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# THE DEMAND FOR HOURS OF LABOR: DIRECT EVIDENCE FROM CALIFORNIA

Daniel S. Hamermesh and Stephen J. Trejo\*

*Abstract*—California's longstanding requirement that most women receive time-and-a-half pay for workhours beyond eight in one day was extended to men in 1980. Analyzing Current Population Survey data from 1973, 1985, and 1991, we find that this overtime penalty substantially reduced the amount of daily overtime worked by California men relative to men in other states. Comparisons that use women to control for California-specific shocks show even stronger effects. The estimates imply a price elasticity of demand for overtime hours of at least  $-0.5$ .

## I. Introduction

For many years, California required that most women receive an overtime premium of time-and-a-half for hours of work beyond eight in a given day. In 1980, this daily overtime penalty was extended to men as well. This situation provides a unique opportunity to estimate the impact of an exogenous increase in the relative price of overtime work. Using Current Population Survey (CPS) data from 1973, 1985, and 1991 that provide information on daily hours of work, we estimate the impact on work schedules of California extending its overtime law to cover men.

This analysis is important for at least two reasons. First, under conditions that are described below, statutory overtime penalties generate exogenous variation in the marginal cost of workhours that allow us to infer something about the elasticity of the demand for hours of labor. Indeed, our estimated effects of California's daily overtime law fit the profile of a labor-demand response. A large body of research attempts to estimate the parameters of various types of labor-demand functions (Hamermesh, 1993), but this literature has been criticized for failing to address adequately the problem of endogeneity in the price of labor (Topel, 1998). The legislatively mandated wage increase that we study here is much less vulnerable to such criticism.

Second, by analyzing California's daily overtime penalty, we can gain a better understanding of the labor market effects of overtime pay regulation. Restrictions on overtime work are often proposed as a policy tool for creating jobs and reducing unemployment, yet there is relatively little direct evidence on the efficacy of this instrument.<sup>1</sup> Because of data limitations and the absence of suitable policy variation, most studies attempt to infer the effects of hours

regulations from estimated demand functions for employment and hours, rather than by comparing outcomes before and after important policy changes.<sup>2</sup> We are in the fortunate position, however, of being able to track shifts in the work schedules of California men as they first became subject to that state's overtime law. Moreover, virtually all previous research on overtime pay regulation has focused on weekly hours standards, whereas the California setting allows us to study the impact of a daily overtime penalty.<sup>3</sup>

The study proceeds as follows. Section II describes relevant features of California's overtime law, and Section III discusses the implications of economic models of overtime pay regulation. Section IV describes the data that we analyze, Section V lays out our empirical strategy for identifying the impact of California's daily overtime penalty, and Section VI reports the basic results. In Section VII, we present estimates from alternative specifications that control in successively greater detail for observable variables. Section VIII discusses implications of our empirical findings, and Section IX concludes with a brief summary.

## II. California's Daily Overtime Law<sup>4</sup>

The overtime pay provisions of the federal Fair Labor Standards Act require that covered workers be paid time-and-a-half for hours of work beyond forty in a given week. California has been one of the few U.S. states to impose any additional restrictions on overtime pay.<sup>5</sup> Under California law, covered workers generally were entitled to receive time-and-a-half for hours worked beyond eight in a given day, even when weekly hours did not exceed forty. Amid considerable controversy, this requirement was recently repealed, so that, as of January 1, 1998, most California workers are covered only by the federal forty-hour weekly overtime standard.

California's daily overtime penalty was instituted well before federal overtime regulation began in 1938, but for a

<sup>2</sup> See, for example, Hart and Wilson (1988) and König and Pohlmeier (1989).

<sup>3</sup> MaCurdy et al. (1997) also analyze California's daily overtime law, but their approach differs in important ways from ours. For example, they rely on cross-sectional comparisons between California workers and other workers, whereas we examine how the work schedules of California men responded to changes in overtime coverage.

<sup>4</sup> Much of the information in this section comes from California Industrial Welfare Commission (1994) and from discussions with Karla Yates of that Commission and Daniel Cornet of the California Department of Industrial Relations. In no way does this imply, however, that these agencies or individuals necessarily endorse or agree with any of the statements made here.

<sup>5</sup> As of 1994, other states that imposed some type of a daily overtime penalty were Alaska, Colorado, Nevada, Oregon, and Wyoming. In most cases, however, these overtime laws cover only a few narrowly defined industries and lack the broad scope of California's law.

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<sup>1</sup> Ehrenberg and Schumann (1982), Hart (1987), and Owen (1989) discuss in detail the relevant issues and survey available research. Recent examples of work on this topic include Trejo (1991, 1998) and Hunt (1999).

long time it applied only to women. In the wake of the Civil Rights Act of 1964, however, California's daily overtime standard was successfully challenged on the grounds that enforcing such a standard for women but not men is discriminatory. The ultimate response was to broaden California's overtime pay requirement so that it covered men as well. For our purposes, it is important to distinguish between three separate coverage regimes of overtime pay regulation in California: before 1974, only women were covered; beginning in 1980, both men and women were covered; and, during the intervening period, as a consequence of legal battles, to a large extent neither men nor women were covered. Because of the ambiguity and confusion about coverage status that existed during the 1974–1979 period, particularly for women, we avoid these years in our empirical analysis.

We exploit two useful features of these coverage changes. First, sometime between 1973 and 1985—two years for which relevant data are available—California introduced a daily overtime pay requirement for men, whereas no such requirement existed at any time in most of the rest of the nation. Consequently, comparing male outcome changes in California over this period with those occurring elsewhere may tell us something about the impact of a daily overtime standard. Second, because California's overtime law applied to women in both 1973 and 1985, changes in outcomes for California women relative to other women do not represent the direct effects of overtime pay regulation but may instead reveal trends that are specific to California.

