a dramatic change from the bachelor military of conscription days, the majority of service people today are married—this includes about 57 percent of enlisted personnel and 73 percent of active duty officers. Moreover, about half of the soldiers have children.¹ On the other hand, while soldiers in the volunteer armed forces are very likely to marry and have children, military careers clearly place special demands on families. For example, military families

¹These statistics are from Office of the Assistant Secretary of Defense (1995:2-1,4-12).

move frequently, and soldiers are often separated from their families for extended periods of time. The nature of duty assignments vary considerably, and families have little control over the timing of moves or the location of their next job. On the plus side, many families live on military bases that provide a range of free services, such as child care, counseling and medical care. However, base housing is not always available, and some soldiers live in regular neighborhoods.²

An important and perhaps unusual feature of military careers is the military's system for determining pay. In addition to a soldier's rank, experience, training, and duty assignment, family structure and living circumstances are also taken into account. All soldiers receive base pay, basic allowance for quarters, and basic allowance for subsistence (Department of Defense, 1996). Base pay is determined by length of service and rank. Basic allowance for quarters compensates people who do not live in government housing, and a variable housing allowance supplements these payments for cost of living differences in different regions. The basic allowance for subsistence is supposed to pay for food. Allowances also exist for special duty and work situations. For example, someone deployed to a combat area might be eligible for hazardous duty pay. On the other hand, personnel deployed to the Gulf stop receiving a basic allowance for subsistence because they receive rations. For most Gulf War veterans, however, this was offset by special pay allowances for soldiers who were separated from their families i.e., combat duty pay, hazard pay and special tax advantages.³

2.3 The 1992 Survey of Officers and Enlisted Personnel

The Department of Defense conducted the 1992 SOEP to gather information on military life and experiences. The SOEP was a mail survey with approximately 140 questions. Data were collected between May and October 1992 using a sampling frame that included service personnel with at least four months of

²The recent literature on the consequences of deployment and changing duty assignments for military families includes Jensen, Martin, and Watanabe (1996), Kelley (1994), Kelley *et al.* (1994), Payne, Warner and Little (1992), and Segal (1986).

³Information on military compensation is drawn from Office of the Secretary of Defense (1996). Thanks also to Major Tracy Urman at the Military Compensation Office for explaining some details.

service in 1991. The samples were stratified by sex, officer status, and branch of service. Sample weights allow the calculation of population statistics, and partially correct for non-response. The overall response rate was 62 percent. The sample size including all strata is 59,930, which corresponds to a population of 1,952,793 active-duty soldiers and mobilized reservists.⁴

The survey has extensive information about military job experiences, including branch of service, rank, years of service, and income from military and non-military jobs. Of particular interest is the information on the number of months a service person spent away from his family due to military assignments. Time away is reported for calendar year 1991 and as a total over the course of soldiers' military career. In addition, information on deployment and months of service in the Persian Gulf as part of Operation Desert Storm/Desert Shield is provided.

Other parts of the survey elicit information on family background and family characteristics. Each respondent reports on his or her family, including dependents and spouse. Variables include age, marital status, educational background, and the primary activity of the spouse (e.g., employment status). Spouses' employment status and the respondent's marital status are the first two outcomes variables studied. The survey module on dependents asks about the number and ages of dependents, child care arrangements, and dependents' disability status. Respondents are asked to distinguish between conditions that are temporary and permanent, and the response to this question is used here to measure the impact of deployment on children. Negative effects of parental separation might appear as temporary disabilities, since these include emotional and behavioral problems. Permanent disabilities seem less likely to be affected by parental absence.⁵

⁴In addition to the stratification variables mentioned in the text, the survey involved four subsamples: active duty personnel, a longitudinal follow-up of personnel interviewed in a 1985 survey who were still in the military in 1991, a reservist sample, and an enlisted recruiter sample. The same branch-of-service, officer, and sex stratification variables were used in all cases. The sample design is documented in Westat, Inc. (1993).

⁵Angrist and Lavy (1996) used Current Population Survey data to study the effect of teen and out-of-wedlock parenting on the incidence of childhood disabilities. They find that children of single mothers are more likely to have disabilities even after controlling for family background and family income. The effects are largest for learning disabilities and emotional problems,

Table 1 shows descriptive statistics for the full sample and for sub-samples of men, women, male parents, and female parents (defined as those with at least one dependent between the ages of one and 22). These statistics and those in Table 2 are weighted by the survey sampling weights. Most of the people in the military are male (89 percent) and, as noted earlier, married (61 percent). The average age is twenty-nine in the full sample, and about half the full sample has one or more legal dependents between the ages of one and 22 (excluding spouses, but possibly including stepchildren). In what follows, we refer to dependents between the ages of one and 22 as children and to soldiers with dependents between ages of one and 22 as parents.⁶

Statistics tabulated separately by sex show that female soldiers are less likely to be married than male soldiers (49 percent married in comparison to 63 percent for men) and that women are more likely to be divorced or separated (about 17 percent, compared to only 8 percent of men). About 41 percent of military women have children, compared with about 52 percent of the men. The table also shows that a little more than 3 percent of parents report they have a dependent with some kind of permanent disability while roughly 5 percent of parents report they have a dependent with some kind of temporary disability.

After the demographic and outcome variables, the table describes military jobs. The Army is the largest service (36 percent of the full sample) and the Marines is the smallest (9.5 percent). About 15 percent of service personnel are officers, and the overall average length of service is about eight years, though female soldiers served for less than seven years on average. About 28 percent of the men were deployed to the Gulf War, while about 15 percent of women were deployed. On average, soldiers spent about 18 months away from home for job-related reasons while serving in the military.

Related to the military variables are the variables measuring type of service. As noted earlier, the SOEP draws stratified samples from the populations of regular active duty personnel (including a

which in some cases would fall into the temporary handicap category in the SOEP.

⁶The age 22 cutoff for the definition of children reflects the brackets in the relevant survey question.

longitudinal follow-up sample), reservists, and recruiters. Because sample weights are used to calculate means, the table shows that the vast majority of soldiers are in the regular active-duty forces. Unweighted statistics, reported in the appendix, have higher proportions than in other groups. Finally, the table reports the proportion married and divorced for survey respondents who were in the military as of March 1990. These data come from our match to administrative records. We also have administrative data on monthly pay for January 1989 through December 1992. Both administrative sources are described in the appendix.

2.4 Gulf War Deployment

The Persian Gulf crisis began on August 2, 1990 when Iraq invaded Kuwait. By the end of Operation Desert Storm in June 1991, 697,000 United States troops had participated in the Gulf War. The war itself lasted only 43 days but many of the soldiers spent considerably longer periods in the Gulf region or were deployed somewhere else (e.g., at sea or in Europe).⁷ Table 2 reports mean characteristics by deployment status. The table reflects the fact that deployment primarily affected somewhat more junior enlisted personnel in the ground-combat arms of the service and the Navy. Deployed servicemen are therefore younger and less educated than their non-deployed counterparts, although the age and schooling gaps by deployment status are smaller for women. Deployed men and women are less likely to be white. These differences suggest that it may be important to control for the demographic and military characteristics of soldiers when comparisons by deployment status are made.

A descriptive question of particular interest in this context is whether deployment is associated with a change in income since the possibility of negative effects from lost income have been a major theme in the literature on single-parenting. Loss of income while deployed was also an issue raised by some Gulf War veterans. We addressed this issue by linking longitudinal data on military pay to survey responses and then comparing the time series of earnings by deployment status. The pay data came from the military's

⁷For an overview of the Gulf War events, see Department of Defense (1992:xiii-xxx).

administrative records in a link described in the data appendix. Of course, a deployed soldier's earnings do not necessarily accrue to family members back home. Still, families that were intact on the eve of deployment must, for all practical purposes, remain so at least until the soldier returns. Also, soldiers on deployment have little need for cash, and reports on family issues prepared for the Marines and Air Force (Caliber Associates, 1992 and 1993) suggest that soldiers' spouses were expected to manage finances during the deployment. For example, spouses were to obtain power of attorney and open joint checking accounts with service members before deployment (if they hadn't already done so).⁸

In addition to the differences documented in Table 2, deployed personnel had lower pay than the non-deployed before deployment. On the other hand, almost all of the difference in pay can be accounted for by differences in branch of service, length of service, age, race, and marital status in 1990. This can be seen in Figure 1, which plots the time series of military pay by deployment status, after regression-adjusting for these characteristics.⁹ The figure shows pay from the first quarter 1990 through the last quarter of 1992. In addition to the small difference in levels, the evolution of soldier's pay through the deployment period is of interest. Although the two series generally move together, between the last quarter of 1990 and the first quarter of 1991 (the Gulf War quarter), the pay of deployed personnel increased more steeply than the pay of non-deployed personnel.

Figure 1 suggests that deployment was actually associated with a small increase in average earnings. A potential problem with this interpretation of pay differences by deployment status is that family income has components besides military pay. The report on family issues prepared for the Air Force (Caliber Associates, 1992) notes that deployed families may have lost income from civilian jobs while deployed.

⁸In the Marine Corp, for example, some spouses were asked to assist spouses of deployed personnel with, among other things, financial management (Caliber Associates, 1993, p. III-32).

⁹The covariates in the regression are age, age-squared, 3 marital status dummies for 1990, a dummy for officer status, a sex dummy, a race dummy, 3 dummies for sub-samples, dummies for branch of service, and length of service in months. The figure plots average earnings each quarter and the average plus the coefficient on a deployment dummy. Regressions were run separately each quarter.

Also, spouses may have given up jobs or reduced work hours to look after children. The question of lost spouse earnings is potentially a factor in the impact of deployment on families and is a point we return to below. On the other hand, the loss of civilian earnings was probably not important for the vast majority of deployed soldiers. Only 10 percent of our sample has some income from a civilian job, and the amounts are generally small. The bulk of compensation received by all soldiers in the SOEP, except for reservists, was from military sources. And while reservists' may have experienced a decline in civilian earnings, this lost income is supposed to have been replaced by military pay while on active duty. In fact, almost half of the Marine Corp reservists who were deployed reported that their income actually went up while deployed (Caliber Associates, 1993, p. III-29). Of course, it is still possible that the loss of civilian labor market experience caused by Gulf War mobilization generated a later earnings penalty.

2.5 Effects on Spouse Employment and Divorce Rates

Reduced form estimates of the relationship between deployment and time away from home are reported in Table 3. The results from models with covariates were computed by ordinary least squares (OLS) estimation of

$$(1) \quad T_i = X_i' \beta_0 + \beta_1 D_i + \eta_i,$$

where T_i is career time away, D_i is a dummy variable indicating Gulf War deployment, and X_i is the vector of covariates. The covariates are age, age-squared, three dummies for branch of service, nine dummies for level of schooling completed at time of entry into the service, dummies for race and officer status, the total number of (non-spouse) dependents aged 1-22, service time, and three dummies for sub-samples. The number of dependents is limited to those over one year old to make this a "pre-treatment measure" of family size. The coefficient β_1 is the effect of the parent's time away from home. All regression estimates are weighted by survey sample weights.

Samples of currently married soldiers were used to estimate effects on spouse's employment and samples of ever-married soldiers were used to estimate effects on divorce. In addition, we report estimates

for the sub-sample of soldiers who began serving before 1990. This strategy allows us to control for additional prewar variables. In addition to the covariates described previously, the regressions for soldiers whose military service began before 1990 include a dummy for receipt of hazardous duty pay in the first two quarters of 1990, 3 dummies for marital status in 1990, and total pay received in the first two quarters of 1990. The 1990 variables are included to better control for military occupation and family-structure characteristics that are correlated with deployment status.¹⁰

Average career time away is about 19 months for men and 10 months for women in both the currently-married and ever-married samples. Deployment for military service in the Gulf is associated with 5 months additional time away for men and 3-4 months additional time away for women. Controlling for covariates has little effect on these estimates. The results are also similar when the samples are restricted to soldiers who entered the military before 1990.¹¹

We use the following model to describe the effect of deployment on spouse employment and divorce:¹²

$$(2) \quad Y_i = X_i' \pi_0 + \pi_1 D_i + v_i,$$

where Y_i is the dependent variable for soldier i and X_i is the same vector of covariates used in (1). Estimates of π_1 in (2) can be interpreted as reduced form effects of deployment in a 2SLS procedure where the first-stage is equation (1) and the second stage is

$$(3) \quad Y_i = X_i' \gamma + \delta T_i + \epsilon_i.$$

Here, δ is the causal effect of time away and the instrument is D_i .

¹⁰Heteroscedasticity-consistent standard errors are reported for all regressions. The 1990 pay variable is our calculation from administrative records showing pay by individual categories. The hazardous-duty variable also comes from the administrative data.

¹¹The median deployment time was between 6-8 months. About 6 percent of deployed soldiers report deployments of 9 months or more. Deployments may have begun in 1991 and could therefore have extended into 1992.

¹²Information on the labor force status of the spouse is reported by the service person and is available for currently married personnel only. Employment is defined as working full or part-time in the military or in a civilian job.

Estimates of the reduced-form effect of deployment on spouses' employment and on soldiers' divorce status are also reported in Table 3. Simple differences in spouses' employment rates by deployment status suggest that deployment reduced employment by 4-5 percent, but this falls to around 3 percent in models with covariates. The negative effect on employment seems likely to be due to the increased child care responsibilities borne by wives while their husbands were deployed. Negative employment effects may persist into 1992 since some deployments were still in progress and because employment status is serially correlated. The causal interpretation of deployment effects on wives' labor supply is supported by the fact that 74 percent of deployed men report that their spouse or ex-spouse took care of their dependents while they were away. On the other hand, among married women, deployment had no (lasting) effect on the employment status of a male spouse. And, in fact, only 32 percent of deployed women identified their husband as the primary dependent-care provider in their absence.

As noted earlier, reduced form estimates of effects on divorce were computed using samples of ever-married men and women, which includes the currently married sample used to estimate spouse employment effects. Although deployment is associated with higher divorce rates for ever-married men, this effect disappears in models with covariates. For women, however, the effects of deployment are positive and significantly different from zero in models with or without covariates. Estimates from a model with covariates show a 4.2 percentage point higher divorce rate among deployed women. Restricting the sample to women in the military before 1990 and including controls for marital status and military pay in 1990 actually makes the estimates a little larger. Robustness to the inclusion of pre-deployment marital status variables is important because it supports the notion that the higher divorce rates for deployed women were in fact caused by deployment. On the other hand, it should be noted that the administrative data on marital status are not always accurate since changes are reported with a lag.

Tables 4a and 4b report OLS and 2SLS estimates of the effect of time away in equation (3). The 2SLS estimates simply rescale the reduced form estimates in Table 3, but they also offer opportunity for interesting

comparisons with OLS estimates of equation (3). The OLS estimates of the effect of time away on spouse employment, reported in table 4a, are very small and not significantly different from zero. In contrast, the corresponding 2SLS estimates imply that a year away reduces the current employment rate of spouses by about 6 percentage points. This estimate is significantly different from zero. The OLS estimate of the effect on spouse's employment status for women are positive but only marginally significant. As indicated by the reduced form estimates, however, the corresponding 2SLS estimate of effects on female soldiers' spouses are negative but not significantly different from zero.

OLS estimates of the effects of time away on divorce are positive and significant for both men and women, although very small. This can be seen in columns one and three of Table 4b. The 2SLS estimates for men are insignificant, however, as are the OLS estimates for men with 1990 controls. In contrast with the results for men, the 2SLS estimates for women are positive, significant, and much larger than the corresponding OLS estimates. The 2SLS estimates for women imply that a year away from home raises divorce probabilities by about 14 percentage points.

Overall, the results in Table 4 suggest that time away due to deployment did have an impact on soldiers' families, though the nature of this impact differs by sex. Negative employment effects appear only for the spouses of deployed male soldiers while divorce rates increased only for female soldiers who were deployed. This suggests that managing the additional child care and household responsibilities caused by deployment may have been easier for male soldiers' wives than for female soldiers' husbands. The idea that a military lifestyle can be hard on marriages is also supported by the fact that about 71 percent of SOEP respondents who divorced while on active duty reported that military service contributed at least in part to the breakup of their marriage.

