How Working Time Reduction Affects Employment and Wages

– Preliminary version –

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Abstract

December 1, 1996 the standard workweek in Portugal was reduced from 44 hours to 40 hours. We study how this mandatory reduction affected employment and wages. We find that the working hours' reduction increased hourly wage of workers involved, keeping monthly earnings approximately constant. The working hours reduction did not lead to job loss of workers directly affected but may have caused negative employment effects for workers working less than 40 hours per week.

Keywords: Workweek reduction, natural experiment, employment dynamics

JEL codes: J22, J63, J81

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1 Introduction

In the past decades working hours have been reduced in many countries, often with the purpose of worksharing, assuming that working time reduction has a positive effect on employment. There are a few studies that analyze the effects of working hours reduction. Crépon and Kramarz (2002) study the 1982 reduction of the workweek in France from 40 to 39 hours finding that it didn't create jobs but increased unemployment. Hunt (1999) finds similar results for gradual working time reduction in Germany. Investigating developments over the period 1984-94 she finds that working time reduction led to higher hourly wages and lower employment. Andrews et al. (2005) also find no evidence of positive employment effects of work-sharing in Germany. Skuterud (2007) presents an analysis of the Canadian province of Quebec where the standard workweek was gradually reduced from 44 to 40 hours concluding that despite a 20% reduction among full-time workers in weekly hours worked beyond 40, the policy failed to raise employment. Varejão (2006) investigates the effects of the 1996 working time reduction in Portugal finding that the policy originated a negative scale effect, a substitution of overtime for normal hours and wage restraint. He finds that the firms' reaction to the policy is affected by the presence of minimum wage earners and the use of overtime hours.

This paper looks at the impact of a workweek reduction from 44 to 40 hours that was introduced in 1996 in Portugal. Our study is distinct from Varejão (2006) for three reasons. First, we look at short-term and long-term effects. Second, we use a longer time period before the policy change to identify the effects of the working hours reduction. Third, we investigated the presence of firm effects.

2 Portuguese labor market

2.1 The reduction of the workweek

In Portugal, mid 1990s the unemployment rate was about 7%, almost 3%-point below the average of the European Union. In December 1996, a new law was introduced with the aim of reducing the standard workweek from 44 to 40 hours. The law was not passed as a tool to create jobs and reduce unemployment but it was introduced because the newly-elected government wanted to speed up the convergence of Portuguese traditionally long hours of work to the European average (Varejão, 2006).

The new law implied that by 1st December 1997 all jobs should meet the new standard, 40 hours per week, in the following way: First, by 1st December 1996, all workweeks above 42 hours should be reduced by 2 hours; workweeks below 42 hours but above 40 hours should meet the new standard of 40 hours per week. Second, by 1st December 1997, all workweeks still above 40 hours should meet the standard.

In order to compensate firms for the reduction in working hours the new law introduced some flexibility. The reduction was implemented taking into account that the normal workweek could be defined on a 4 months average. The maximum number of hours could be increased 2 hours per day given that it did not exceed 10 hours per day and 50 hours per week.

2.2 Data

We use a longitudinal dataset matching firms and workers in the Portuguese economy, called Quadros de Pessoal (QP – "Lists of Personnel"). The data are gathered annually by the Ministry of Employment, based on an inquiry that every establishment with wage-earners is legally obliged to fill in. Reported data cover all the personnel working for the establishment in a reference week in October (see Cardoso (2006) for details). Every year QP gathers information for more than 250 thousand firms and 2.5 million workers. We use information for the time period 1994-1998. The worker data include gender, age, schooling, monthly earnings and duration of work. Our sample contains workers that are wage earners, regardless of being full-time or part-time workers. We dropped individuals with missing information on normal hours of work and monthly earnings.

2.3 Definitions of variables

Normal hours are defined as the hours worked during a normal week. This measure is not affected neither by irregular or unusual overtime, work for premium pay, regular pay, or no pay at all, nor by unusual absence or rest.[1] Overtime hours in a week is the time worked in addition to the hours worked during normal periods of work, and having a higher hourly wage than normal rates.

Monthly earnings are the monthly payments associated with the normal duration of work. We use the national consumer price index to transform nominal earnings into real ones. The hourly wage is computed as the ratio of monthly earnings and normal hours of work.

The worker is considered to lose his job in 2 situations. First, if he comes in our sample twice in the same year, in which case we consider he changed job. Second, if he disappears from our sample for at least one year.

3 Empirical analysis

Table 1 shows that in the period October 1994-1996 on average 23% of the Portuguese workers had a normal workweek between 40 and 42 hours, while 27% had a workweek of more than 42 hours. So, half of the Portuguese workers was affected by the reduction in working hours. By October 1997 the percentage of workers working more than 40 hours decreased to 38 and by October 1998 only 9% of the workers worked more than 40 hours.