In California, state minimum wage and overtime pay standards are set through a series of fifteen “orders” issued by the Industrial Welfare Commission. Each order covers a different sector of California's workforce, with most of these sectors defined along industrial lines, but with a few defined according to occupation. In terms of required overtime pay, almost all of the orders specify time-and-a-half after eight hours of daily work; the orders for agricultural workers and live-in domestics are exceptions, in that they specify looser restrictions (for example, a ten-hour daily overtime standard for agricultural workers).<sup>6</sup> Certain groups, however, are exempt from state overtime pay regulation. Coverage exclusions for the self-employed, outside salespeople, and executive, administrative, and professional workers resemble the corresponding exclusions that appear in federal overtime law. Other groups exempt from California's daily overtime penalty are government workers, family workers, and workers involved in on-site activities such as construction, drilling, mining, milling, and logging.

<sup>6</sup> In order to facilitate alternative work schedules, changes made after 1985 gave certain workers the option to relax overtime pay requirements. For example, by a two-thirds vote of the appropriate employment unit, manufacturing workers could adopt a ten-hour daily overtime standard and health care workers could adopt a twelve-hour daily standard. Employers complained that the conditions required to implement these alternative work schedules were very difficult to satisfy, however, and relatively few work groups opted to adopt such schedules.

### III. Theoretical Background

Before turning to the empirical work, we briefly discuss what economic theory says should happen when California mandates a daily overtime penalty. Most analyses of overtime pay regulation have focused on labor demand, using models that distinguish between the number of workers hired and the hours that each worker puts in (Ehrenberg (1971), Hart (1987), Hamermesh (1993)). These models predict that California's overtime law will produce systematic effects on the distribution of daily hours of work. In particular, an overtime penalty after eight hours of daily work raises the marginal cost to employers of assigning overtime. Firms should respond by lowering the incidence of long workdays and shortening the workdays of workers who continue to put in more than eight hours per day. Moreover, the overtime penalty should increase the prevalence of eight-hour workdays, because some firms will find it optimal to avoid paying this penalty by limiting workdays to eight hours.<sup>7</sup> Indeed, the simplest labor-demand models imply that the overtime penalty will not affect workdays under eight hours, so that the rise in the incidence of eight-hour workdays should be exactly the same magnitude as the decline in the incidence of overtime workdays (Trejo, 1998).

The analysis in the preceding paragraph ignores the fact that California's daily overtime law merely supplements the federal requirement for overtime pay after forty hours of weekly work. For workers already receiving time-and-a-half for weekly overtime because of the federal Fair Labor Standards Act, California's daily overtime penalty may not have any additional impact on the marginal wage. As a result, employers' responses to the California law may be muted by the overlap between state and federal overtime pay regulation. We will return to this issue in section VIII when we discuss the implications of our empirical findings.

Labor supply behavior can also mute responses to overtime pay regulation. Often, analyses of hours policies stress only one side of the labor market, but hedonic models provide a simple way to equilibrate supply and demand in the market for work schedules. In these models, workhours are viewed as a job aspect over which both firms and workers have preferences, with compensating wage differentials arising in equilibrium for jobs with workdays of different lengths (Lewis (1969), Kinoshita (1987)). Under certain circumstances, straight-time hourly wages can adjust to mitigate or even completely neutralize the effects of a mandatory overtime penalty (Trejo, 1991). Consequently, if hourly wage rates are sufficiently flexible, California's overtime law does not necessarily restrict the ability of workers and firms to contract over packages of daily hours

<sup>7</sup> Put differently, the statutory overtime premium creates a kink in the cost function at eight hours of daily work, and this kink induces some firms that would otherwise assign overtime instead to adopt the corner solution of an eight-hour workday.

and earnings. Changes in the overtime premium or standard workday set by law could generate perfectly offsetting changes in straight-time hourly wages so as to leave daily hours and earnings unchanged.

Existing models of the effects of overtime pay regulation are thus consistent with a wide range of outcomes. California's daily overtime penalty could produce a substantial reduction in overtime work and a corresponding increase in the prevalence of eight-hour workdays, or it might have little or no effect on work schedules. This theoretical indeterminacy highlights the need for our empirical analysis.

#### IV. Data

We analyze data from the May 1973, May 1985, and May 1991 Current Population Survey (CPS). In addition to the demographic and labor force information routinely collected in the CPS (including data on weekly hours of work), these particular surveys (as well as the May surveys from 1974–1978 and in 1997) provide information about daily work schedules that is not otherwise available in the CPS. All three surveys report the number of days per week usually worked by each individual, and the 1985 and 1991 surveys also ask about usual daily hours of work. Because direct information on daily work hours is absent in 1973, we impute this variable the same way in all three years by taking the ratio of usual weekly hours to usual days per week.<sup>8</sup>

Our sample includes individuals aged sixteen and older who held jobs during the CPS survey week and for whom data are available on daily workhours. As discussed in section II, some workers are either exempt from California's overtime law or are subject to a less restrictive standard than the eight-hour workday. To the extent possible, we exclude such workers from the analysis so as to sharpen our estimates of the law's impact. In particular, we use the CPS codes for industry, occupation, and class of worker to exclude the following groups: self-employed workers, government workers, managers and professionals, domestic workers, agricultural workers, and persons employed in on-site activities such as forestry, fishing, construction, and mining. One group of exempt workers that we cannot identify in CPS data is outside salespeople, but this group is relatively small and therefore its inclusion is unlikely to matter much.

As described in greater detail below, our estimation strategy involves comparing California with states that have

<sup>8</sup> The questionnaire asks, "How many days a week does . . . usually work at this job?" and "How many hours per week does . . . usually work at this job?" Imputing daily hours using these questions does not appear to influence our findings. For 1985 and 1991, when both direct and imputed measures of daily work hours are available, the two measures are highly correlated and produce similar estimation results. Nor does it matter whether we round off our imputed measure of daily hours to the nearest integer. We report here the estimates obtained without rounding. In other words, if imputed daily hours are 8.23, we treat the worker as having 0.23 overtime hours per day and we categorize his workday as "longer than eight hours" rather than as "exactly eight hours." The results are similar, however, when we recalculate these variables after first rounding imputed daily hours to the nearest integer.