2.6 Child Disabilities

Previous research suggests that the children of Gulf War veterans were affected by the deployment of a parent. For example, Jensen, Martin and Watanabe (1996) report higher levels of depression and stress

among the children of deployed service personnel. We study the effect of deployment and time away from home using measures of children's disability status. The dependent variables in this case are indicators of the incidence of permanent and temporary disabilities among soldiers' children. These are coded from responses to the question: "Are any of your dependents physically, emotionally, or intellectually handicapped requiring specialized treatment or care?" Respondents reply either "yes, permanently," "yes, temporarily," or "no." One reason this question was included in the survey is that military dependents with disabilities, whether chronic or temporary, are eligible for a variety of special programs and benefits (see, e.g., Department of the Navy, 1993). Estimates of effects on children are computed using a sample of parents, which we define as military personnel with dependents between the ages of one and 22.¹³

Reduced form estimates of the effect of deployment on disability status, reported in Table 5, show that the effect of deployment on temporary disabilities is positive but not significantly different from zero, whereas the effects on permanent disabilities is negative but not significantly different from zero.¹⁴ This finding appears in models with or without covariates, and in models that control for 1990 variables. Similar results are obtained when the effects are estimated separately for men and women.

Above we argued that deployment did not lead to a decline in income for most families. In fact, the military earnings of deployed soldiers appear to have gone up slightly. This claim should be qualified, however, with the observation that reduced employment by the spouses of deployed soldiers may have led to reduced family income. But since the effect of deployment on employment rates is small, reduced spouse earnings seem unlikely to have been a major concern for most families. In addition to maintaining income levels while soldiers are away, the military also offers a wide range of support service for families, including child care, counseling, and help managing household finances. The findings here suggest that the

¹³Here we interpret dependent's disabilities as referring to children's disabilities. But since dependents can also be over 65 in the SOEP, a small number of dependents with handicaps in the parent sample could be elderly instead of children. Discarding parents with elderly dependents leaves the results unchanged.

¹⁴In an earlier draft of this paper we reported statistically significant estimates of effects on temporary handicaps, however, those estimates did not use the survey sampling weights.

combination of support services and a stable economic situation provided effective insulation against the negative effects of single-parenting for the children of deployed personnel.

2.7 Caveats

Our interpretation of the results in Tables 3-5 is that they capture the causal effect of time away from home due to deployment to the Persian Gulf. An alternative interpretation is that differences by deployment status are not caused by deployment, but rather they reflect the characteristics of deployed soldiers. Of course, deployed personnel clearly differ from non-deployed personnel along some dimensions. But since the basic pattern of results reported here is not very sensitive to the list of included covariates, unobserved confounding variables may not be important either. In future work, we hope to improve on this control strategy by using better longitudinal data on soldiers and their families.

Another caveat is that even if the deployment effects reported here are causal, they need not be due to time spent away from families. For example, possible alternative explanations are related to Gulf War syndrome. If Gulf War service created health problems for service people, then the instrumental variables strategy confounds effects due to illness with effects due to time away from family. The leading explanations for Gulf War syndrome are stress and potential exposure of some units to chemical weapons. Clearly stress and anxiety were experienced by families as well as soldiers. On the other hand, there is no evidence that service-related illnesses or Gulf-syndrome symptoms spilled over to families (Presidential Advisory Committee on Gulf War Veteran's Illnesses, 1996).

2.8 Conclusion

The notion that work affects family life has a long history in economics. For example, many labor economists have considered the possibility that improved labor market opportunities for women contributed to the increase in divorce, although the evidence on this point is mixed (see, e.g., Becker, Landes, and Michael, 1977 and Hoffman and Duncan, 1994). And, as noted in the introduction, economists have looked

at the effects of mother's labor supply on children's cognitive achievement. But the task of estimating the direct effect of different types of work schedules on families has largely been left to sociologists and psychologists.

This paper presents new evidence on the causal effect of work-related parental absences on families using Gulf War deployment as a natural experiment. The most striking result is that deployment of female soldiers appears to have increased the likelihood of divorce, although the deployment of men did not have a similar effect. This is consistent with the notion that deployment of female soldiers put stress on their marriages, while the wives of deployed men were able to adapt to their husbands' absences. The divorce results for the Gulf War provide an interesting contrast with the World War II experience since the World War II demobilization was accompanied by an unprecedented spike in divorce rates (see, e.g., Davanzo and Rahman, 1993). The post-World War II increase in divorce is presumably attributable to the large-scale deployment of men since few women served in World War II.¹⁵

A second and related result is that time away from home reduced the employment rates of soldiers' wives. The employment effects are probably due to increased child care responsibilities since deployed husbands report that their wives bore most of the responsibility for child care in their absence. On the other hand, wives' deployment does not lead to a change in husbands' labor market behavior, a finding consistent with Angrist and Evans' (1988) results that show no interaction between wives' fertility and husbands' labor supply. Finally, we found no evidence of an increase in disabilities in the children of service personnel, at least as measured by the reported incidence of disabilities. Because Gulf War deployments are not associated with significant declines in earnings, this result offers some support for the view that loss of income is largely responsible for negative effects of parental absences, though the extensive support network for military families may also have been a factor. Of course, the Gulf War experience is not necessarily representative of the impact of other sorts of separations on families. A natural avenue for further research

¹⁵See Michael (1988) for a discussion of World War II and divorce.

is the analysis of additional episodes involving exogenous work-related family separations.

Table 1
Descriptive Statistics
1992 D.O.D. Survey of Officers and Enlisted Personnel

Variable	Full Sample (1)	Men (2)	Women (3)	Male Parents (4)	Female Parents (5)
<i>Sex</i>	.888 (.001)				
<i>Age</i>	28.8 (.030)	28.9 (.040)	28.2 (.042)	32.1 (.046)	30.0 (.061)
<i>Married</i>	.641 (.002)	.655 (.003)	.530 (.003)	.915 (.002)	.704 (.005)
<i>Divorced</i>	.087 (.001)	.074 (.002)	.196 (.003)	.061 (.002)	.193 (.004)
<i>Any Kids</i>	.526 (.002)	.536 (.003)	.441 (.003)		
<i>Number of Dependents</i>	1.16 (.005)	1.20 (.007)	.795 (.007)	2.12 (.007)	1.71 (.009)
<i>Spouse's Employment Status</i>	.604 (.002)	.579 (.003)	.853 (.003)	.540 (.003)	.839 (.004)
<i>Army</i>	.361 (.002)	.360 (.003)	.372 (.003)	.379 (.003)	.393 (.005)
<i>Navy</i>	.289 (.002)	.292 (.002)	.261 (.003)	.268 (.003)	.246 (.004)
<i>Air Force</i>	.255 (.002)	.246 (.002)	.326 (.003)	.271 (.003)	.325 (.005)
<i>Marines</i>	.095 (.001)	.102 (.002)	.040 (.001)	.081 (.002)	.037 (.002)
<i>% Officer</i>	.152 (.001)	.152 (.002)	.159 (.002)	.176 (.003)	.126 (.003)
<i>Time Away</i>	18.1 (.079)	19.0 (.101)	10.7 (.096)	20.9 (.117)	11.0 (.123)
<i>Deployments</i>	.278 (.002)	.295 (.002)	.147 (.002)	.286 (.003)	.127 (.003)
<i>Service Time</i>	96.6 (.319)	98.7 (.424)	80.2 (.401)	131.9 (.517)	100.7 (.614)
<i>Outside Job</i>	.106 (.001)	.108 (.002)	.088 (.002)	.127 (.002)	.074 (.003)

Table 1 (CONTINUED)

Variable	Full Sample	Men	Women	Male Parents	Female Parents
	(1)	(2)	(3)	(4)	(5)
<i>Family Moves</i>	2.64 (.012)	2.75 (.015)	1.74 (.015)	3.07 (.017)	2.02 (.019)
<i>Ln(Total Pay)</i>	9.65 (.002)	9.66 (.003)	9.60 (.003)	9.84 (.004)	9.68 (.005)
<i>Married to Military Spouse</i>	.080 (.001)	.052 (.001)	.307 (.003)	.059 (.002)	.384 (.005)
<i>High School Graduate</i>	.335 (.002)	.346 (.003)	.248 (.003)	.272 (.003)	.240 (.004)
<i>Some College</i>	.446 (.002)	.436 (.003)	.533 (.003)	.482 (.003)	.573 (.004)
<i>College Graduate</i>	.182 (.002)	.179 (.002)	.204 (.003)	.205 (.003)	.167 (.003)
<i>Non-White</i>	.279 (.002)	.267 (.002)	.377 (.003)	.296 (.003)	.432 (.005)
<i>Enlisted Recruiter</i>	.008 (.0004)	.009 (.0005)	.003 (.0003)	.013 (.0007)	.004 (.0006)
<i>Regular Member Sample</i>	.926 (.001)	.932 (.001)	.869 (.002)	.902 (.002)	.812 (.004)
<i>Full Time Reserve Component</i>	.037 (.0007)	.035 (.001)	.049 (.001)	.049 (.001)	.066 (.002)
<i>Longitudinal Sample</i>	.029 (.0007)	.023 (.0008)	.078 (.002)	.035 (.001)	.112 (.003)
<i>Sample Size</i>	59896	35473	24423	22677	9950

Table 1 Notes: Statistics are weighted by survey final sampling weights.

Table 2
 Comparison of Means by Deployment Status
 1992 D.O.D. Survey of Officers and Enlisted Personnel

Variable	Men			Women		
	Deployed (1)	Non- Deployed (2)	Difference (3)	Deployed (4)	Non- Deployed (5)	Difference (6)
<i>Age</i>	28.0 (.071)	29.3 (.048)	-1.35 (.087)	27.7 (.110)	28.3 (.046)	-.57 (.119)
<i>Married</i>	.637 (.005)	.663 (.003)	-.026 (.003)	.475 (.009)	.540 (.003)	-.064 (.009)
<i>Number of Dependents</i>	1.16 (.014)	1.22 (.008)	-.063 (.016)	.688 (.019)	.815 (.007)	-.126 (.019)
<i>Army</i>	.369 (.005)	.352 (.003)	.017 (.006)	.530 (.009)	.340 (.003)	.190 (.008)
<i>Navy</i>	.319 (.005)	.285 (.003)	.034 (.005)	.208 (.007)	.274 (.003)	-.065 (.008)
<i>Air Force</i>	.174 (.004)	.278 (.003)	-.104 (.005)	.227 (.035)	.346 (.003)	-.118 (.008)
<i>Marines</i>	.137 (.004)	.085 (.002)	.052 (.004)	.035 (.003)	.041 (.001)	-.005 (.004)
<i>Non-White</i>	.293 (.005)	.256 (.003)	.037 (.005)	.437 (.009)	.366 (.003)	.071 (.008)
<i>Service Time</i>	91.0 (.738)	103.0 (.520)	-12.0 (.94)	74.8 (1.006)	81.6 (.442)	-6.76 (1.14)
<i>Outside Job</i>	.083 (.003)	.118 (.002)	-.035 (.004)	.070 (.005)	.090 (.002)	-.032 (.005)
<i>Family Moves</i>	2.51 (.028)	2.85 (.018)	-.034 (.033)	1.72 (.043)	1.74 (.015)	-.021 (.042)
<i>% Officer</i>	.123 (.003)	.166 (.002)	-.044 (.004)	.139 (.006)	.164 (.003)	-.025 (.007)
<i>Time Away</i>	22.7 (.203)	17.5 (.114)	5.16 (.220)	13.9 (.282)	10.21 (.102)	3.65 (.278)

Table 2 (CONTINUED)
 Comparison of Means by Deployment Status
 1992 D.O.D. Survey of Officers and Enlisted Personnel

Variable	Men			Women		
	Deployed (1)	Non-Deployed (2)	Difference (3)	Deployed (4)	Non-Deployed (5)	Difference (6)
<i>Ln(Total Pay)</i>	9.50 (.006)	9.73 (.004)	-.23 (.007)	9.37 (.011)	9.64 (.003)	-.269 (.010)
<i>Married to Military Spouse</i>	.051 (.002)	.052 (.001)	-.001 (.003)	.279 (.008)	.312 (.003)	-.033 (.008)
<i>High School Graduate</i>	.407 (.005)	.321 (.003)	.087 (.006)	.289 (.008)	.240 (.003)	.049 (.008)
<i>Some College</i>	.409 (.005)	.448 (.003)	-.038 (.006)	.524 (.009)	.534 (.003)	-.009 (.009)
<i>College Graduate</i>	.136 (.004)	.197 (.002)	-.060 (.004)	.173 (.007)	.209 (.003)	-.037 (.007)
<i>Spouse's Employment Status</i>	.553 (.006)	.589 (.003)	-.036 (.007)	.835 (.010)	.856 (.003)	-.021 (.009)
<i>Divorced</i>	.075 (.003)	.073 (.002)	.002 (.003)	.227 (.010)	.191 (.003)	.035 (.009)
<i>Sample Size</i>	8915	25893		3118	20856	

Table 2 Notes: Statistics are weighted by survey final sampling weights.

Table 3
Reduced Form Estimates of the Effect of Deployment

Dependent Variable	Currently Married			Ever Married		
	Mean (1)	Reduced Form (2)	R.F. with Covariates (3)	Mean (4)	Reduced Form (5)	R.F. with Covariates (6)
A. Men						
<i>Time Away</i>	22.3	6.05 (.276)	6.00 (.238)	22.3	6.00 (.267)	6.01 (.231)
<i>Spouse's Employment Status</i>	.568	-.034 (.008)	-.026 (.008)			
<i>Divorce</i>				.0644	.0043 (.0036)	.0024 (.0038)
<i>Sample Size</i>	23458	23458	23458	25049	25049	25049
B. Women						
<i>Time Away</i>	11.7	3.40 (.393)	3.63 (.372)	12.00	3.41 (.356)	3.55 (.340)
<i>Spouse's Employment Status</i>	.866	-.013 (.010)	-.007 (.010)			
<i>Divorce</i>				.172	.0262 (.0103)	.0212 (.0102)
<i>Sample Size</i>	11623	11623	11623	14110	14110	14110

Table 3 Notes: Regressions with covariates include age, age-squared, 3 dummies for branch of service, 9 dummies for current education level completed, dummies for race and officer status, log of total military and non-military compensation, service time, and 3 dummies for sampling strata. The regressions using the ever married samples (Columns 4-6) also includes the number of children greater than age 2. The standard errors reported in parentheses are heteroscedasticity consistent.

Table 4
OLS and 2SLS Estimates

Dependent Variable:	Spouse's Employment Status				Divorce			
	Currently Married Men		Currently Married Women		Ever Married Men		Ever Married Women	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)
<i>Covariates</i>								
<i>Time Away</i>	.00019 (.00021)	-.00437 (.00132)	.00109 (.00025)	-.00202 (.0029)	.00014 (.00011)	.00040 (.0006)	.000035 (.0002)	.0060 (.0029)
<i>Age</i>	-.004 (.004)	.004 (.005)	.002 (.004)	.005 (.006)	.0215 (.0018)	.0212 (.0019)	.033 (.004)	.0270 (.005)
<i>Non-White</i>	.056 (.008)	.051 (.009)	-.010 (.007)	-.010 (.007)	.0039 (.0043)	.0042 (.0044)	.0178 (.007)	.0168 (.008)
<i>Army</i>	.001 (.010)	-.017 (.011)	-.044 (.011)	-.042 (.012)	-.110 (.005)	-.0100 (.005)	-.0100 (.012)	-.0159 (.012)
<i>Navy</i>	.029 (.010)	.043 (.011)	-.025 (.011)	-.031 (.012)	-.110 (.048)	-.0098 (.005)	-.0327 (.0116)	-.0211 (.013)
<i>Airforce</i>	.021 (.010)	-.022 (.016)	-.011 (.010)	-.020 (.014)	.0007 (.0049)	.0032 (.0075)	-.0258 (.0115)	-.007 (.0149)

Table 4 (CONTINUED)

Dependent Variable:	Spouse's Employment Status				Divorce			
	Currently Married Men		Currently Married Women		Ever Married Men		Ever Married Women	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)
<i>Covariates</i>								
<i>Officer</i>	-.062 (.013)	-.051 (.014)	-.044 (.018)	-.037 (.019)	-.0216 (.007)	-.0222 (.0071)	.0022 (.0178)	-.0097 (.019)
<i>Number of Kids Ages 2 to 22</i>					-.0221 (.0014)	-.0223 (.0016)	-.0183 (.0032)	-.0149 (.004)
<i>Ln(Total Pay)</i>	-.046 (.013)	-.043 (.013)	.028 (.015)	.026 (.015)	-.007 (.007)	-.007 (.0069)	-.0301 (.0134)	-.028 (.013)
<i>Sample Size</i>	23458	23458	11623	11623	25049	25049	14110	14110

Table 4 Notes: Regressions with covariates include age, age-squared, 3 dummies for branch of service, 9 dummies for current education level completed, dummies for race and officer status, log of total military and non-military compensation, service time, and 3 dummies for sampling strata. The regressions on using the ever married samples (Columns 5-8) also includes the number of children greater than age 2. The standard errors reported in parentheses are heteroscedasticity consistent.