We analyze the impact of the reduction of the workweek assuming that the policy change resembles a natural experiment. The treatment group consists of all individuals who worked more than 40 hours in October 1996; the control group consists of workers who worked 35-40 hours in October 1996.[2]

[1]The duration of work is neither self-reported as in Hunt (1999) nor refers to hours worked during a reference week as in Crépon, B. and F. Kramarz (2002). QP collects information on both normal and overtime hours done in the reference month; a posteriori we transform them into weekly hours.

[2]We ignore the workers on part-time jobs (less than 35 hours) because they may have a different

To analyze the effects of the working week reduction we estimate the following equations:

$$\Delta y_{it} = \beta x_{it} + \delta_1 h_{4042,i}.d_{96,it} + \delta_2 h_{42p,i}.d_{96,it} + \delta_3 h_{4042,i}.d_{97,it} + \delta_4 h_{42p,i}.d_{97,it} + \epsilon_{it} \quad (1)$$

where Δy, the dependent variable, represents changes in normal hours, overtime hours, hourly wages, monthly wages and employment status for individual i in the period from October in year t to October in year $t+1$. Furthermore, x represents a vector of personal characteristics, β is a vector of parameters, the δ's are also parameters while ϵ is an error term.

Included in x are d_{96} and d_{97}, dummy variables indicating calendar years and h_{4042} and h_{42p} dummy variables representing working hours categories, 40-42 hours per week and more than 42 hours per week respectively. Both categories are defined on the basis of the situation in October 1996, just before the introduction of the working time reduction. Assuming that the workers working less than 40 hours per week were not affected, the general calendar time effects are represented by the calendar year dummies and assuming that the differential development of the affected workers is represented by the working hours categories, the interaction terms represent the treatment effects. Our main interest concerns the short-run treatment effects represented by δ_1 and δ_2, and the long-run effects represented by δ_3 and δ_4. The relevant parameter estimates are presented in the upper part of Table 2.

As expected normal hours go down substantially. Overtime hours increase in the first year, but in the second year they are approximately constant. Apparently, the initial reduction of normal working hours is partly compensated by an increase in overtime hours although this effect is small. Hourly wages for workers affected increase, leaving monthly earnings approximately constant. Somewhat surprisingly the affected workers in the category 40-42 hours have a lower probability to lose their job than non-affected workers. This may be explained by the flexibility that firms could use on this group of workers.

So far, we ignored firm information. However, it might be that the treatment

attachment to the labor market. To exploit the natural experiment character of the working time reduction we focus on workers that are close to the “threshold” of 40 hours per week.

effects are influenced by the firm share of workers that worked more than 40 hours per week. To investigate this possibility we add to equation (1) a number of interaction terms:[3]

$$\Delta y_{it} = \beta x_{it} + (\delta_1 + \omega_1.n)h_{4042,i}.d_{96,it} + (\delta_2 + \omega_2.n)h_{42p,i}.d_{96,it}$$

$$+(\delta_3 + \omega_3.n)h_{4042,i}.d_{97,it} + (\delta_4 + \omega_4.n)h_{42p,i}.d_{97,it} + \epsilon_{it} \quad (2)$$

where n represents the share of workers in the firm in worker i that worked more than 40 hours in October 1996. To the extent that the ω's differ from zero the composition of the workforce affects the treatment effect. As shown in the lower part of Table 2 ω_1 and ω_2 are often insignificantly different from zero indicating that in the short run the composition of the workforce is not very important. However, since the other ω-parameters often differ significantly from zero, in the long-run the treatment effect is influenced by the workforce composition.

Table 3 gives an idea of the size of the firm effects by presenting treatment effects calculated on the basis of the parameter estimates of the lower part of Table 2. From these calculations we draw two conclusions. First, the treatment effects are bigger – in absolute terms – for workers who worked more than 42 hours per week, with one exception, the employment effect. Workers in the category 40-42 hours are less likely to lose their job than workers working fewer or more hours. Our second conclusion concerns the firm effects. Most of the treatment effects do not depend on the share of workers working 40 hours or more. Apparently, the firm effects are significant but quantitatively not very important. The only exception concerns the long term effects on employment. Somewhat surprisingly, the employment effects are more favorable the higher the share of workers working more than 40 hours. Our interpretation of this phenomenon is that there are negative spillover effects affecting the employment of workers that worked less than 40 hours per week.

[3] And, we also added to the equation $n_i, n_i.d_{96,it}, n_i.d_{97,it}$, to make sure that the ω-parameters represent the treatment effects.

4 Conclusions

The reduction of working hours from 44 to 40 directly affected about half of all workers in Portugal since they were working more than 40 hours per week prior to the introduction of the new law in December 1996. Initially, the reduction of working hours was compensated by the use of overtime. Hourly wages of the affected workers increased, reducing their monthly wage only slightly. Workers in the category 40-42 hours were less likely to lose their job. The composition of the workforce in the firm seems to have influenced the employment of workers who worked less than 40 hours per week. P.M. We will investigate the employment effects in more detail taking in consideration job creation and job destruction into account.