TABLE 1.—SAMPLE SIZES, MAY 1973, 1985, AND 1991 CPS

Year	Men		Women	
	California	Non-West	California	Non-West
1973	1,409	12,896	1,107	9,993
1985	1,087	12,031	987	11,701
1991	1,218	11,000	1,014	11,254

The sample includes individuals aged sixteen and above who held jobs during the survey week and for whom data are available on usual daily hours of work. Excluded are self-employed workers, government workers, and other workers who are generally exempt from overtime pay regulation (managers and professionals, domestic workers, agricultural workers, and persons employed in on-site activities such as forestry, fishing, construction, and mining).

not regulated daily overtime. For this reason, our "control group" excludes workers living in states (listed in footnote 5) that imposed any type of daily overtime pay requirement. As it turns out, these states are among those less-populated states not separately identified in the 1973 CPS data, but note that all are located in the West. Accordingly, in all years we define the control group to include only workers from the three non-Western regions of the United States (Northeast, North Central, and South). Our estimates therefore compare outcome changes in California with the corresponding changes that occurred outside the Western region.<sup>9</sup>

Table 1 displays the resulting sample sizes by year, sex, and region. In each year, we have samples of roughly 1,000 California women and somewhat more California men, and the corresponding cells for non-Western states contain 10,000 or more workers. The CPS sampling weights were used in all of the statistical calculations that we report here, but unweighted estimates are similar.

#### V. Estimation Approach

To estimate the effects of California extending its overtime law to male workers, our basic strategy is to track outcomes for California men before and after they were subject to a daily overtime penalty, and then compare these changes with the corresponding changes for men in non-Western states who were never subject to daily overtime pay regulation. This comparison generates the so-called "difference-in-difference" estimator (Card and Sullivan (1988):

$$\Delta_M^2 = (Y_{CA,M}^{85} - Y_{CA,M}^{73}) - (Y_{NW,M}^{85} - Y_{NW,M}^{73}), \quad (1)$$

where the subscript  $M$  denotes men and  $Y_{r,M}^t$  represents the outcome for men in region  $r$  (California or non-West) at time  $t$  (1973 or 1985). As described in section II, premium pay for daily overtime was mandatory for California men in 1985 but not in 1973, whereas in neither year did such a requirement apply to men in non-Western states.

The estimator in equation (1) assumes that, were it not for the expanded coverage of California's overtime law, outcome changes for men would have been similar across

<sup>9</sup> The results are similar, however, when Western states outside of California are included in the control group (which is not surprising because these states have relatively small populations and the daily overtime penalties that do exist are narrow in coverage).

regions. Because the daily overtime penalty applied to California women throughout the period we study, it is natural to use outcome changes for female workers to control for idiosyncratic shocks that may have affected the California labor market. The resulting “difference-in-difference” estimator is

$$\Delta^3 = \Delta_M^2 - \Delta_F^2, \quad (2)$$

where  $\Delta_F^2$  is the female analog to equation (1).<sup>10</sup> In equation (2), changes for California women (relative to other women) are presumed to reflect region-specific period effects, and the impact of extending California’s overtime law to men is estimated by the extent to which outcome changes for California men (relative to other men) differed from the relative changes experienced by California women. Other groups not directly affected by the extension of California’s daily overtime penalty might be used in computing equation (2) (for example, exempt male workers), but, for this purpose, female workers have the unique virtues of being numerous and easy to identify.

For ease of exposition, we will refer to estimates based on equation (1) as *double-difference* estimates. Similarly, we will refer to estimates based on equation (2) as *triple-difference* estimates. It is convenient to compute the double- and triple-difference estimators within a regression framework. For double differences, we pool the 1973 and 1985 CPS samples of male workers and estimate the following regression:

$$Y_i = \alpha + \gamma_1 T_i + \gamma_2 C_i + \gamma_3 T_i C_i + \epsilon_i, \quad (3)$$

where  $Y_i$  is the outcome observed for individual  $i$ ,  $T$  is an indicator variable marking observations from the 1985 survey,  $C$  is an indicator variable identifying people who live in California, and  $\epsilon$  is a random error term. The coefficient  $\gamma_3$  measures the double difference defined in equation (1). For triple differences, we add the data for women and estimate

$$Y_i = \alpha + \gamma_1 T_i + \gamma_2 C_i + \gamma_3 M_i + \gamma_4 T_i C_i + \gamma_5 T_i M_i + \gamma_6 C_i M_i + \gamma_7 T_i C_i M_i + \epsilon_i, \quad (4)$$

where  $M$  is an indicator variable identifying male workers. The coefficient  $\gamma_7$  represents the triple difference defined in equation (2).

As a check on our results, we also report analogous estimates for the period 1985–1991. Because this period witnessed no major changes in California’s overtime law—and the changes that did occur affected both men and women—our estimated effects for the 1973–1985 period are suspect if similar patterns emerge over 1985–1991. Finally, it is straightforward to add observable control variables to

<sup>10</sup> See Gruber (1994), Gruber and Poterba (1994), and Yelowitz (1995) for other recent applications of the “difference-in-difference” and “difference-in-difference-in-difference” estimators.

TABLE 2.—PERCENTAGE OF WORKERS WITH WORKDAYS LONGER THAN EIGHT HOURS

	Men		Women	
	California	Non-West	California	Non-West
<i>1973–1985 Change</i>				
(1) 1973	18.5	21.6	4.6	6.7
(2) 1985	16.0	23.6	8.5	9.2
(3) Row (2) – Row (1)	–2.5	2.0	3.9	2.5
(4) Calif. (3) – Non-West (3)	–4.5 (1.7)		1.4 (1.2)	
(5) Men (4) – Women (4)		–5.9 (2.1)		
<i>1985–1991 Change</i>				
(6) 1991	20.0	24.6	11.1	10.9
(7) Row (6) – Row (2)	4.0	1.0	2.6	1.7
(8) Calif. (7) – Non-West (7)	3.0 (1.8)		0.9 (1.4)	
(9) Men (8) – Women (8)		2.0 (2.3)		

Here and in the succeeding tables, standard errors are in parentheses, sampling weights are used in the calculations, and all numbers have been rounded independently.

the regression specifications in equation (3) and (4), and we do this in section VII below.<sup>11</sup>

## VI. Basic Results

This section presents our basic empirical results. The outcome analyzed in table 2 is the percentage of workers with workdays longer than eight hours. The top half of the table shows changes over the 1973–1985 period during which California’s daily overtime penalty was extended to cover men, and the bottom half shows changes over the 1985–1991 period when no important changes occurred in California’s overtime law. Standard errors of the estimated effects are displayed in parentheses.