Table 5
Reduced Form Estimates- Handicap Status

Dependent Variable	All Parents			Male Parents			Female Parents		
	Mean (1)	Reduced Form (2)	R.F. with covariates (3)	Mean (4)	Reduced Form (5)	R.F. with covariates (6)	Mean (7)	Reduced Form (8)	R.F. with covariates (9)
<i>Time Away</i>	20.00	8.58 (.267)	6.37 (.238)	23.7	6.91 (.303)	6.39 (.271)	11.68	4.56 (.470)	4.33 (.457)
<i>Temporary Handicaps</i>	.046	.006 (.003)	.006 (.003)	.045	.005 (.004)	.005 (.004)	.048	.016 (.008)	.011 (.008)
<i>Permanent Handicaps</i>	.037	-.003 (.003)	-.004 (.003)	.037	-.004 (.003)	-.004 (.003)	.036	.001 (.007)	-.006 (.007)
<i>Sample Size</i>	28823	28823	28823	19932	19932	19932	8891	8891	8891

Table 5 Notes: Regressions with covariates include age, age-squared, 3 dummies for branch of service, 9 dummies for current education level completed, dummies for race and officer status, log of total military and non-military compensation, service time, and 3 dummies for sampling strata. Regressions on the using the full parent sample (columns 1-3) include a dummy for sex. The standard errors reported in parentheses are heteroscedasticity consistent.

Table 6
OLS and 2SLS Estimates

Dependent Variable	All Parents				Male Parents				Female Parents			
	Temporary Handicaps		Permanent Handicaps		Temporary Handicaps		Permanent Handicaps		Temporary Handicaps		Permanent Handicaps	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)	OLS (9)	2SLS (10)	OLS (11)	2SLS (12)
<i>Time Away</i>	.00021 (.0001)	.0010 (.0005)	.00019 (.0001)	-.0006 (.0005)	.00024 (.0001)	.00078 (.0005)	.00022 (.0001)	-.0006 (.0005)	.00025 (.0002)	.0025 (.0019)	.00014 (.0002)	-.00133 (.0016)
<i>Male</i>	-.008 (.003)	-.014 (.005)	-.008 (.003)	-.002 (.005)								
<i>Age</i>	.013 (.002)	.012 (.002)	.007 (.001)	.008 (.002)	.011 (.002)	.010 (.002)	.006 (.002)	.007 (.002)	.013 (.003)	.011 (.004)	.007 (.003)	.009 (.003)
<i>Non-White</i>	-.013 (.003)	-.013 (.003)	-.016 (.003)	-.016 (.003)	-.011 (.004)	-.011 (.004)	-.014 (.003)	-.015 (.003)	-.017 (.005)	-.018 (.005)	-.020 (.004)	-.019 (.004)
<i>Army</i>	.013 (.004)	.015 (.004)	.011 (.003)	.009 (.004)	.007 (.004)	.010 (.005)	.008 (.004)	.005 (.005)	.027 (.007)	.025 (.008)	.017 (.007)	.018 (.007)
<i>Navy</i>	.011 (.004)	.010 (.004)	.001 (.003)	.001 (.003)	.007 (.004)	.005 (.005)	.001 (.004)	.004 (.004)	.020 (.007)	.026 (.008)	-.002 (.006)	-.006 (.007)
<i>Airforce</i>	.006 (.004)	.013 (.006)	-.000 (.003)	-.007 (.005)	.005 (.004)	.011 (.007)	.002 (.004)	-.006 (.006)	.009 (.007)	.017 (.009)	-.005 (.006)	-.010 (.008)

Table 6 (CONTINUED)
OLS and 2SLS Estimates

Dependent Variable	All Parents				Male Parents				Female Parents			
	Temporary Handicaps		Permanent Handicaps		Temporary Handicaps		Permanent Handicaps		Temporary Handicaps		Permanent Handicaps	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)	OLS (5)	2SLS (6)	OLS (7)	2SLS (8)	OLS (9)	2SLS (10)	OLS (11)	2SLS (12)
<i>Officer</i>	-.021 (.005)	-.023 (.006)	-.013 (.005)	-.011 (.005)	-.024 (.006)	-.025 (.006)	-.012 (.006)	-.010 (.006)	-.012 (.04)	-.015 (.012)	-.018 (.004)	-.016 (.013)
<i>Ln(Total pay)</i>	-.003 (.005)	-.004 (.005)	-.015 (.004)	-.014 (.004)	.003 (.005)	.003 (.005)	-.013 (.005)	-.013 (.005)	-.020 (.003)	-.018 (.011)	-.018 (.009)	-.020 (.009)
<i>Sample Size</i>	28823	28823	28823	28823	19932	19932	19932	19932	8891	8891	8891	8891

Table 6 Notes: Regressions with covariates include age, age-squared, 3 dummies for branch of service, 9 dummies for current education level completed, dummies for race and officer status, log of total military and non-military compensation, service time, and 3 dummies for sampling strata. The standard errors reported in parentheses are heteroscedasticity consistent.

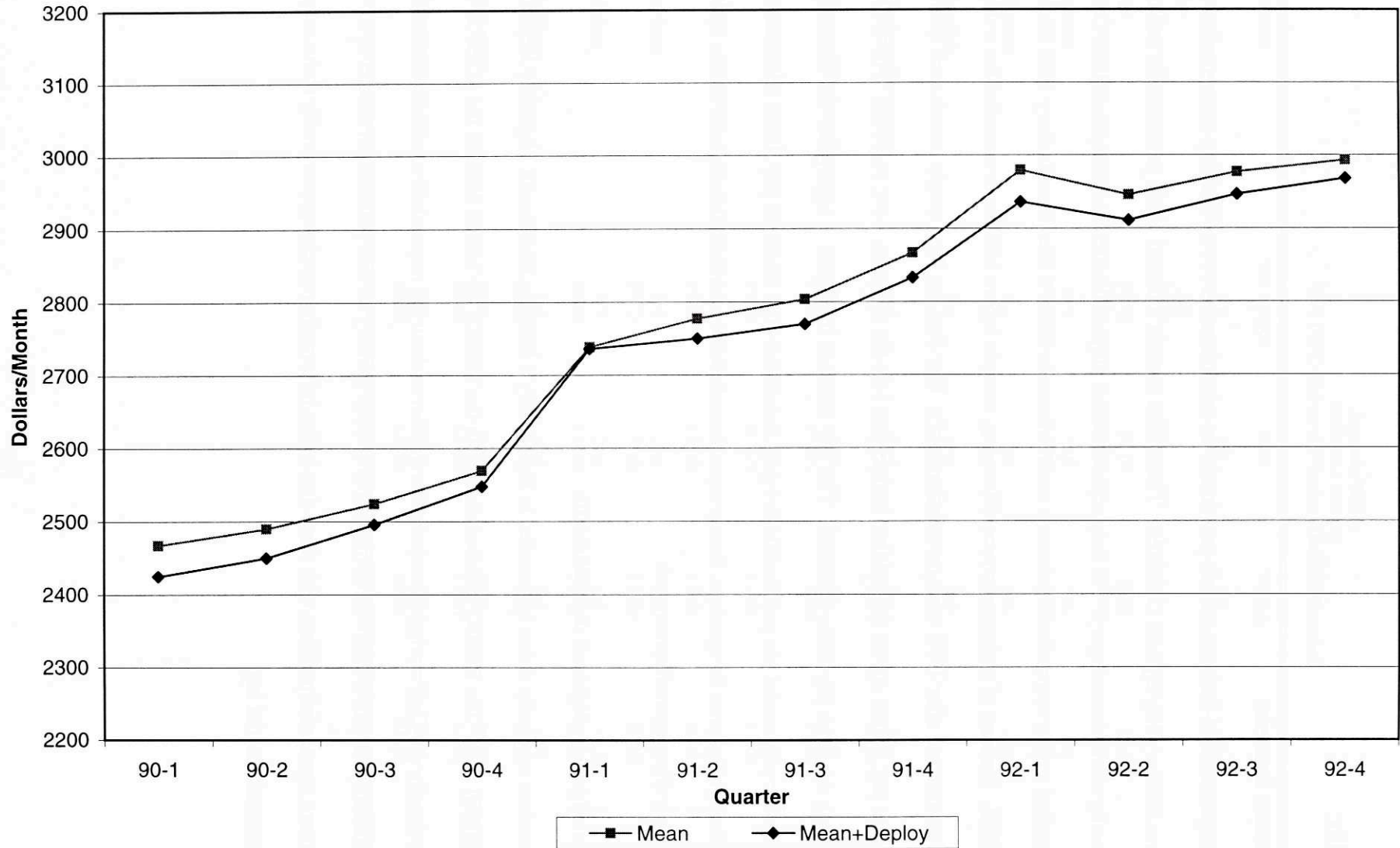


Figure 1. Regression Adjusted Earnings By Deployment Status for Military Personnel

Source: Tabulations from Joint Uniform Military Pay Files: See Appendix A for details.

Appendix

Military Income Records

The Department of Defense records pay data in an administrative record keeping system called the Joint Uniform Military Pay System (JUMPS). These files contain a record of all payments for military compensation by allowance category. For the purposes of this project, the Defense Manpower Data Center (DMDC) matched survey respondents to income records from the JUMPS files from January 1989 through December 1992. Because of a change in record keeping, records before 1991 were recorded for a single month each quarter and after 1991 were recorded monthly. Our data are for a single month each quarter. Records of zero pay, which appear for soldiers before they join the military, were excluded. Also, a few records showing negative pay were excluded. The pay measure in Figure 1 aggregates the largest pay components: basic pay, career sea pay, hostile fire pay, hazardous duty incentive pay, basic allowance for subsistence, basic allowance for quarters, family separation allowance, variable housing allowance, and the variable housing allowance offset amount.

Information on pre-deployment marital status

Information on family status is recorded in the military's Defense Enrollment Eligibility Reporting System (DEERS) files. The DMDC matched data from the DEERS for March 1990 to the SOEP at our request. The data for pre-Gulf marital status indicates whether each survey respondent was married, divorced, legally separated, annulled, a widower, or married to another military service person as of March 1990. As noted in the text, a potential problem with these data is that information on changes in family status may be reported with a substantial lag.

Appendix Table 1
 Descriptive Statistics
 1992 D.O.D. Survey of Officers and Enlisted Personnel

Variable	Full Sample (1)	Men (2)	Women (3)	Male Parents (4)	Female Parents (5)
<i>Sex</i>	.592 (.002)				
<i>Age</i>	31.96 (.031)	33.14 (.041)	30.24 (.044)	35.4 (.044)	40.0 (.063)
<i>Married</i>	.671 (.002)	.765 (.003)	.534 (.003)	.935 (.002)	.739 (.004)
<i>Divorced</i>	.114 (.002)	.068 (.001)	.198 (.003)	.055 (.002)	.187 (.004)
<i>Any Kids</i>	.544 (.002)	.639 (.003)	.407 (.003)		
<i>Number of Dependents</i>	1.19 (.005)	1.49 (.007)	.748 (.007)	2.11 (.006)	1.75 (.009)
<i>Spouse's Employment Status</i>	.662 (.002)	.068 (.001)	.860 (.007)	.532 (.003)	.848 (.004)
<i>Army</i>	.243 (.002)	.237 (.002)	.252 (.003)	.254 (.003)	.269 (.004)
<i>Navy</i>	.278 (.002)	.260 (.002)	.304 (.003)	.246 (.003)	.279 (.004)
<i>Air Force</i>	.292 (.002)	.272 (.002)	.319 (.003)	.288 (.003)	.334 (.005)
<i>Marines</i>	.187 (.002)	.229 (.002)	.123 (.002)	.213 (.003)	.118 (.003)
<i>% Officer</i>	.462 (.002)	.474 (.003)	.443 (.003)	.477 (.003)	.361 (.005)
<i>Time Away</i>	18.31 (.082)	22.00 (.107)	11.86 (.104)	23.51 (.122)	11.66 (.131)
<i>Deployments</i>	.205 (.002)	.256 (.002)	.130 (.002)	.241 (.003)	.104 (.003)

Appendix Table 1(CONTINUED)

Variable	Full Sample	Men	Women	Male Parents	Female Parents
	(1)	(2)	(3)	(4)	(5)
<i>Service Time</i>	119.3 (.336)	137.6 (.458)	93.2 (.435)	163.9 (.502)	112.9 (.634)
<i>Outside Job</i>	.082 (.001)	.086 (.002)	.075 (.002)	.096 (.002)	.070 (.002)
<i>Family Moves</i>	3.11 (.013)	3.70 (.016)	2.02 (.015)	4.01 (.019)	2.36 (.020)
<i>Ln(Total Pay)</i>	9.99 (.002)	10.07 (.003)	9.87 (.004)	10.19 (.004)	9.92 (.005)
<i>Married to Military Spouse</i>	.149 (.001)	.046 (.001)	.300 (.003)	.048 (.001)	.887 (.005)
<i>High School Graduate</i>	.174 (.002)	.181 (.002)	.163 (.003)	.151 (.002)	.171 (.004)
<i>Some College</i>	.462 (.002)	.329 (.002)	.357 (.003)	.363 (.003)	.432 (.005)
<i>College Graduate</i>	.462 (.002)	.461 (.003)	.462 (.003)	.454 (.003)	.378 (.004)
<i>Non-White</i>	.239 (.002)	.198 (.002)	.298 (.003)	.209 (.003)	.355 (.005)
<i>Enlisted Recruiter</i>	.041 (.0008)	.066 (.001)	.005 (.0004)	.085 (.002)	.006 (.0008)
<i>Regular Member Sample</i>	.761 (.002)	.682 (.002)	.875 (.002)	.609 (.003)	.819 (.003)
<i>Full Time Reserve Component</i>	.068 (.001)	.098 (.002)	.024 (.0009)	.112 (.002)	.033 (.002)
<i>Longitudinal Sample</i>	.130 (.001)	.153 (.002)	.096 (.002)	.190 (.003)	.141 (.003)
<i>Sample Size</i>	59896	35473	24423	22677	9950

Appendix Table 1 Notes: Statistics are unweighted in this table.

Chapter 3

The Impact of Overtime Coverage on Public Sector Workers

3.1 Introduction

The Fair Labor Standards Act (FLSA), first enacted in 1938, sets both the minimum wage and overtime premium in the United States. The law's initial purpose was to shorten work weeks and to increase employment. Under the FLSA, eligible workers receive time-and-a-half pay for every overtime hour worked. Recent debates over the shortened work week in Europe and union claims that companies abuse mandatory overtime have sparked interest in amending the FLSA. In light of the limited variation in the law over the past 60 years, however, little empirical evidence exists to guide policy reforms. In a recent paper, Hamermesh and Trejo (1998) use limits on daily hours worked for women to study the effects of a law change in California that required payment of overtime for more than 8 hours of work a day. A second research strategy exploits the rules about which types of workers are "covered" by FLSA, i.e., which workers are actually eligible for the overtime premium. For example, Trejo (1991) uses coverage variation to look at private sector changes in the 1970's. Costa (1999) uses similar coverage changes in the FLSA in the 1930-1940's and finds that hours of work were reduced when a mandatory overtime premium was imposed on the retail trade sector.

This chapter studies a policy change that extended overtime coverage to state and local government employees in 1985—one of the few major changes in the FLSA overtime provisions in the post-war period. In 1979, local bus drivers sued the San Antonio Transit authority for overtime pay, with the case reaching the Supreme Court in 1985. In its decision in *Garcia v. San Antonio Metropolitan Transit Authority*, the

Court changed the legal standard by which eligibility for overtime coverage was determined, ruling that state and local workers were eligible for overtime pay. In response, Congress passed amendments to the Fair Labor Standards Act in 1985 which allowed overtime to be compensated with either cash payment or vacation time. These two events changed the overtime eligibility rate for state and local government workers from 20 to 80 percent (Trejo, 1997).

The empirical analysis here uses a difference-in-differences strategy to estimate the effect of the *Garcia* law change on the percentage of state and local government workers working any overtime, overtime hours worked, and earnings. I use hourly federal government workers and salaried state and local government workers as control groups. I also study two industries within the public sector that have high overtime hours worked—public administration and transportation. The data for all outcome variables comes from the Merged Outgoing Rotation Groups (MORG) from the Current Population Survey for the years 1983-1988. Using federal government workers as the control group, the results suggest that overtime hours, earnings, and the percentage of workers working any overtime increased after the law change. This finding is robust to the choice of control groups and to the inclusion of controls for month effects, year effects, region effects, and individual characteristics. The results are similar for samples of public administration and transportation workers, although of a smaller magnitude and less precise. I also present results from comparisons of hourly and salary state and local government workers, and also find marginally significant and positive effects on overtime hours worked and percentage of workers working any overtime.