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Table 1: **Proportion of workers in each hour category; normal working hours**

	October			Δ	Δ
	1994-1996	1997	1998	1994/6-97	1997-98
<35	11	8	11	-3	3
35-40	37	54	80	17	26
40-42	22	23	8	1	-15
>42	30	15	1	-15	-14
Total	100	100	100	0	0

Table 2: **Parameter estimates**

		Normal hours	Overtime hours	Hourly wage (%)	Monthly earnings (%)	Job loss (%)
a. Personal characteristics						
Short run effects						
h_{4042}	δ_1	-1.52 (35.8)**	0.06 (2.6)**	3.65 (13.5)**	-0.47 (1.6)	-4.94 (13.6)**
h_{42p}	δ_2	-3.58 (95.2)**	0.08 (4.8)**	8.26 (34.9)**	-0.57 (2.2)**	0.01 (0.0)
Long run effects						
h_{4042}	δ_3	-0.88 (18.2)**	0.05 (2.2)**	2.92 (11.4)**	0.49 (1.7)*	-5.73 (16.4)**
h_{42p}	δ_4	-2.39 (55.3)**	0.02 (1.4)	5.88 (25.9)**	0.05 (0.2)	-0.01 (0.3)
$\overline{R}^2$		0.085	0.0001	0.011	0.003	0.040
b. Personal and firm characteristics						
Short run effects						
h_{4042}	δ_1	-2.49 (20.3)**	0.02 (0.2)	6.04 (7.1)**	-1.37 (1.5)	-3.63 (3.4)**
$h_{4042}.n$	ω_1	-0.02 (0.1)	-0.01 (0.1)	-2.39 (2.1)**	-1.49 (1.2)	-3.34 (2.3)**
h_{42p}	δ_2	-4.67 (35.9)**	0.00 (0.1)	9.96 (13.2)**	-1.59 (1.9)*	0.32 (0.3)
$h_{42p}.n$	ω_2	-0.21 (1.3)	0.03 (0.4)	-1.33 (1.3)	-1.41 (1.3)	-1.97 (1.5)
Long run effects						
h_{4042}	δ_3	0.04 (0.3)	-0.11 (1.8)*	0.77 (1.1)	0.83 (1.0)	-1.27 (1.3)
$h_{4042}.n$	ω_3	-2.42 (12.7)**	0.21 (2.3)**	3.22 (3.3)**	-3.65 (3.2)**	-10.18 (7.3)**
h_{42p}	δ_4	-1.93 (14.2)**	-0.02 (0.5)	5.39 (8.1)**	0.65 (0.8)	5.24 (5.9)**
$h_{42p}.n$	ω_4	-1.73 (9.3)**	0.04 (0.6)	0.75 (0.8)	-4.02 (3.7)**	-11.09 (8.9)**
$\overline{R}^2$		0.089	0.0002	0.014	0.003	0.040
F-statistic		166.4**	2.1**	20.4**	9.1**	18.2**

Note: Ordinary least squares; first four columns based on 415,863 observations, the fifth column based on 536,997 observations; parameter estimates of control variables are not represented; control variables are dummy variables for working hours category (h_{4042}, h_{42p}), calendar year dummies (d_{96}, d_{97}), industry (10 categories), region (7 categories), education (8 categories), wage (5 categories)(not included in the wage and earnings regressions), size of firm (4 categories) and tenure. The estimates in the lower part of the table also contain firm' share of workers working more than 40 hours per week (n) and the interaction terms $n.d_{96}, n.d_{97}$. The population includes all full-time workers in the private sector working between 35 and 50 hours. absolute t-statistics based on robust standard errors in parentheses, The F-statistic concerns a comparison of the estimation results in the lower and the upper part of the table; a **/* indicates that the coefficient is different from zero at a 5%/10% level of significance.

Table 3: **Treatment effects**

Weekly working hours	40-42		>42	
% of workers affected	25	50	25	50
	(1)	(2)	(3)	(4)
Short run effects				
Normal hours	-2.5	-2.5	-4.7	-4.8
Overtime hours	0.0	0.0	0.0	0.0
Hourly wage (%)	5.4	4.8	9.6	9.3
Monthly earnings (%)	-1.7	-2.1	-1.9	-2.3
Job loss (%)	-4.5	-5.3	-0.2	-0.7
Long run effects				
Normal hours	-0.6	-1.2	-2.4	-2.8
Overtime hours	-0.1	-0.0	-0.0	0.0
Hourly wage (%)	1.6	2.4	5.6	5.8
Monthly earnings (%)	-0.1	-1.0	-0.4	-1.4
Job loss (%)	-3.8	-6.4	2.5	-0.3

Note: The % of workers affected concerns the workers that worked more than 40 hours per week in October 1996; the calculations are based on the parameter estimates of the lower part of Table 2.