The top half of table 2 indicates that the extension of California’s overtime law to male workers was accompanied by a substantial decline in the prevalence of daily overtime among California men as compared to men in non-Western states. In 1973, before California’s daily overtime pay requirement applied to men, 18.5% of California men and 21.6% of men in the non-West worked more than eight hours per day. By 1985, after California extended overtime coverage to men, the incidence of daily overtime among male workers had fallen to 16.0% in California at the same time that it had risen to 23.6% in the non-West. The double-difference estimate, shown in row 4 of the table, implies that the daily overtime penalty reduced the incidence of long workdays among California men by 4.5 percentage points. This drop represents a 24% decline when measured against the proportion of California men working daily overtime in 1973.<sup>12</sup>

<sup>11</sup> Throughout we report least-squares estimates, but probit estimates of overtime incidence and tobit estimates of overtime hours imply similar effects of California’s overtime law.

<sup>12</sup> Notice that even in 1973, before the daily overtime penalty became mandatory for them, California men worked long hours less frequently than did men in other states. If the sources of this initial difference are difficult to observe and control for, then cross-sectional comparisons of

Whereas for men the prevalence of daily overtime rose between 1973 and 1985 in the control states but not in California, a different pattern exists for women. Specifically, overtime incidence increased substantially (from 4.6% to 8.5%) for female workers in California but grew somewhat more modestly (from 6.7% to 9.2%) for women in non-Western states. Because California's overtime law applied to women in both 1973 and 1985, the triple-difference estimate, shown in row 5, assumes that this excess growth of 1.4 percentage points for California women measures the impact of California-specific shocks that had the same effect on the overtime hours of male workers. Accounting for these shocks yields an even larger estimate of the response to California's daily overtime pay requirement—namely, that extending overtime coverage to California men reduced their incidence of overtime workdays by 5.9 percentage points, or 32%.<sup>13</sup>

Row 3 of table 2 tells the story quite clearly. Of the four sex/region groups, three show an increased prevalence of long workdays between 1973 and 1985. The one group that experienced a decline in the incidence of daily overtime—California men—is also the only group directly affected by the expansion of California's overtime law that took place during this period. In other words, the work schedules of California men moved opposite the direction observed for other workers over this period. We think it reasonable to attribute this divergent trend for California men to their becoming subject to that state's daily overtime penalty.

Between 1973 and 1985, the California economy improved relative to the rest of the nation.<sup>14</sup> Overtime is procyclical, which may explain why the incidence of daily overtime rose more over this period for California women than for other women. Thus, overtime work by California

men fell in spite of business conditions favoring increased overtime. As a result, the estimated impact of California's daily hours standard is larger when we use the triple-difference approach that attempts to control for region-specific changes in business conditions than it is when we use the double-difference approach that does not control for such changes. The relative strength of California's economy over this period suggests that, in this particular case, the double-difference estimate will understate the true effect of the daily overtime penalty.

There is reason to suspect, however, that the triple-difference estimate may overstate the true effect of the daily overtime penalty. Suppose that overtime work by men and overtime work by women are substitute inputs. Because the daily overtime penalty already applied to California women, extending coverage to California men raised the marginal cost of male overtime relative to female overtime. California employers might respond by increasing female overtime to replace some of the reduction in male overtime. This substitution argument provides an alternative explanation for why the incidence of daily overtime rose more between 1973 and 1985 for California women than it did for women in other states. To the extent that the observed changes in female overtime are due to male-female hours substitution within California (rather than to the relative improvement of California's economy) the triple-difference estimate overstates the reduction in male overtime generated by the daily overtime penalty. Consequently, the discussion in this paragraph and the preceding paragraph indicates that the double- and triple-difference estimates may provide bounds on the true effect.

The bottom half of table 2 presents analogous calculations for the 1985–1991 period when no major changes were made to California's overtime law. Consider the possibility that the double- and triple-difference estimates for the 1973–1985 period reflect ongoing trends that are unique to California men, rather than the effects of that state's daily overtime penalty being extended to male workers. We might then expect to find similar estimates for 1985–1991, and such a finding would raise concerns that the earlier estimates could be spurious. The data in the bottom half of table 2 do not fit this scenario. The double and triple differences are positive for the 1985–1991 period, whereas these differences are negative for the 1973–1985 period. Although not statistically significant, the 1985–1991 differences suggest that the initially large impact that California's daily overtime penalty had on male workers may have been partially undone over time.<sup>15</sup> Nominal wage rigidities could explain this pattern, because, in that case, the wage adjustments predicted by

California men and other men in 1985—after California's law was extended to male workers—will not identify the effects of the daily overtime penalty. It is for this reason that we adopt the strategy of comparing the changes that California men and other men experienced between 1973 and 1985. As for why the incidence of daily overtime was relatively low for California men even before they were subject to the state overtime law, two explanations come to mind. First, in 1973, California's economy was depressed compared to the rest of the country. (See the relevant data on unemployment rates provided in footnote 14.) Second, to maintain internal equity, some California firms in 1973 may have offered male employees the same daily overtime premium that these firms were legally required to pay their female employees.