In a standard competitive framework, the change in overtime coverage constitutes an exogenous increase in wages, and thus, moves employment along the labor demand curve. The expected effects of the overtime legislation is likely a reduction in overtime hours. I explore three possible explanations for the positive effect of the law change—a shift in demand for state and local government workers that confounds the analysis, a supply response to the change in the overtime premium, and shifting of workers between covered and uncovered sectors. I analyze additional evidence on number of workers in the public sector,

other control groups, and financial data on state budgets. I argue that the increase in overtime hours and overtime hours worked was mainly due to a change in supply by workers, which is only possible because the government sector is not behaving competitively.

This chapter proceeds as follows. Section 3.2 provides background on the history of FLSA coverage of state and local government workers. Section 3.3 discusses the data set and Section 3.4 describes the estimation strategy. Section 3.5 presents the results and discusses the validity of the underlying identifying assumptions. Section 3.6 discusses three competing explanations for the results. Section 3.7 concludes and provides directions for future research.

3.2 Overtime Provisions of FLSA for Government Workers¹

Under the original 1938 FLSA, state and local government workers were not eligible for overtime pay. Throughout the 1960's and 1970's, the United States Congress and the Supreme Court debated both the equity and constitutionality of extending coverage to public sector workers. The Commerce clause of the U.S. Constitution prohibits the federal government from passing laws that restrict intrastate commerce or impede the ability of state and local governments to remain independent. With the 1966 Fair Labor Standards Act Amendments, employees of state and local governments “engaged in the operation of hospitals, residential care facilities primarily in the care of the sick, aged, and the mentally ill or defective; schools, and mass transit systems” were the first public sector group made eligible for both the minimum wage and overtime provisions of the law (U.S. Congress, 1985). In the 1968 *Maryland v. Wirtz* case, the Supreme Court affirmed that the extension of the FLSA provisions to state institutions did not “exceed Congress’ power under the commerce clause” (U.S. Congress, 1985). Between 1972 and 1974, a series of FLSA amendments extended coverage to almost all state and local government employees.

A major change in the law occurred with the 1974 case of *National League of Cities v. Usery*, where

¹An excellent source on the history of the FLSA provisions and government workers is testimony by Susan Meisinger, Deputy Undersecretary for Employment Standards, before Congressional Committee to review FLSA 1985 Amendments.

the Supreme Court ruled that enforcing FLSA on state and local government workers limited the States' "ability to function effectively in a federal system" (*National League of Cities et. al. v. Usery*, 426 [***1] U.S. 833). The *National League of Cities v. Usery* decision set a standard that any worker in a "traditional government" function was ineligible for FLSA coverage. As a result, for most of the 1970's and early 1980's, the majority of state and local government workers were not covered by the FLSA.

In 1979, a controversy over the coverage status of local mass transit operators in San Antonio, Texas broke out between the Department of Labor (DOL), local bus operators, and the transit authority. The DOL argued that the mass transit workers were eligible for FLSA coverage because their jobs did not meet the standard for "constitutional immunity" as laid out by the court (U.S. Congress, 1985). The transit authority argued that bus operators were a part of traditional government functions. After a series of law suits and appeals, the case of *Garcia v. San Antonio Metropolitan Transit Authority* was heard by the Supreme Court in 1985. The court ruled that the notion of "traditional government functions" was both "unworkable" and "inconsistent with established principles of federalism." Further, "there is nothing in the overtime and minimum-wage requirements of the FLSA...that is destructive of state sovereignty or violative of any constitutional provision." (*Garcia v. San Antonio Metropolitan Transit Authority et al.*, 469 [***1] U.S. 528) Thus, *Garcia* essentially made all state and local government workers eligible for all provisions of the FLSA, including overtime pay.

The change in status of state and local government workers as a result of the Supreme Court ruling sparked a contentious debate between local lawmakers and the unions. Mayor Edward Koch of New York testified before Congress in September 1985 that:

The National League of Cities estimates that America's cities will spend in excess of \$2 billion to comply with the act. . . Garcia is unnecessary, expensive, and intrudes on federalism's longstanding division of powers. It should be applied only where worker rights are not secure. Local and State governments have been at the forefront of recognizing and protecting worker rights.

(Subcommittee on Labor Standards, 1985)

Municipalities feared that the cost of the additional overtime would bankrupt the states and disrupt collective

bargaining. The American Federation of State, County, and Municipal Employees, however, argued the costs of the new law would be much smaller:

Eighty percent of the work force is under the act. What he is really stating, therefore, is he wants a special privilege of extricating local government, local State employees. . .Ninety percent of the white-collar force, people whom we represent, work a 35-hour week, so they are unaffected by this...What it means, therefore, in terms of overtime, the total bill we have is \$45 million.

(Subcommittee on Labor Standards, 1985)

The Congressional response was the passage of 1985 Amendments to the Fair Labor Standards Act in November, which allowed overtime compensation to take the form of either time and a half wages or time and a half vacation time. The DOL began enforcement of the new FLSA on April 1, 1986.

3.3 Data and Descriptive Statistics

Data for this project come from the 1983-1988 CPS Merged Outgoing Rotation Group (MORG) files. The CPS has a rotating sampling structure; respondents are interviewed for four consecutive months, not surveyed for eight months, and surveyed for another four months. The MORG files contain data for those individuals being interviewed for the 4th and 8th times. The data set contains observations on almost 30,000 individuals in a given month. The MORG files contain more state and local government workers than any single month CPS file. However, the data is collected monthly, so people in the data set are surveyed in different months. I restrict my samples to only those persons in the last(16th) month of the survey. My final sample contains 21,692 state and local government workers between 1981 and 1988. All estimates are weighted by sampling weights.

Table 1 presents descriptive statistics for three samples of employed, full-time workers from the 1984 MORG files: private sector workers, state and local government workers, and federal government workers. Private sector workers are, on average, 36.3 years old—about 4 years younger than those in the public sector. Far more men than women work in the private (61 percent male) and federal government (64 percent male) sectors than in state and local government (49 percent male). There are also more minorities employed in the public sectors than in the private sector, with about 17 percent of state and local government employees

being non-white. Local public sector workers are also more educated, on average, with 44 percent holding a college degree.

Full-time, private sector employees work the longest hours, about 42.1 hours per week. The average number of people working any overtime is highest in the private sector as well, with 34 percent reporting some hours over 40 last week. Thirty percent of state and local government employees work some overtime, and the average overtime hours worked is about 3 hours a week. Federal government employees report the fewest overtime hours (2.7 per week) and the smallest percentage of people working any overtime (.26 percent). There are also fewer hourly employees in the state and local government jobs than in both private sector and the federal government. Average hourly earnings are highest in the federal sector; they earn on average about 90 dollars a week more than their counterparts in the other samples.

Table 2 gives the distribution of hourly state and local government workers by industry, as well as the average hours worked, overtime hours worked, percent that report any overtime worked during the previous week, and the main occupations within each industry group. Almost 28 percent of hourly state and local government workers are employed in public administration, which includes protective services, such as police and fire, as well as administrative support and clerical staff. About one quarter of the public administrative employees report working some overtime, and on average, worked about 3.36 overtime hours in the last week.

Another quarter (25.4 percent) of hourly state and local government employees work in education. These people work in personal services jobs, including child care provision and administrative support. Only 21 percent of hourly employees in the education industry report working any overtime. On average, education workers work about 1.4 overtime hours per week. The hours worked by education workers tend to be very cyclical, and for this reason, they will be treated separately in the analysis that follows. Transportation workers make up a relatively small portion of all state and local hourly government workers (3.3 percent) but work the longest hours (43.2 per week), have the most workers reporting overtime (40.8

percent) and not surprisingly, the highest overtime hours of any group (4.35 overtime hours last week).

3.4 Estimation

The estimation strategy in this chapter is a difference-in-differences technique. The difference-in-differences estimator gives the causal effect of the policy change of interest, in this case, the overtime coverage extension to state and local government workers, by comparing the changes in outcomes for a treatment group with the outcomes for a control group. Ideally, the treatment and control groups would behave identically in the absence of the law change. The validity of the estimator turns on the assumption that the treatment and control groups would change similarly absent the FLSA change.

Assume Y_{oi} is the overtime hours worked of individual i in the absence of the law change that extended overtime coverage. Let Y_{1i} be the overtime hours worked of individual i if the law changes to extend overtime coverage to state and local government workers. The overtime hours worked by state and local government workers in year t is $E[Y_{oi}|c,t]$ without the law change, and $E[Y_{1i}|c,t]$ if the law changes. In practice, the law changed in 1986 and only effects state and local government workers. So, the only observations of $E[Y_{1i}|c,t]$ are for c =state and local government workers and t >April,1986. Since we never observe state and local government workers in the absence of the law change, we need to rely on other control groups, for example, c =hourly federal government workers, to estimate $E[Y_{oi}|c,t]$.²

The difference-in-differences model makes the following restriction on the conditional mean function:

$$(1) \quad E[Y_{oi}|c,t]=\beta_c + \gamma_t$$

So, in the absence of the law change, overtime hours worked can be split into the sum of the year specific effect and a state and local government specific effect. The regression form of the equation can then be expressed as:

²This framework follows very closely from Angrist and Krueger, 1999.

$$(2) \quad Y_i = \beta_c + \gamma_t + \delta M_i + \varepsilon_i$$

where $E[\varepsilon_i|c,t]=0$ and M_i is an indicator for being both a state and local government workers and also being observed in the period after the law change, April 1, 1986.

The estimate δ is equal to:

$$\delta = \{E[Y_i|c = \text{state}, t = \text{pre} - \text{Garcia}] - E[Y_i|c = \text{federal}, t = \text{pre} - \text{Garcia}]\} - \\ - \{E[Y_i|c = \text{state}, t = \text{post} - \text{Garcia}] - E[Y_i|c = \text{federal}, t = \text{post} - \text{Garcia}]\}$$

in the simple model. A regression adjusted version of the above estimate can also be obtained by the following:

$$(3) \quad Y_i = X_i' \beta_o + \beta_c + \gamma_t + \delta M_i + \varepsilon_i$$

where β_o is a vector of covariates, including age, age-squared, 3 dummies for education levels (high school grad, some college, college graduate), dummies for race, marital status, and sex. I also run several specifications which control for seasonal hours trends (11 month dummies), annual hours trends (7 year dummies), local economic effects (8 regional dummies), and possible interactions between state and local government work hours and season (11 interactions between month and dummy for being a state and local government worker). Since the unit of observation is individuals at a given month and year, it is possible that there is correlation in the error term between month and year (random effects in the model without month, year controls).

In Table 3, I present a comparison of mean characteristics for the treatment and control groups for four samples—hourly government employees (excluding education industry), hourly public administrators, hourly transportation workers within the public sector, and hourly and salary state and local government

workers. All samples are restricted to persons ages 18-55 who are employed full time,³ and all tabulations in Table 3 are for the time period prior to the law change (pre-April 1986).

In columns (1) and (2), I include public sector workers excluding the education industry. State and local hourly government workers are, on average, two years younger than federal government workers, and more likely to be female and white. Almost identical fractions of workers from the two groups have high school degrees and college degrees. The hours characteristics look similar as well— both groups average almost exactly 40 hours per week and roughly 2 overtime hours per week. Seventeen percent of workers in state and local government report working any overtime last week, compared with 21 percent of federal hourly workers.

Table 3 also presents the same treatment and control groups for two more restricted samples— public administration and transportation workers. Public administration is the largest industry group among the state and local government workers (27.4 percent), and a comparison of state and local employees to federal employees in public administration is found in columns (3) and (4). On average, local public sector workers are 2.5 years younger than workers in federal public administration, and as in the full sample, more minorities are employed in the federal jobs. Both sectors have similar percentage of high school graduates (about 42 percent), some college completed (about 34 percent), and college graduates (about 18 percent). Federal workers worked about 1 hour less overtime each week before the law, and about 6 percent more of the sample worked any overtime in the previous week.

The comparison of state and local transportation workers is presented in Columns (4) and (5) of Table 3. Again, the samples are quite similar. Overall, a higher percentage of men work in transportation and educational attainment is lower within the industry. Relative to federal government transportation workers, state and local employees are about the same age, but less educated. The work characteristics are

³I also restrict the sample to persons with less than 70 hours per week, though the results are insensitive to this restriction.

similar, but about 7 percent more persons report working any overtime among the federal government sample in the previous week.

Finally, in Columns (7) and (8), I present a comparison between hourly state and local government employees and salary state and local government employees, excluding education workers. The demographic characteristics differ slightly by age (about 2.5 years), race (hourly workers are more likely to be non-white) and education (salary workers are more educated). Salary workers, on average, work almost one-half hour more each week, and about one-half hour extra overtime each week. The percentage of workers working any overtime last week is also greater amongst salaried workers.

3.5 Results

In Table 4, I present the difference-in-differences estimators for hourly public sector workers (excluding education workers)—comparing state and local government workers (treatment) with federal government workers (control). I present results for three outcomes—a dummy for any overtime hours worked, the actual overtime hours worked last week (hours worked minus 40), and log hourly earnings. All regression results are weighted, and standard errors are corrected for possible within month-year correlation of the error term. In column (1), I present the simplest estimator: the difference in group means. The treatment group dependent mean on any overtime hours worked is .182. State and local government workers as a whole work less overtime than federal government workers, and a smaller percentage of all government workers are working any overtime in the post-law period. The difference-in-differences estimator is positive and significant on any overtime worked (.051), implying that the effect of the law was to increase the percentage of state and local government workers who worked overtime. In column (2), I add month, year, and month*treatment dummies, but the interaction coefficient remains about the same magnitude. In column (3), I also add region dummies and individual characteristics. Again, the coefficient is still positive and significant, and of the same magnitude across specifications.

For the outcome overtime hours worked last week, the treatment group dependent mean is 1.97 hours

per week. Again, the difference-in-differences estimator is positive and significant (.450) across all specifications. The regression adjusted estimator is slightly smaller, about .566 overtime hours per week, still a 29 percent increase in the dependent mean. Average log earnings go up about 6.7 percent for state and local workers as a result of the law change.

In Table 5, I present the results for the public administrative workers. The results look very similar to the effects for the analysis with all government workers, but less precise. The percentage of state and local government workers working any overtime is positive and insignificant; the point estimate is about .032 on a treatment group dependent mean of .219. The effects are also positive and marginally significant for overtime hours worked last year, and the log hourly earnings went up by about 8.3 percent. The results for transportation workers in government sectors are less precise; the percentage of workers working any overtime is positive but insignificant and slightly larger than the effect for the administrative workers. The mean overtime hours worked is also positive but insignificant, and average log hourly earnings are insignificant as well.

In Table 6, I present the difference-in-differences results for hourly state and local government employees compared to salary state and local government employees. Again, all samples exclude education workers. Similar to the results in the federal versus state comparison, the results in the hourly versus salary comparison also give positive coefficients on both any overtime hours worked and overtime hours worked last week. The effects are robust to all specifications, though a little less precise for the overtime hours worked last week. The magnitude of the effects is a bit smaller for these samples than the state/local versus federal comparison.

One test of the validity of the identifying assumptions by running a simple regression of the form:

$$(4) \quad Y_i = X_i' \beta_o + \beta_c + \gamma_t + \beta_c * \gamma_t + \varepsilon_i$$

and plotting the coefficients on the interaction term $\beta_c * \gamma_t$ for each year. This will allow us to see how much variation was occurring before and after the law change that might be contaminating the validity of the

comparison between the treatment and control groups. In Figures 1-8, I plot the coefficient on the year-treatment interaction year by year for both overtime hours worked and any overtime hours both for yearly intervals and quarterly intervals.⁴ Figures 1 and 2 correspond to the regression results shown in Table 4. Both the yearly and quarterly graphs for both outcomes show a relatively flat series before the law change, and then a sharp upward movement between 1985 (the initial passage of the *Garcia* decision) and the first quarter of 1986 (the first date of enforcement of the new law). It also appears that there is a slight downward trend before and after the law change.

The graphs for the industry coefficients are a bit more problematic for the identification strategy. The public administrators have a slight upward trend before the law change as seen in Figures 3 and 4. The quarterly graph shows upward movement during the adjustment period (Q3-85, Q4-85) and then gets fairly flat right after the law is enforced. The graphs are even more discouraging for the transportation workers—the quarterly graph in Figure 5 and 6 actually shows a downward trend in 1985 and 1986, with an upward spike afterward. This may not be surprising, however, since the results are generally weakest and insignificant for this group. The difference-in-differences estimator for the transportation workers should be viewed most cautiously.