<sup>13</sup> In using changes for women to account for California-specific shocks, our specification assumes that such shocks produce the same percentage-point change in the overtime incidence of men and women. This assumption results in conservative estimates of the effects of California's daily overtime penalty. An alternative assumption is that the region-specific shocks produce the same proportional change in the overtime incidence of men and women. Triple-difference estimates using this alternative assumption imply even larger estimated effects of California's overtime law, because women work long hours much less frequently than men do, and, therefore, the rise in the overtime incidence of California women (relative to other women) between 1973 and 1985 is bigger when measured in proportional rather than in absolute terms.

<sup>14</sup> The overall U.S. unemployment rate climbed from 4.9% in May 1973, to 7.2% in May 1985, whereas the California unemployment rate rose only slightly over the same period, from 7.0% to 7.3%. Between 1985 and 1991, neither unemployment rate changed much, with 1991 rates of 7.7% for California and 6.9% for the nation as a whole.

<sup>15</sup> The double- and triple-differences for 1985–1991 are sizeable in economic terms, despite our inability to rule out at conventional levels of statistical significance that these effects are zero. This issue reappears throughout the study, because the precision of our estimates will allow us to detect only relatively large effects. Even for a state as populous as California, monthly CPS data on labor market outcomes contain considerable sampling error. Card (1992) encountered the same problem in his analysis of California's 1988 minimum-wage hike.

TABLE 3.—PERCENTAGE OF WORKERS WITH WORKDAYS OF EXACTLY EIGHT HOURS

	Men		Women	
	California	Non-West	California	Non-West
<i>1973–1985 Change</i>				
(1) 1973	62.7	61.2	63.8	54.6
(2) 1985	64.0	57.1	58.1	50.5
(3) Row (2) – Row (1)	1.3	-4.1	-5.7	-4.1
(4) Calif. (3) – Non-West (3)	5.5 (2.1)		-1.5 (2.3)	
(5) Men (4) – Women (4)		7.0 (3.1)		
<i>1985–1991 Change</i>				
(6) 1991	60.1	54.9	56.9	49.9
(7) Row (6) – Row (2)	-3.9	-2.2	-1.2	-0.6
(8) Calif. (7) – Non-West (7)	-1.6 (2.2)		-0.7 (2.4)	
(9) Men (8) – Women (8)		-1.0 (3.3)		

TABLE 4.—AVERAGE DAILY OVERTIME HOURS WORKED BY OVERTIME WORKERS

	Men		Women	
	California	Non-West	California	Non-West
<i>1973–1985 Change</i>				
(1) 1973	1.76	1.70	1.61	1.58
(2) 1985	1.84	2.02	2.05	1.88
(3) Row (2) – Row (1)	0.08	0.32	0.44	0.30
(4) Calif. (3) – Non-West (3)	-0.25 (0.15)		0.15 (0.37)	
(5) Men (4) – Women (4)		-0.40 (0.40)		
<i>1985–1991 Change</i>				
(6) 1991	1.75	1.94	1.98	1.70
(7) Row (6) – Row (2)	-0.09	-0.08	-0.07	-0.18
(8) Calif. (7) – Non-West (7)	-0.01 (0.14)		0.11 (0.37)	
(9) Men (8) – Women (8)		-0.12 (0.39)		

hedonic models of overtime pay regulation would occur gradually as inflation facilitates reductions in the real straight-time hourly wage.

Table 3 has the same format as table 2, but the outcome examined in table 3 is the percentage of workers who work exactly eight hours per day. Once again, the 1973–1985 change for California men differs markedly from the corresponding change for every other group. Whereas eight-hour workdays became somewhat more widespread among California men over this period, California women and workers of either sex in non-Western states experienced a substantial reduction in the incidence of eight-hour days. The double-difference estimate in row 4 of table 3 implies that California's daily overtime penalty increased the prevalence of eight-hour workdays among California men by 5.5 percentage points, and the triple-difference estimate in row 5 implies an even larger effect of 7.0 percentage points. The analogous estimates for 1985–1991 are relatively small and of the opposite sign as the 1973–1985 estimates, which provides some assurance that the estimates for the earlier period do not merely reflect spurious trends that are unique to California men.

The double- and triple-difference estimates compare the intertemporal changes experienced by different groups of workers, but the cross-section comparisons in table 3 tell a similar story. In 1973, before the daily overtime penalty was mandatory for California men, eight-hour workdays were about equally prevalent among male workers in California and non-Western states. After California's overtime law was extended to men, however, the 1985 and 1991 data show that eight-hour days became noticeably more common for California men than for other men. California women, by contrast, were subject to the daily overtime penalty in all three years, and in all three years the incidence of eight-hour workdays is much higher for California women than for other women.

California's overtime law thus appears to have induced greater bunching at eight-hour workdays, just as labor-

demand theory predicts. Also in line with the theory is the fact that the double and triple differences for 1973–1985 reported in table 3 imply effects that are opposite in sign and roughly similar in magnitude to the effects on the incidence of daily overtime reported in table 2. Taken together, the results in table 2 and 3 indicate that California's daily overtime penalty caused some long workdays to be shortened to eight hours, without much impact on workdays of less than eight hours.

In table 4, the sample is limited to those who work more than eight hours per day, and the outcome studied is the average number of daily overtime hours worked by these overtime workers. In 1973, men working overtime averaged about an hour and three-quarters of overtime per day, regardless of whether they lived in California or elsewhere. By 1985, however, the conditional mean of male overtime hours was distinctly lower in California than it was elsewhere. The resulting double-difference estimate implies that California's overtime law reduced by one-quarter of an hour (14%) the amount of daily overtime worked by men who continued to put in overtime after they became subject to the law. This estimate just barely achieves statistical significance at the 10% level. Among female overtime workers, average daily overtime hours increased more in California than elsewhere between 1973 and 1985, and, as a result, the triple-difference estimate is larger (in absolute value) than the double-difference estimate. The triple difference is estimated imprecisely, however, because our sample includes relatively few California women who work overtime. Finally, the double and triple differences for 1985–1991 are small and swamped by their standard errors.

The theory of labor demand suggests two avenues through which an overtime penalty may reduce overtime hours. First, to the extent that expanded use of other inputs can replace overtime hours and produce the same output at only slightly higher cost, firms will take advantage of these substitution possibilities. Second, when good substitutes for overtime hours are not available, marginal costs rise sharply, inducing



firms to scale back production. In the first case, firms' costs and profits need not be greatly affected by overtime pay regulation, whereas, in the second case, firms will likely suffer declines in output and profits. Ultimately, the impact that California's overtime law had on businesses in the state depends on the relative importance of substitution effects versus scale effects in generating the large reduction in daily overtime that the law appears to have caused.

Increasing the number of days worked per week is one obvious way to compensate for shorter workdays. To investigate this possibility, we calculated double- and triple-difference estimates of the impact of California's overtime law on the number of days that employees usually work each week. These estimates (not reported here) give no indication that California men worked more days per week after they became subject to the daily overtime penalty. In a search for inputs that are close substitutes for daily hours, workdays would be high on the list of candidates. Consequently, the failure to find an effect on workdays may indicate that employers cannot easily avoid daily overtime by substituting other inputs. But there is little variation across years in the average number of days worked per week, which suggests that this input is not very sensitive to economic conditions and perhaps not a promising candidate for substitution, after all. (See also Hamermesh (1996, Chapter 5).)

In addition, we looked for evidence that California's daily overtime law caused firms to expand employment as a substitute for assigning long workdays. Double-difference estimates reveal that the employment rate of California men increased relative to the employment rate of men in non-Western states over the 1973–1985 period. California women experienced very similar gains in their relative employment rate, however, so triple-difference estimates show no impact on employment. Consequently, these data do not provide compelling evidence that the daily overtime penalty raised the employment rate of California men beyond what would have been expected from business-cycle movements.

## VII. Results with Control Variables

We next present double- and triple-difference estimates that control for observable variables available in the CPS. By adding controls, we hope to net out the influence of factors other than the daily overtime penalty that may have altered the work schedules of California men over the relevant period. For double differences (which include only men in the sample), equation (3) is extended as follows:

$$Y_i = \alpha + X_i\beta_1 + X_iT_i\beta_2 + \gamma_1T_i + \gamma_2C_i + \gamma_3T_iC_i + \epsilon_i, \quad (5)$$

where  $X$  is a vector of control variables. Notice that the coefficients on these control variables are allowed to differ across survey years. For triple differences, which add

women to the sample, equation (4) is changed to

$$Y_i = \alpha + X_i\beta_1 + X_iT_i\beta_2 + X_iM_i\beta_3 + X_iT_iM_i\beta_4 + \gamma_1T_i + \gamma_2C_i + \gamma_3M_i + \gamma_4T_iC_i + \gamma_5T_iM_i + \gamma_6C_iM_i + \gamma_7T_iC_iM_i + \epsilon_i. \quad (6)$$

Here, the coefficients on the control variables can vary by both survey year and sex.

We employ two different specifications of the control vector  $X$ . The first includes the following demographic characteristics of each worker: age, age squared, completed years of schooling, marital status (an indicator variable identifying those who are married with spouse present), and race/ethnicity (indicators identifying Hispanics, non-Hispanic blacks, and non-Hispanics whose race is neither white nor black).<sup>16</sup> In the second specification, we also include indicators that classify workers into ten industry categories and six occupation categories.<sup>17</sup>

Table 5 reports double- and triple-difference estimates from alternate specifications that successively add control variables. For comparison purposes, the columns labeled (1) reproduce the estimates from tables 2 through 4 that do not control for demographic characteristics (other than region of residence and sex) or industry and occupation. Specification (2) adds the controls for demographic characteristics, and specification (3) includes controls for both demographic characteristics and major industry and occupation categories. The estimates for the 1973–1985 period measure the impact of extending California's overtime law to men, and adding the control variables tends to shrink these estimates somewhat, particularly for the double differences. The triple differences are much more stable across specifications than are the double differences, which may indicate that the triple-difference approach does a good job of accounting for California-specific shocks that are correlated with changes in the demographic, industrial, and occupational composition of the work force. In any case, the overall pattern of the results reported in the previous section does not change dramatically when we add detailed controls for observable characteristics.

<sup>16</sup> We do not control for union membership, because this information is collected for only a quarter of the observations in the 1985 and 1991 CPS data (so including a union indicator in the regressions would drastically reduce our sample sizes). This omission is unlikely to affect our results, however, because rates of unionization and the decline in these rates over time were very similar in California and the control states. Between 1973 and 1985, for example, unionization rates for the male workers in our samples fell from 37.8% to 23.3% in California and from 38.0% to 23.5% in the other regions.

<sup>17</sup> The industry categories are durable goods manufacturing; nondurable goods manufacturing; transportation, communication, and other public utilities; wholesale trade; retail trade; finance, insurance, and real estate; business and repair services; personal services; entertainment and recreation services; and professional and related services. The occupation categories are sales workers; clerical workers; service workers; crafts workers; operators, including transportation workers; and laborers. Recall that workers from certain industries (such as agriculture and construction) and occupations (such as managers and professionals) have already been excluded from the sample because these sectors are exempt from the overtime pay regulation.