Finally, the graphs in Figures 7 and 8, which correspond to the analysis comparing hourly and salary state and local government workers (Table 6) look more promising. There appears to be a bit of a pre-law downward trend, but then a sharp spike again during the reform period. The graph for overtime hours worked shows the spike in Q2-86 and Q3-86, just after the law went into effect.

3.6 Competing Explanations

Two simple models are often used to predict the impact of overtime coverage regulation (Trejo, 1991). In a fixed wage model, wages are set competitively by the market. A change in overtime eligibility

⁴The quarter graphs depict moving averages of the coefficients.

would create both a substitution effect and a scale effect. The substitution effect would cause employers to demand less of the high cost overtime hours and instead, use an alternative factor of production, such as capital or non-covered labor. The scale effect makes the final product more costly to produce, inducing less production of the total good. The effect on output is indeterminate, but the model predicts overtime hours should go down.

Contrast that with a fixed job model in which employers and employees consider the job package of hours and wages jointly. A change in coverage is mitigated by shifting the hours-wage mix; in a fixed job model, overtime legislation is predicted to have no effect on hours. The key insight of the fixed job model is that the hourly wage rate is flexible. This flexibility allows employers to adjust both hours worked and wages in response to an overtime law change, and thus mitigate any effect of the law; for example, by lowering wages for the same number of hours worked (Trejo, 1991).

Neither traditional model, however, can explain the positive effect of the 1985 FLSA reforms. I explore three possible explanations: a change in the demand for state and local government services, a supply response by workers to the overtime premia, and shifting of workers between covered and uncovered sectors within governmental units.

First, if the demand for government services shifted simultaneously with the law change, and the shift is differential across treatment and control groups, then the increase in demand could mitigate any negative effects on overtime hours worked. In the early 1980's, there was a widely perceived shifting of power from federal governments to state and local governments under Ronald Reagan. This type of shift would be particularly damaging to the difference-in-differences estimate that compares the experience of federal government workers to state and local government workers. Shifting of work from federal government workers to state and local government workers could lower their hours of work; shifting work to state and local government workers would increase their hours. In a difference-in-differences estimator, this would show up as a positive effect of the law, but could have little to do with the law change itself. From a more practical standpoint, it also

implies the law may have passed at a time which was particularly well timed from the workers' perspective, and badly timed from the government's perspective.

One piece of evidence that could shed some light on the demand story is to look at the number of workers employed in the government sector in the 1980's. The Bureau of Labor Statistics collects monthly establishment data on number of workers employed annually in the Federal Government and the State and Local Government sectors. The data does not distinguish between hourly and salaried workers, however. In Table 7, I present difference-in-differences estimates comparing federal and state/local government employees after the law. Here, I find that during the period, the average number of employees in state and local governments also went up in the period. The coefficient on the interaction term implies that the law change increased the number of hours worked by 1.5 percent. Again, two competing effects could be at work here. The increase in number of employees could be a natural response to the law; employers may hire more salaried workers in the state and local sector who are not eligible for overtime, but overtime hours per worker also went up. It is also consistent with a story where demand for state and local government workers went up differentially, and government sectors increased overtime hours worked and the number of workers employed. However, the magnitude of the change is relatively small.

A second story that can explain an increase in overtime pay and overtime hours is a supply response by workers to the increased compensation. The ability for a supply response to exist, however, turns critically on the assumption that governments are not behaving competitively. There is a long literature, in fact, that suggests public sector markets do not maximize profits (e.g., Ehrenberg and Schwarz, 1982). If managers have little direct incentives to restrict hours, and workers would like to supply more hours at the higher overtime wage rate, then a positive supply response to the law change is not surprising. The allowance for payment of compensatory time may well have eroded the monitoring incentives that government supervisors had if they were mainly concerned about the cost of overtime pay.

A natural test of the demand versus supply explanations is to look at groups where the differential

demand effects may be less of a problem. For example, as the control groups get narrower in the industry by industry analysis, the results are in the same direction and of the same magnitude, although less precise. The results from the difference-in-differences estimators comparing hourly and salary workers within state and local government are the most promising; here, the type of demand shock driven by shifting workloads from federal government to state government should not be an issue. Yet, the results are clearly similar to those in the initial specifications, and again, significant.

One caveat about the last comparison is the possibility of shifting between uncovered and covered sectors. If jobs can be reclassified easily, shifting may occur from salary to hourly status to be made eligible for overtime. This type of response is both a supply response and a response to the law change; it makes the interpretation of the coefficient a bit harder to understand. If we take the baseline overtime hour change from the main specification in Table 4, then the implied elasticity of supply is .57 for overtime hours after the law change.

It is also interesting to find out what happened to state budgets in light of the law change. Legislators predicted that the law would incur great costs; the passage of the compensatory time waiver was supposed to mitigate this burden. In Table 8, I present some simple descriptive statistics on the expenditures by governments on payrolls and salaries for the year, 1983-1988. This information is merely suggestive, but shows no pronounced spike in the salary/local government expenditures during the time period. The rate of increase for state and local government workers is fairly constant throughout the period. However, a more detailed accounting would be necessary to understand the mechanisms at work with the financial figures.

3.7 Conclusions

Episodes like the *Garcia* natural experiment in 1985 provide a unique opportunity for economists and lawmakers to learn about the mechanisms that might be important in determining the effects of changes in hours legislation. The effect of the law change in this case was positive and significant, implying a supply elasticity of .5 for overtime hours. This can be explained by two main factors: changes in demand for

government workers, and a supply response by workers who were able to adjust because of the non-competitive nature of the government sector. The industry level regressions, the comparisons between hourly and salary state and local government workers, and the anecdotal financial evidence however lend credence to the supply story. On the other hand, the positive difference-in-differences result on the number of workers employed in the government sector may indicate demand shifts are occurring as well.

A better understanding of public sector labor markets and which sectors behave competitively would be a valuable tool to guide economists and policy makers. Another direction for future research is a more careful accounting of state laws on hours regulation, which may have interacted with the federal law to create some interesting experiments. For example, the attorney general in Kentucky did not allow compensatory time provisions of the FLSA to be enacted; the only acceptable form of compensation to state and local government for overtime work was cash compensation. Finally, exploring how the degree of unionization in various sectors differentially affected the responses of workers could be a fruitful avenue for future work as well.

Table 1
 Summary Statistics, Full Time Workers
 1984 Merged Outgoing Rotation Groups, Current Population Survey

	Private Sector (1)	State and Local Government (2)	Federal Government (3)
<i>Demographics</i>			
Age	36.3 (12.4)	40.1 (11.7)	40.8 (11.3)
Sex	.609 (.488)	.490 (.500)	.644 (.479)
Non-white	.123 (.329)	.166 (.372)	.215 (.411)
High school graduate	.402 (.490)	.268 (.442)	.345 (.475)
Some college completed	.236 (.425)	.198 (.399)	.287 (.452)
College graduate	.192 (.394)	.443 (.497)	.293 (.455)
<i>Job Characteristics</i>			
Hours Worked Last Week	42.6 (8.84)	41.5 (9.28)	41.0 (8.20)
Worked Any Overtime Last Week	.337 (.472)	.295 (.456)	.247 (.431)
Overtime Hours Worked Last Week	3.65 (7.57)	3.10 (7.57)	2.52 (6.43)
Paid Hourly	.561 (.496)	.316 (.465)	.555 (.497)
Earnings Last Week (dollars)	364 (208)	377 (178)	461 (200)
Sample Size	57607	10490	3136

Table 1 Notes: Standard deviations are in parenthesis. Estimates are weighted by sample weights.

Table 2
Summary Statistics
Hours by Industry, Hourly State and Local Government Workers

Industry	Percent in Industry (1)	Hours Worked (2)	Any OT Worked (3)	Overtime Hours Worked (4)	Main Occupations with in Industry (percentage) (5)
Public Admin.	28.3	41.1 (9.0)	.235 (.426)	3.36 (9.1)	Protective service (34.2) Admin. support (15.0)
Education	25.4	39.4 (6.9)	.205 (.403)	1.37 (4.9)	Cleaning/building support (25.4) Admin. support (14.9)
Hospital	12.6	40.3 (7.1)	.159 (.366)	1.56 (5.72)	Health assessment (24.0) Health service (18.3)
Construction	8.1	40.4 (6.9)	.202 (.402)	1.74 (5.08)	Other transport/moving (19.9) Construction trades (19.3) Construction laborer (18.7)
Utilities	7.0	42.3 (9.3)	.279 (.449)	3.31 (8.23)	Precision production (15.2) Motor Vehicle operator (12.8)
Health	5.0	39.5 (5.2)	.113 (.318)	.709 (3.65)	Health service (34.0) Health assessment (11.4)
Social Services	4.0	38.9 (6.9)	.162 (.370)	1.38 (4.99)	Professional specialty (28.9) Secretaries/typists (11.7)
Transportation	3.3	43.2 (10.1)	.408 (.494)	4.35 (8.97)	Motor vehicle operators (40.5) Mechanics and repairers (14.6)
Entertainment	2.0	39.8 (8.0)	.133 (.342)	1.55 (5.71)	Farm workers and related (31.3) Exec. admin, managers (13.2)
Insurance	1.0	38.8 (5.7)	.088 (.288)	.400 (2.81)	Secretaries/typing (26.4) Cleaning/building services(19.8)
Other Industries	3.2	41.9 (10.5)	.235 (.426)	3.36 (9.07)	Farm workers and related (10.7) Cleaning/building service (10.2)
Sample Size	6530	6530	6530	6530	6530

Table 2 Notes: Standard deviations are in parentheses for columns 2-4. Percentage in occupation in parentheses in column 5.

Table 3
Comparison of Means
Treatment and Control Groups

	Hourly (excluding education)		Hourly Public Admin.		Hourly Transportation		State and Local only	
	State/ Local (1)	Federal (2)	State/ Local (3)	Federal (4)	State/ Local (5)	Federal (6)	Hourly (7)	Salary (8)
<i>Demographics</i>								
Age	34.9 (9.7)	37.1 (9.3)	34.5 (9.2)	37.1 (9.4)	38.2 (9.5)	37.6 (9.0)	34.9 (9.7)	37.2 (9.2)
Sex	.565 (.496)	.625 (.484)	.596 (.491)	.576 (.494)	.817 (.386)	.717 (.450)	.565 (.496)	.586 (.492)
Non-white	.219 (.414)	.261 (.439)	.172 (.377)	.229 (.420)	.313 (.464)	.280 (.450)	.219 (.414)	.167 (.372)
High School graduate	.419 (.494)	.422 (.493)	.415 (.493)	.419 (.493)	.450 (.498)	.411 (.492)	.419 (.494)	.303 (.459)
Some college complete	.290 (.454)	.352 (.477)	.345 (.476)	.332 (.471)	.280 (.449)	.414 (.492)	.290 (.454)	.274 (.446)
College graduate	.152 (.359)	.161 (.367)	.180 (.384)	.196 (.397)	.087 (.282)	.111 (.314)	.152 (.359)	.365 (.482)
<i>Job Characteristics</i>								
Hours Last Week	40.4 (6.97)	40.7 (7.0)	41.0 (7.5)	40.1 (7.0)	41.5 (7.4)	41.8 (7.0)	40.4 (6.97)	40.8 (7.8)
OT Hours Last Wk.	1.89 (5.09)	2.10 (5.10)	2.4 (5.8)	1.8 (4.9)	2.7 (5.6)	2.9 (5.4)	1.89 (5.09)	2.5 (5.8)
Any OT Hours Last Wk.	.172 (.377)	.207 (.405)	.211 (.408)	.156 (.362)	.254 (.437)	.330 (.470)	.172 (.377)	.216 (.411)
Earnings	321 (140)	410 (152)	350 (148)	408 (164)	422 (133)	445 (116)	321 (140)	414 (186)
Sample Size	6531	4539	2564	2124	257	1209	6531	8006

Table 3 Notes: Standard deviations in parentheses. Estimates are weighted by sample weights.

Table 4
Difference-in-differences Estimator
Control Group: Hourly Federal Government Workers (excluding education)

	Any Overtime Hours Worked Treatment Group Dep. Mean: .182			OT Hours Worked Last Week Treatment Group Dep. Mean: 1.97			Log Hourly Earnings Treatment Group Dep. Mean: 6.74		
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)	OLS (9)
State & Local Gov.	-.035 (.010)	-.016 (.033)	-.004 (.030)	-.212 (.116)	-.200 (.331)	-.044 (.310)	-.273 (.011)	-.276 (.025)	-.232 (.022)
Post	-.031 (.011)	-.037 (.014)	-.029 (.014)	-.422 (.134)	-.328 (.180)	-.244 (.184)	.059 (.013)	-.063 (.022)	-.046 (.017)
SLG *Post	.051 (.014)	.053 (.014)	.051 (.013)	.585 (.159)	.597 (.146)	.566 (.144)	.072 (.016)	.067 (.014)	.067 (.012)
Month dummies	no	yes	yes	no	yes	yes	no	yes	yes
Year dummies	no	yes	yes	no	yes	yes	no	yes	yes
Month* SLG dummies	no	yes	yes	no	yes	yes	no	yes	yes
Region dummies	no	no	yes	no	no	yes	no	no	yes
Other Covariates	no	no	yes	no	no	yes	no	no	yes
Sample Size	20637	20637	20637	20637	20637	20637	18131	18131	18131

Table 4 Notes: Estimates are weighted by sample weights. Standard errors are corrected for correlation between month-year effects and the error term. Other covariates include age, age-squared, dummies for male, non-white, education levels (high school grad, some college, college grad), and marital status.

Table 5
 Difference-in-differences Results
 Hourly Public Sector Workers, Selected Industries

	Public Administration			Transportation		
	Any OT Worked Mean:.219	OT Hours Worked Mean:2.47	Log Hourly Earnings Mean:6.73	Any OT Worked Mean:.236	OT Hours Worked Mean:2.44	Log Hourly Earnings Mean:6.90
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)
State & Local Gov.	.061 (.033)	.414 (.357)	-.169 (.029)	.128 (.063)	2.29 (.744)	-.223 (.040)
Post	-.023 (.024)	-.218 (.352)	-.025 (.025)	-.051 (.037)	-.474 (.437)	-.078 (.041)
SLG *Post	.032 (.021)	.402 (.256)	.053 (.017)	.055 (.042)	.589 (.491)	.016 (.040)
Sample Size	8955	8955	8955	2880	2880	2497

Table 5 Notes: Estimates are weighted by sample weights. Standard errors are corrected for correlation between month-year effects and the error term. Other covariates include age, age-squared, dummies for male, non-white, education levels (high school grad, some college, college grad), and marital status.

Table 6
Difference-in-differences Results
Control Group: Hourly vs Salary State and Local Government Workers

	Any Overtime Hours Worked Treatment Group Dep. Mean: .215			OT Hours Worked Last Week Treatment Group Dep. Mean: 2.08		
	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)
Hourly	-.044 (.006)	-.018 (.016)	.010 (.013)	-.623 (.083)	-.498 (.235)	-.167 (.204)
Post	-.002 (.008)	-.020 (.014)	-.016 (.014)	-.058 (.101)	-.131 (.162)	-.088 (.164)
Hourly *Post	.022 (.010)	.022 (.009)	.022 (.009)	.219 (.137)	.217 (.121)	.206 (.113)
Month dummies	no	yes	yes	no	yes	yes
Year dummies	no	yes	yes	no	yes	yes
Month* SLG dummies	no	yes	yes	no	yes	yes
Region dummies	no	no	yes	no	no	yes
Other Covariates	no	no	yes	no	no	yes
Sample Size	26710	26710	26710	26710	26710	26710

Table 6 Notes: Estimates are weighted by sample weights. Standard errors are corrected for correlation between month-year effects and the error term. Other covariates include age, age-squared, dummies for male, non-white, education levels (high school grad, some college, college grad), and marital status.