TABLE 5.—IMPACT OF CALIFORNIA'S OVERTIME LAW ON DAILY WORK SCHEDULES, DOUBLE AND TRIPLE DIFFERENCES, WITH SUCCESSIVELY MORE-DETAILED CONTROLS

Dependent Variable/ Time Period	Double Differences			Triple Differences		
	(1)	(2)	(3)	(1)	(2)	(3)
Percent with work-days >8 Hours:						
1973-1985 change	-4.5 (1.7)	-3.3 (1.7)	-2.9 (1.7)	-5.9 (2.1)	-4.8 (2.1)	-4.5 (2.1)
1985-1991 change	3.0 (1.8)	4.9 (1.9)	4.3 (1.9)	2.0 (2.3)	4.8 (2.4)	3.9 (2.4)
Percent with work-days = 8 hours:						
1973-1985 change	5.5 (2.1)	4.4 (2.2)	2.2 (2.1)	7.0 (3.1)	7.2 (3.2)	7.4 (3.0)
1985-1991 change	-1.6 (2.2)	-2.1 (2.3)	-1.1 (2.3)	-1.0 (3.3)	-1.5 (3.4)	-0.1 (3.3)
Average daily OT hours of OT workers:						
1973-1985 change	-.25 (.15)	-.23 (.16)	-.13 (.15)	-.40 (.40)	-.33 (.43)	-.24 (.42)
1985-1991 change	-.01 (.14)	.03 (.15)	-.05 (.15)	-.12 (.39)	-.07 (.43)	-.24 (.42)
Control Variables:						
Demographic characteristics	No	Yes	Yes	No	Yes	Yes
Major industry and occupation	No	No	Yes	No	No	Yes

Here and in table 7 the demographic characteristics controlled for in specifications (2) and (3) are age, education, marital status, and race/ethnicity. The industry and occupation controls used in specification (3) identify ten industry categories and six occupation categories. For the double-difference estimates, the effects of the control variables are allowed to vary by survey year. For the triple-difference estimates, the effects of the control variables are allowed to vary by survey year and sex.

VIII. Implications

Our estimates of the impact of California's daily overtime penalty are consistent with labor-demand models of overtime pay regulation. For illustrative purposes, we can compute rough measures of the price elasticity of demand for daily overtime hours implied by these estimates. Start with the identity

$$E(OT) = \Pr(OT > 0)E(OT|OT > 0), \tag{7}$$

where *OT* represents daily overtime hours. Overtime hours per worker is the product of overtime incidence and the average amount of overtime worked by overtime workers. Note that the average *E(OT)* is taken over all workers, including those who work zero hours of overtime. To a first-order approximation, the percentage change in the average overtime hours of California men induced by that state's overtime law is

$$\% \Delta E(OT) = \% \Delta \Pr(OT > 0) + \% \Delta E(OT|OT > 0). \tag{8}$$

The 1973-1985 double and triple differences in table 5 provide estimates of the components of equation (8). For example, consider the double-difference estimates that do not control for demographic characteristics or industry/occupation. According to these estimates, extension of the daily overtime penalty to California men reduced their incidence of long workdays by 4.5 percentage points and

lowered their conditional overtime hours by one-quarter of an hour. When compared to the initial levels observed for California men in 1973, the estimated effects represent a 24.3% decline in overtime incidence and a 14.2% fall in conditional overtime hours. Summing these percentage changes yields a 38.5% reduction in average daily overtime hours, which is the numerator of the labor-demand elasticity that we seek. As for the denominator, assume for the moment that California's overtime law produced a 50% increase in the price of male overtime hours. Taking the ratio of these numbers yields an elasticity of demand for daily overtime of -0.77.

Table 6 shows what happens when we repeat this calculation for each of the various specifications in table 5. All of the elasticities imply a sizeable demand response, although the estimated magnitude of this response shrinks somewhat as more-detailed controls for observables are included in the regressions. The elasticities range from -0.46 to -0.77 for the double-difference estimates and from -0.76 to -1.09 for the triple-difference estimates.

There are reasons to be skeptical, however, of these estimates of the price elasticity of demand for daily overtime hours. For one thing, although the daily overtime premium discourages firms from assigning overtime, it simultaneously makes overtime hours more attractive to workers. To the extent that the labor-market changes generated by California's overtime law reflect both demand and supply responses, the observed reduction in overtime will be smaller than if offsetting supply effects were absent. Moreover, as noted in section II, standard characterizations of labor-market equilibrium imply that compensating differentials in straight-time hourly wages can arise to mitigate the effects of a mandatory overtime penalty.

Even more problematic is our assumption that California's overtime law produced a 50% rise in the price of male overtime hours. For this to occur, it would have to be the case that no California men received an overtime premium before the law was imposed, and that afterward compliance was perfect. Because both of these conditions fail, the actual increase in the average overtime wage was less than 50%, and therefore the preceding calculations understate the implied demand elasticity (in absolute value).

What makes this issue particularly important is the considerable overlap between state and federal overtime pay regulation. In fact, the federal requirement for time-and-a-half after forty hours of weekly work seems to render

TABLE 6.—ESTIMATES OF THE PRICE ELASTICITY OF DEMAND FOR DAILY OVERTIME HOURS

	(1)	(2)	(3)
Double-difference estimates	-0.77 (0.25)	-0.62 (0.26)	-0.46 (0.25)
Triple-difference estimates	-1.09 (0.51)	-0.89 (0.54)	-0.76 (0.53)
Control Variables:			
Demographic characteristics	No	Yes	Yes
Major industry and occupation	No	No	Yes

California's daily overtime standard redundant for most workers.<sup>18</sup> By this argument, the California law raises the marginal wage only for workers whose schedules satisfy the following two conditions: daily hours exceed eight *and* weekly hours are no greater than forty. The CPS data indicate that relatively few people work this combination of long daily hours but short weekly hours. In 1973, for example, only about 1% of male workers in California, or 6% of men with workdays longer than eight hours, were apparently in a position to gain overtime protection from state law that they did not already receive from federal law.<sup>19</sup>

Given the paucity of work schedules with long daily but not weekly hours, the effects that we attribute to California's overtime law must be driven by the responses of workers with workweeks exceeding forty hours. Table 7 provides direct confirmation of this point. It presents estimated effects of the California law on weekly work schedules that are analogous to the estimated effects on daily work schedules reported in table 5.<sup>20</sup> The estimates in the two tables are similar. In other words, the impact of California's daily overtime penalty shows up even when overtime is defined on the weekly basis specified by the federal Fair Labor Standards Act, and the estimated effects of the California law on both daily and weekly work schedules seem to fit the predictions of labor-demand theory.