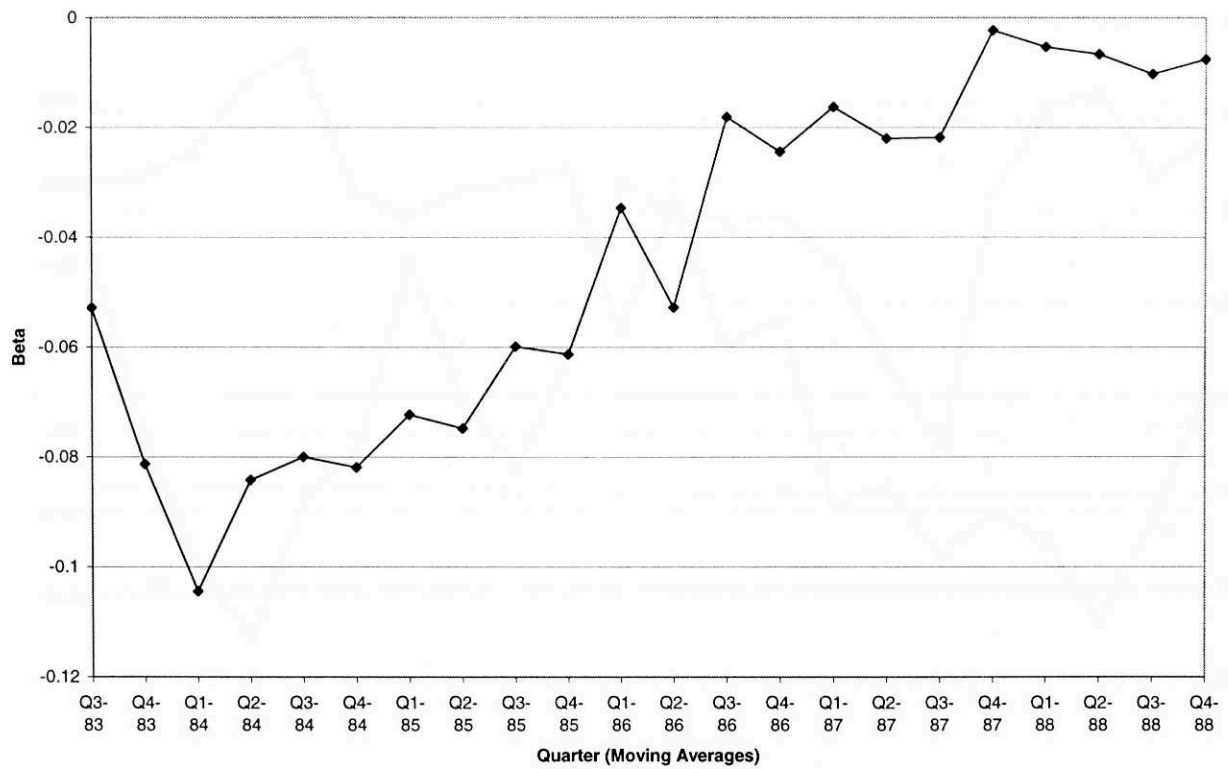
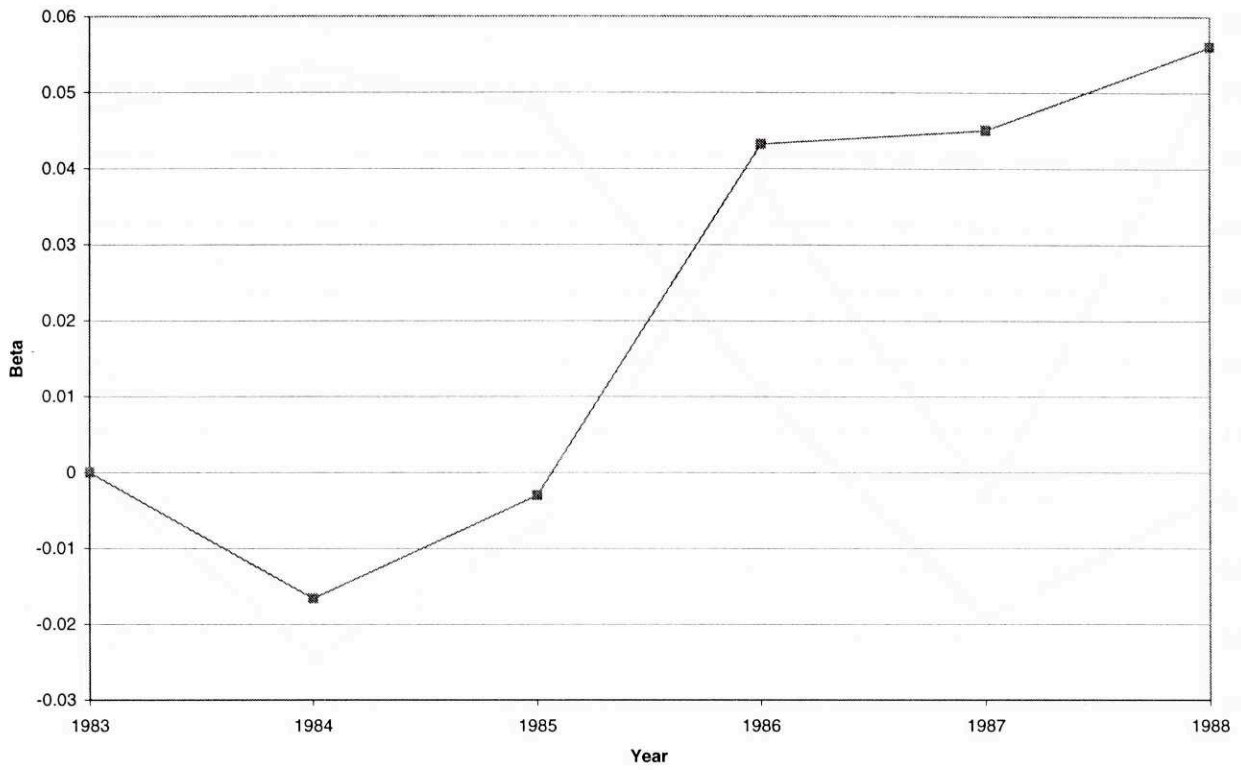
Table 7
 Number of Government Employees
 Difference-in-differences Estimator

	Log Number of Employees Treatment Group Dependent Mean:9.51	
	OLS (1)	OLS (2)
State Government	1.55 (.005)	1.56 (.003)
Post	.049 (.006)	-.010 (.003)
Post*State	.011 (.009)	.014 (.002)
Other Covariates	no	yes
Sample Size	192	192

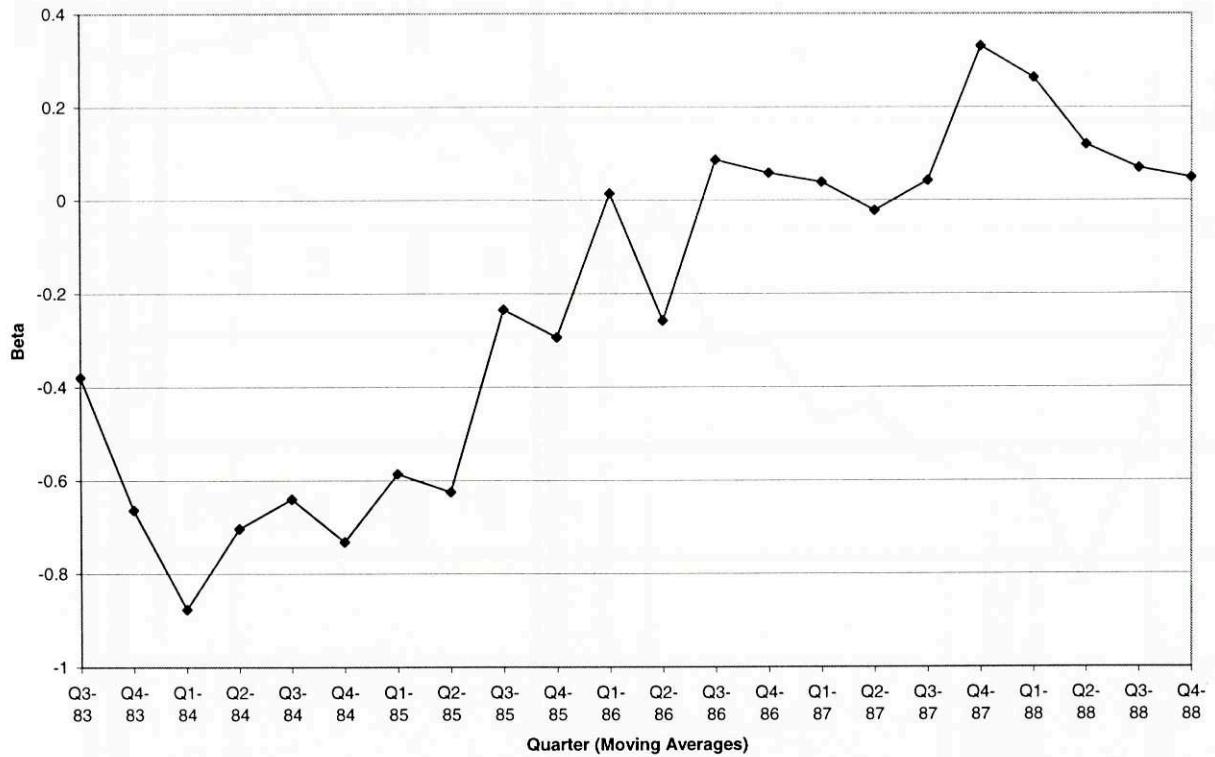
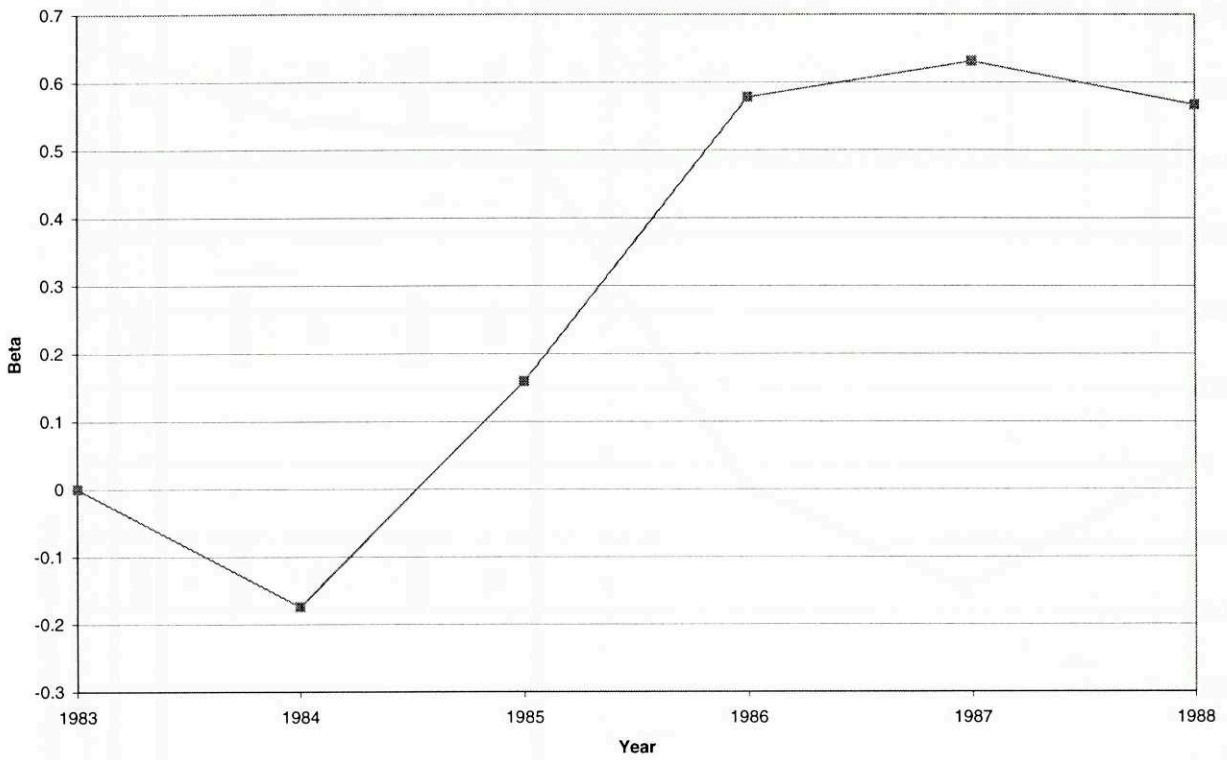
Table 8
Expenditure for salaries and wages by Governments (million of dollars)
1981-1988

	1983	1984	1985	1986	1987	1988
Federal	109,641	111,173	120,331	123,054	129,262	134,912
Percentage Change	5.1	1.4	8.2	2.3	5.0	4.4
State/Local	204,378	219,266	236,877	256,662	274,323	295,689
Percentage change	7.4	7.3	8.0	7.7	6.9	7.9

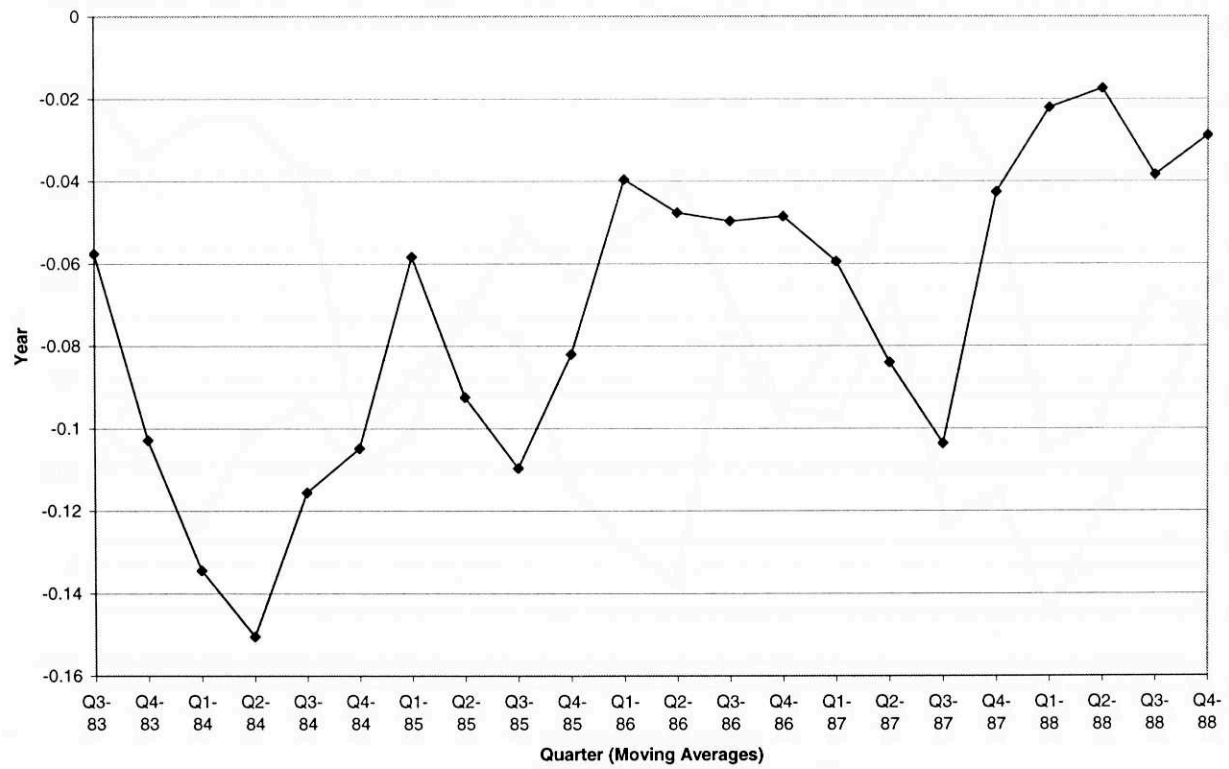
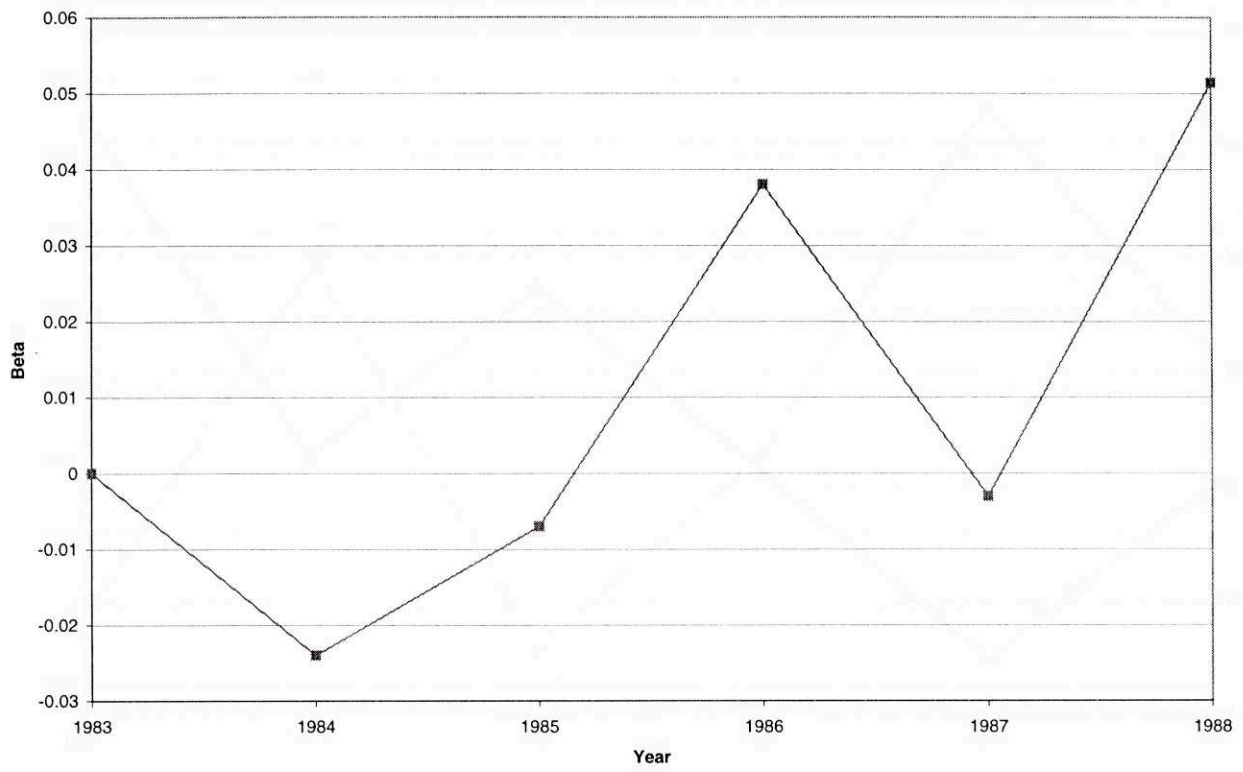
Table 8 Notes: All data comes from the Statistical Abstract of the United States, various years.



**Figure 1. Coefficients on Interaction of Treatment*Year, Treatment*Quarter.
Hourly Public Sector Employees, Excluding Education, Any Overtime Hours Worked.**



**Figure 2. Coefficients on Interaction of Treatment*Year, Treatment*Quarter.
Hourly Public Sector Employees, Excluding Education, Overtime Hours Worked Last Week.**



**Figure 3. Coefficients on Interaction of Treatment*Year, Treatment by Quarter
Hourly Public Administration Only, Any Overtime Hours Worked**

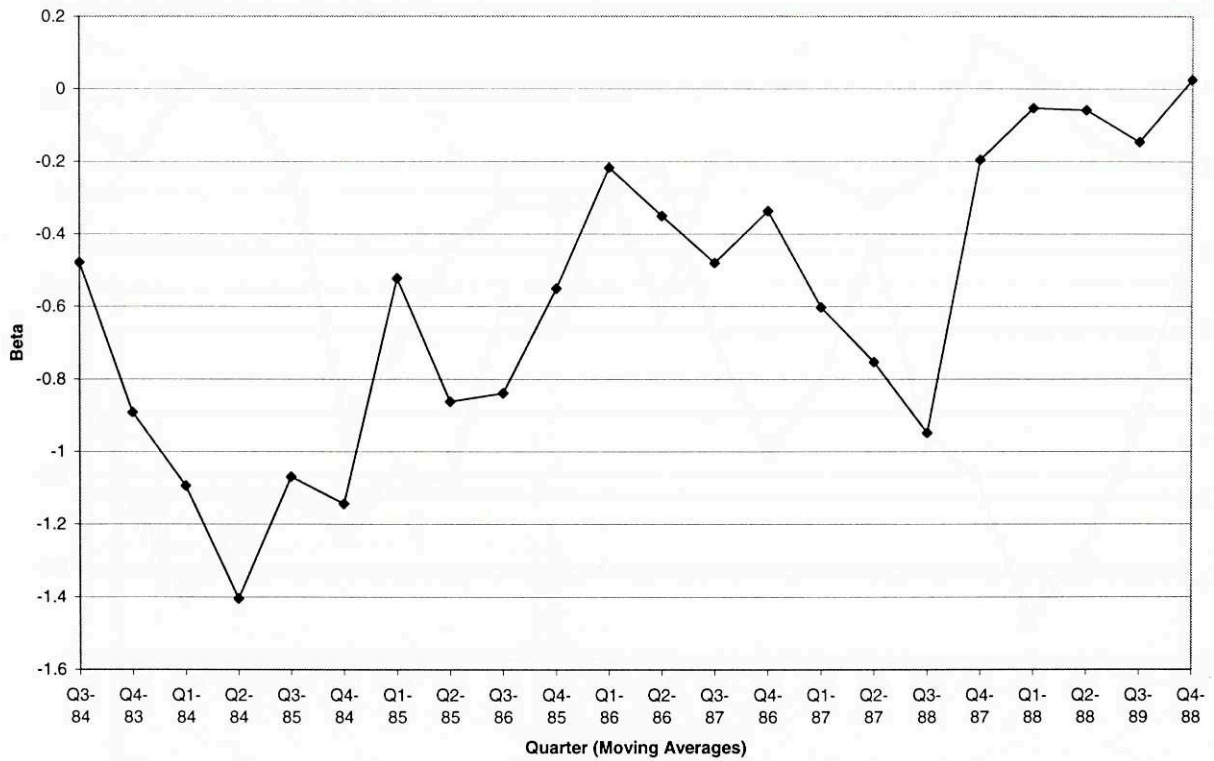
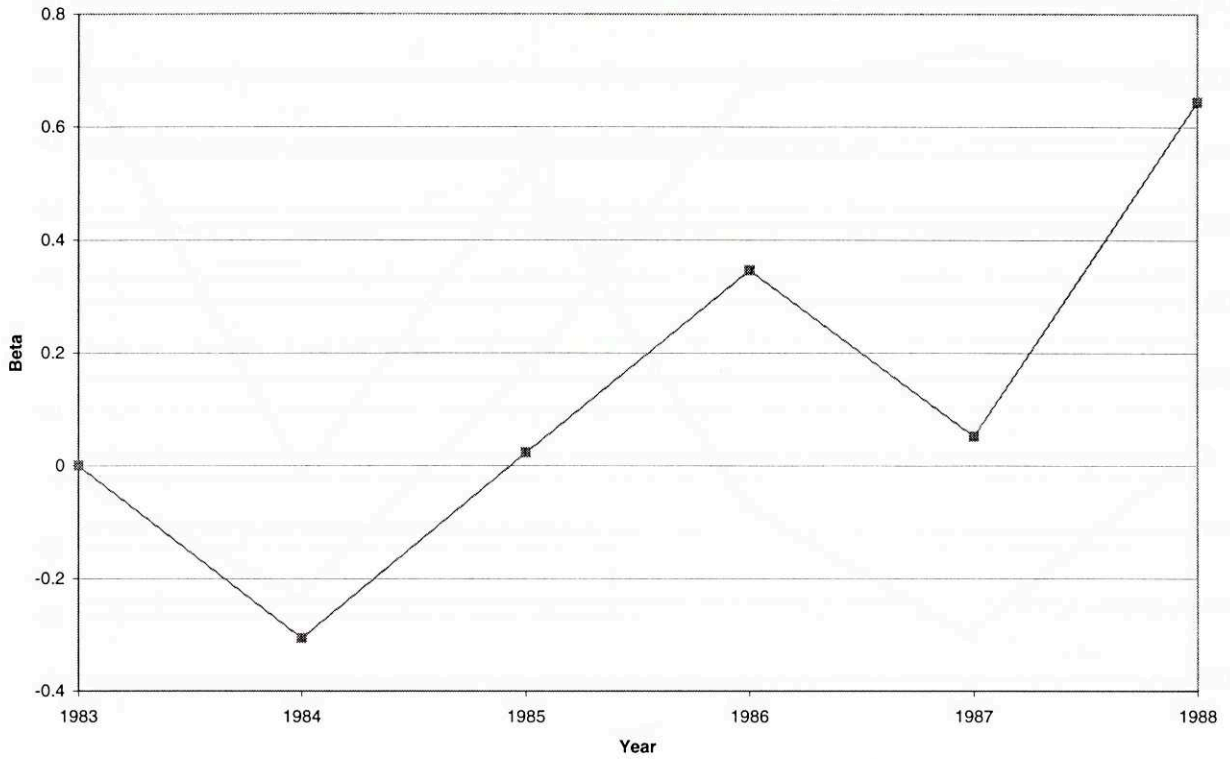
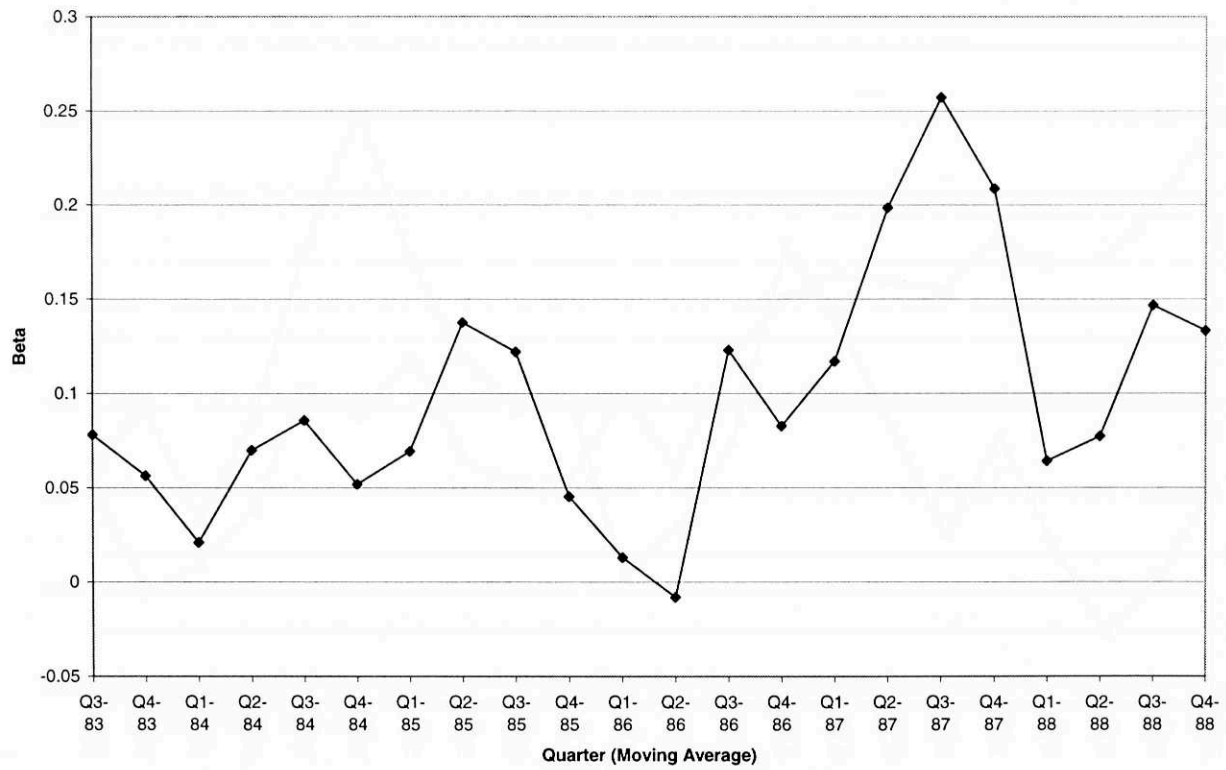
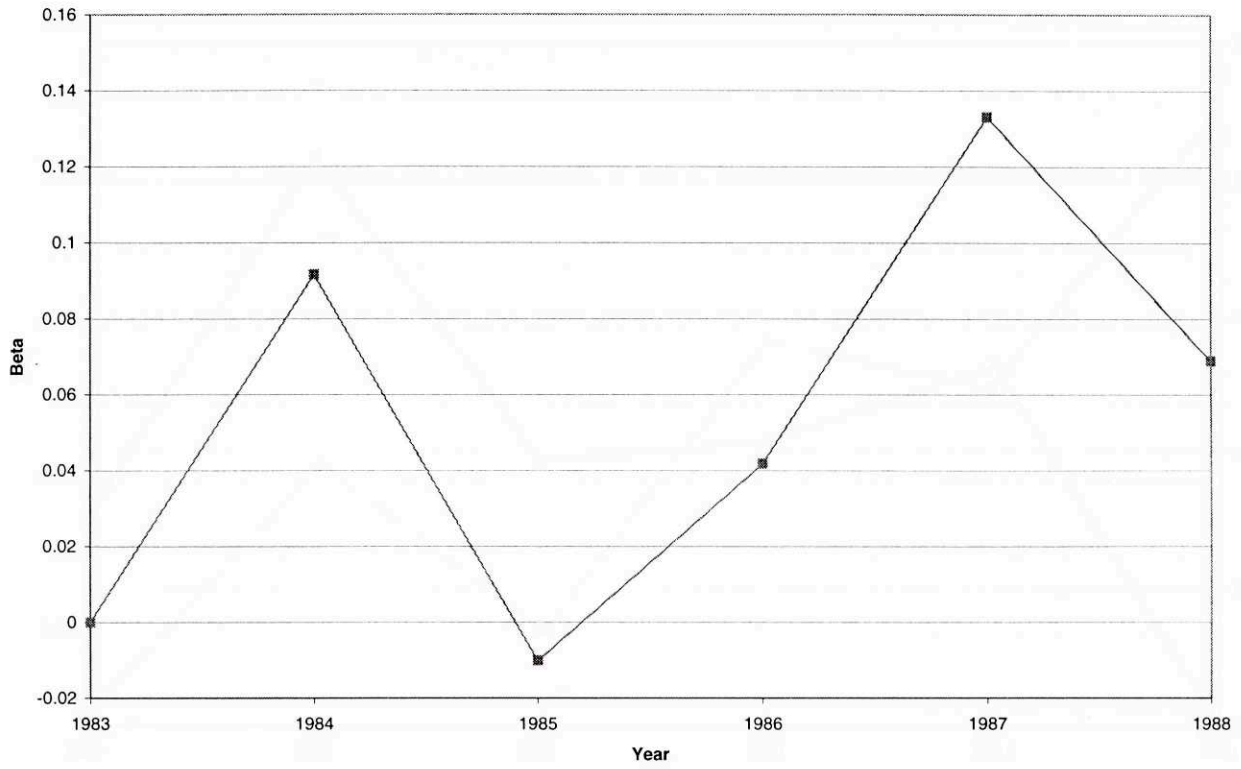


Figure 4. Coefficients on Interaction of Treatment*Year, Treatment*Quarter
Hourly Public Administration Only, Overtime Hours Worked Last Week.