The results in table 7 raise a puzzle: Why should California's daily overtime penalty affect employees who work more than forty hours per week and therefore presumably already receive overtime pay because of the Fair Labor Standards Act? We offer two possible explanations. First, when hours of work vary from day to day within a week, the California law can increase required overtime payments even to workers whose long workweeks make them subject to the federal overtime premium. For example, consider someone who works three ten-hour days and two six-hour days each week. According to the federal forty-hour weekly standard, this worker is due two hours of overtime pay, whereas under California's eight-hour daily standard the worker should receive six hours of overtime pay. Unfortunately, we do not know of any data that allow us to measure the intraweek variability of daily workhours.

A second possibility is that California's daily overtime law increased compliance with the overtime pay provisions

<sup>18</sup> Indeed, for employees working five days per week and an unchanging number of hours each day, overtime hours are the same whether defined according to an eight-hour daily standard or a forty-hour weekly standard. Of the California men in our 1973 sample who worked more than eight hours per day (which is the group directly affected by the expansion of state overtime law that occurred in 1980), 51% worked exactly five days per week.

<sup>19</sup> The propensity for California men to work long workdays without exceeding a forty-hour workweek grew from 1% in 1973 to 3% in 1985 and 1991, and, in all three years, this propensity is similar for men in non-Western states as for men in California. The propensity is slightly higher for women than it is for men, but the important point is that such work schedules are uncommon for all groups in all years.

<sup>20</sup> The CPS information on daily schedules pertains to "usual" daily hours of work. So, in table 7, we employ the corresponding data on usual weekly hours of work.

TABLE 7.—IMPACT OF CALIFORNIA'S OVERTIME LAW ON WEEKLY WORK SCHEDULES, DOUBLE AND TRIPLE DIFFERENCES, WITH SUCCESSIVELY MORE-DETAILED CONTROLS

Dependent Variable/ Time Period	Double Differences			Triple Differences		
	(1)	(2)	(3)	(1)	(2)	(3)
Percent with work- weeks >40 hours:						
1973-1985 change	-3.3 (1.7)	-2.7 (1.8)	-2.3 (1.8)	-6.2 (2.0)	-4.9 (2.1)	-4.4 (2.1)
1985-1991 change	2.5 (1.7)	3.9 (1.9)	3.4 (1.9)	1.5 (2.1)	3.9 (2.3)	3.2 (2.3)
Percent with work- weeks = 40 hours:						
1973-1985 change	6.1 (2.1)	4.7 (2.1)	2.5 (2.1)	5.5 (3.1)	4.9 (3.1)	5.0 (3.0)
1985-1991 change	-1.8 (2.2)	-1.8 (2.3)	-0.9 (2.2)	1.0 (3.2)	1.5 (3.3)	2.7 (3.2)
Average weekly OT hours of OT workers:						
1973-1985 change	-2.40 (0.94)	-2.18 (0.88)	-1.61 (0.79)	-2.92 (2.35)	-3.18 (2.01)	-3.00 (2.03)
1985-1991 change	1.73 (0.75)	1.67 (0.77)	1.13 (0.77)	1.48 (1.98)	1.25 (2.20)	0.55 (2.17)
Control Variables:						
Demographic characteristics	No	Yes	Yes	No	Yes	Yes
Major industry and occupation	No	No	Yes	No	No	Yes

of the Fair Labor Standards Act.<sup>21</sup> When the daily overtime penalty was first extended to California men, the state mounted a publicity campaign to inform employers of the change, and additional inspectors were hired to search for violations among newly covered workers. In California, then, overtime laws were policed by both state and federal regulators. A related point is that California's eight-hour workday may be more visible and easier for firms to monitor than the federal forty-hour workweek. Typically, a supervisor can observe with little effort whether the workers on his shift put in daily overtime, whereas detecting weekly overtime may require coordination between two or more supervisors (for example, a weekday supervisor and a weekend supervisor).

Setting aside the difficulties just discussed, the elasticities reported in table 6 measure the price responsiveness of the demand for daily overtime hours. If we accept the evidence that increases in the overtime penalty induce little substitution toward additional days per week, then these elasticities also indicate how the demand for weekly hours responds to a change in the marginal wage. As the literature on substitution between workers and hours makes clear, however, demand elasticities for employment and hours will generally differ (Hamermesh (1993, chapter 3)). Because our estimates provide no information about the price elasticity of demand for employment, they cannot be used to infer the

<sup>21</sup> Compliance with federal overtime law is far from perfect, with one estimate suggesting that it is as low as 80% (Ehrenberg and Schumann (1982)).

demand elasticity for “total” hours of work (that is, the product of employment and hours per worker). Instead, our estimates pertain only to the daily and (possibly) weekly hours dimensions of labor demand, but our evidence on these dimensions of labor demand is unique in that it originates from an exogenous shift in the marginal wage.

### IX. Conclusion

We find strong evidence that the distribution of daily workhours responded to the California overtime law exactly as the theory of labor demand predicts. After California’s daily overtime penalty was extended to men, overtime hours and the incidence of overtime workdays declined substantially for male workers in California relative to men in other states, and the prevalence of eight-hour workdays rose by roughly the same amount that overtime incidence fell. The implied price elasticity of demand for daily overtime hours is at least  $-0.5$ . Unlike most prior studies of labor demand, our estimates represent the response to an exogenous price change. Regarding substitution possibilities, the data give no indication that, after becoming subject to the daily overtime penalty, California men worked more days per week to compensate for their shorter workdays. These results persist when we use analogous comparisons for women to account for idiosyncratic shocks that may have affected the California labor market.

Surprisingly, California’s daily overtime law altered in important ways the work schedules of employees with workweeks exceeding forty hours, despite the fact that such workers were already entitled to overtime pay under the federal Fair Labor Standards Act. To the extent that workhours vary from day to day within a week, however, a daily overtime penalty can increase required overtime payments even to workers whose long workweeks make them subject to a weekly overtime penalty. In addition, California’s efforts to publicize and enforce its overtime law may have improved compliance with the federal overtime law.

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