**Figure 5. Coefficient on Interaction of Treatment*Year, Treatment*Quarter.
Hourly Transportation Workers Only, Any Overtime Hours Worked.**

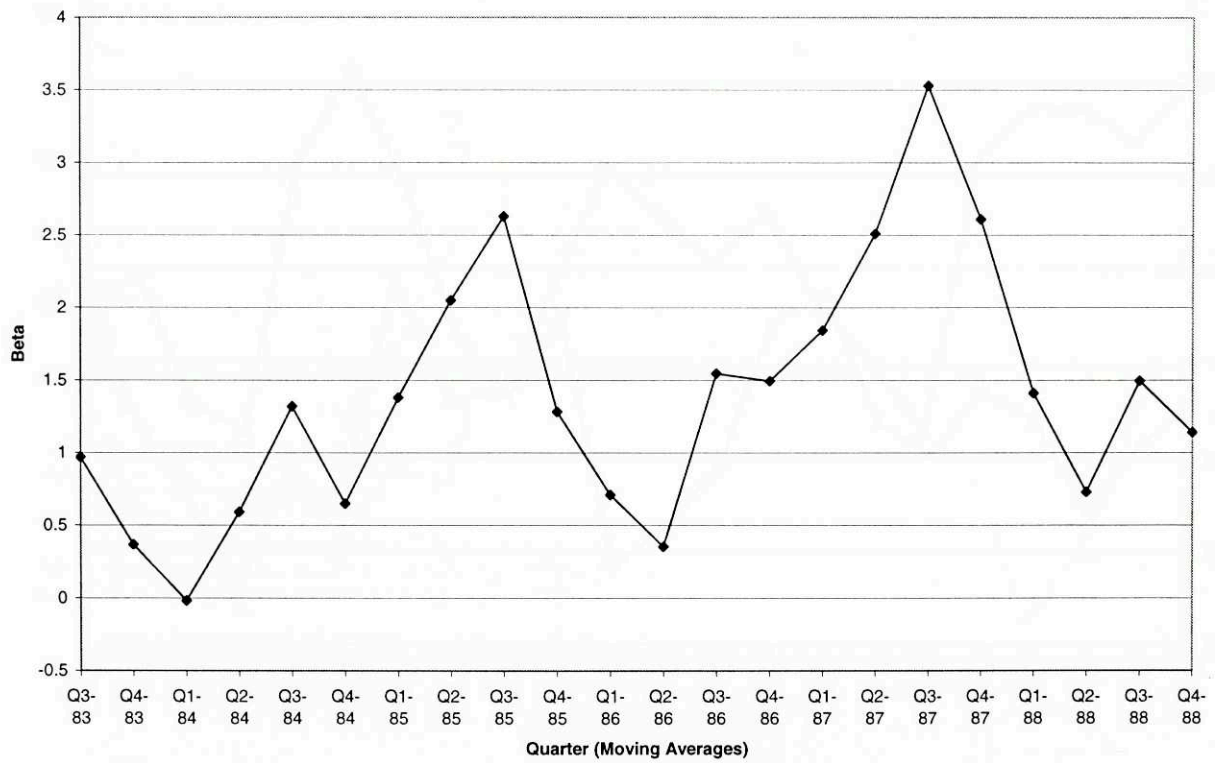
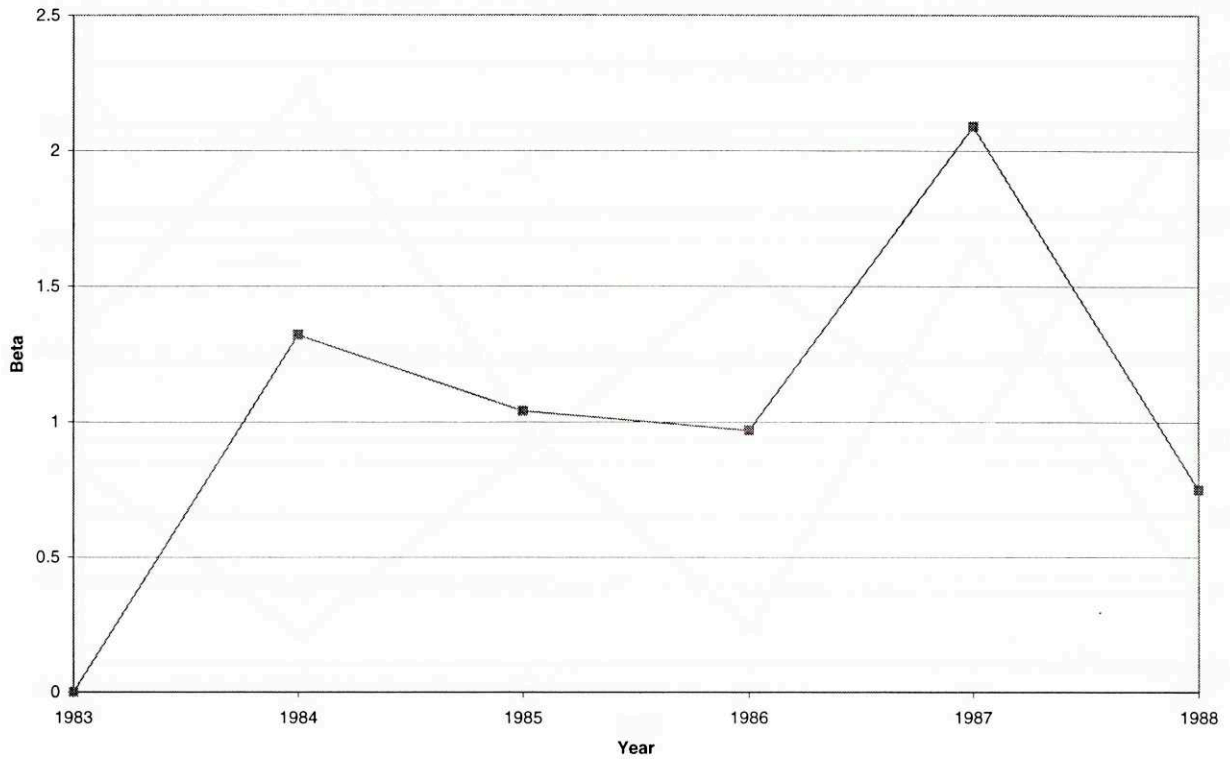
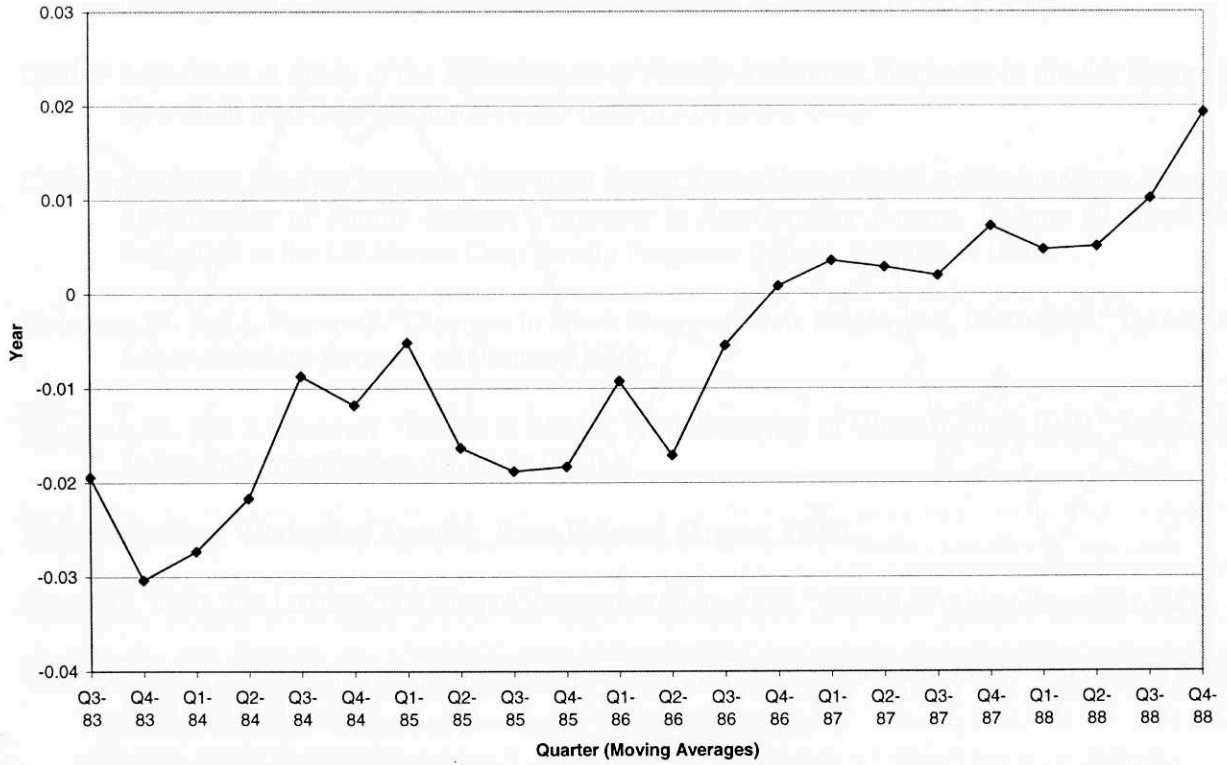
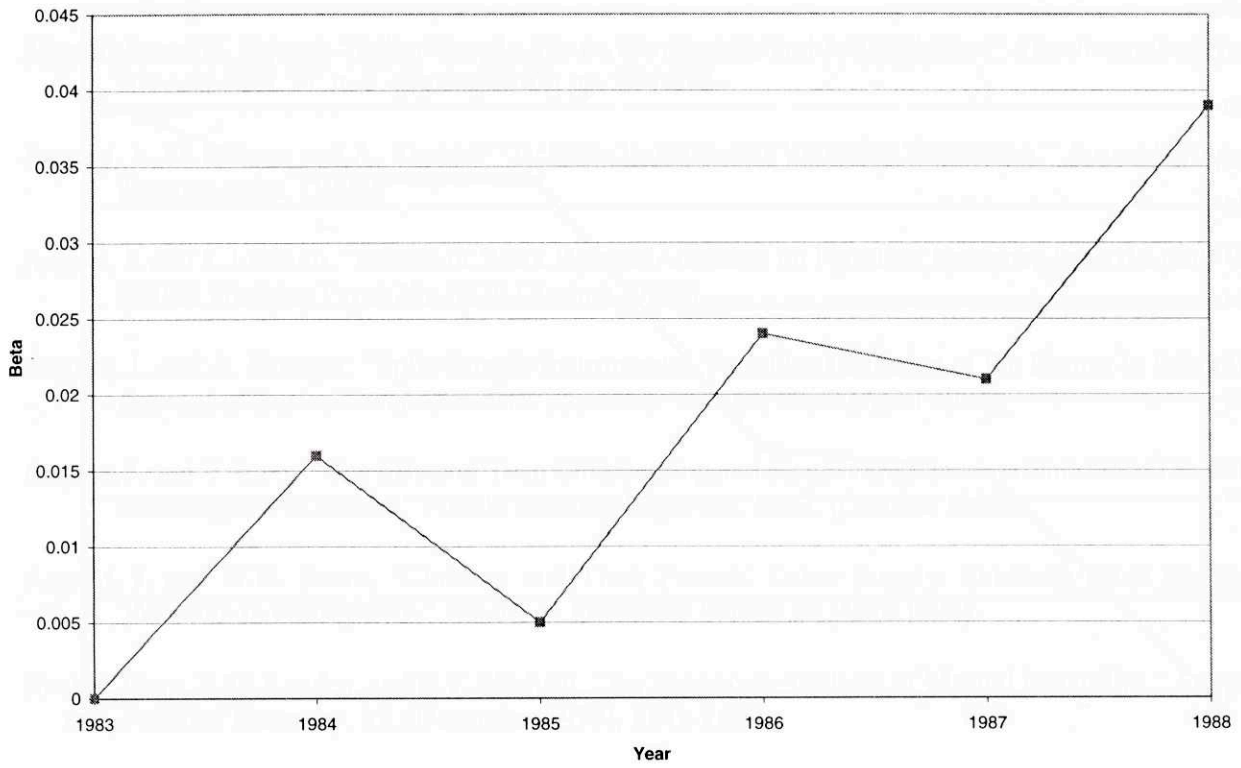


Figure 6. Coefficients on Interaction of Treatment*Quarter, Treatment*Year.
Hourly Transportation, Overtime Hours Worked.



**Figure 7. Coefficients on Interaction of Treatment*Year, Treatment*Quarter.
Salary vs. Hourly Public Sector Employees, Any Overtime Hours Worked.**

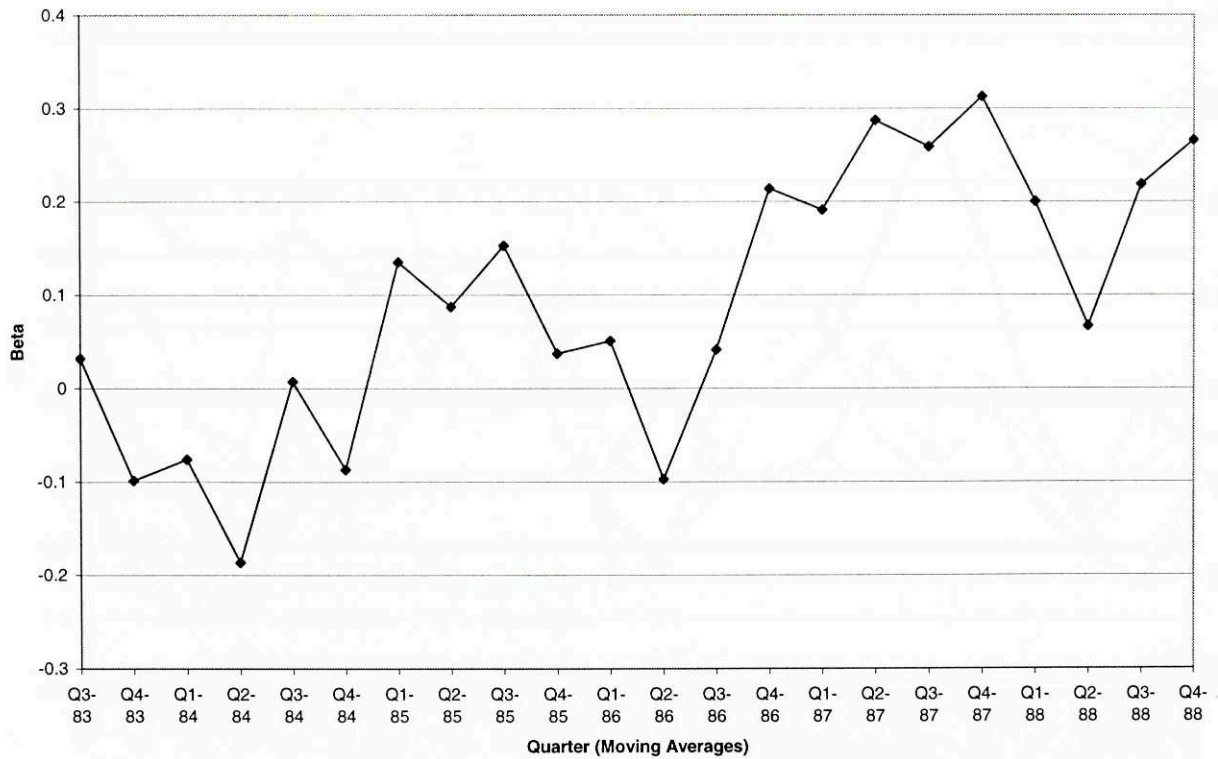
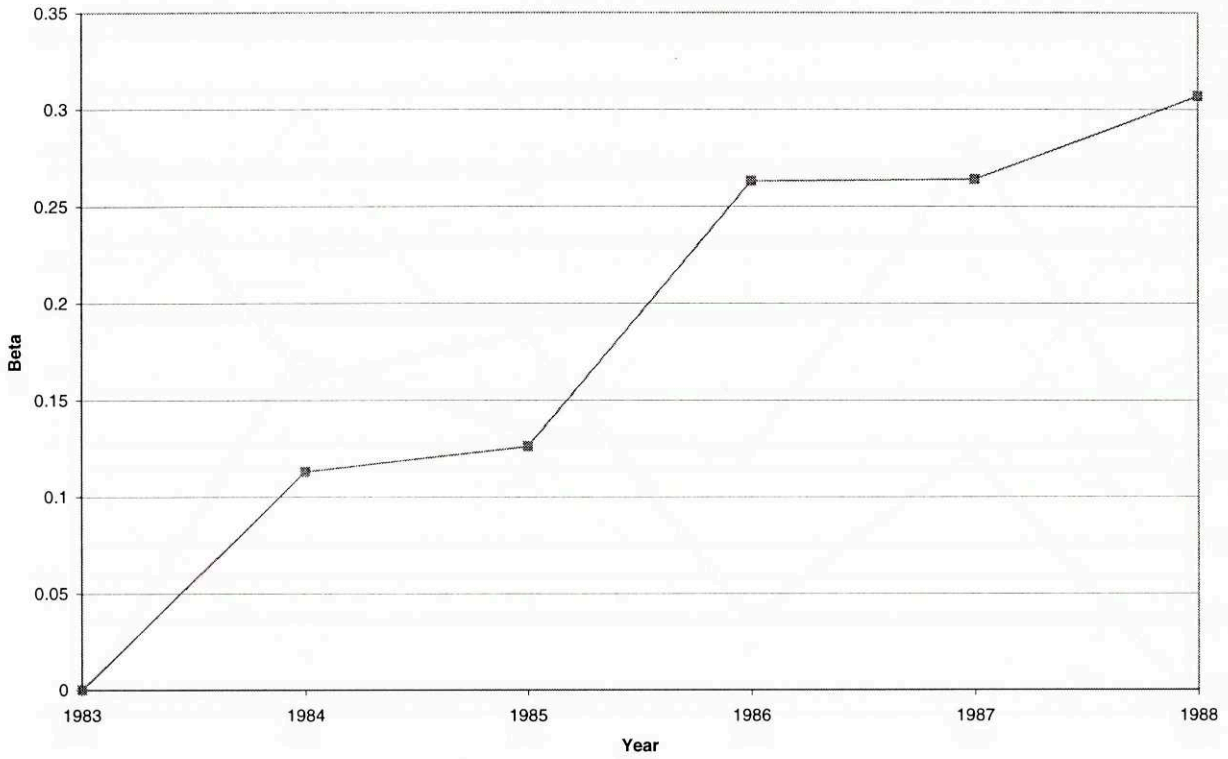


Figure 8. Coefficients on Interaction of Treatment*Quarter, Treatment *Year
Hourly State and Local Government Employees, Overtime Hours Worked

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